



ILLUSTRATED ENCYCLOPEDIA OF

BIRDS



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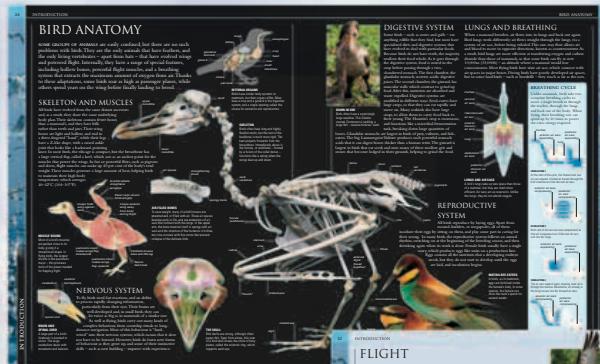


ABOUT THIS BOOK

THIS BOOK IS DIVIDED INTO THREE CHAPTERS. An overview of the physiology and behaviour of birds is given in the INTRODUCTION; the chapter on HABITATS looks at the distribution of birds throughout the world, both in terms of geography and types of habitat; and BIRD SPECIES, provides detailed information on orders, families, and individual species of bird.

INTRODUCTION

This opening chapter provides information on the physical characteristics of birds, focusing on the aspects of their physiology that differentiate birds from the rest of the animal kingdom. Bird behaviour is also examined, from different feeding preferences and methods to systems of communication, courtship rituals, and breeding and parenting. There is also coverage of migration behaviour and routes. Threats to birds and steps being undertaken to protect them through conservation efforts are also discussed in the closing pages of this chapter.



BIRD FLIGHT ▶

This key aspect of bird behaviour is examined in detail, including aerodynamics, different types and patterns of flight of a variety of bird species.



BIRD CONSERVATION ▶

The final part of this chapter examines how birds are adapting to conditions in the modern world. As well as looking at the threats, it also describes the positive steps that are being taken to conserve bird species.

◀ ANATOMY AND PHYSIOLOGY

These pages include detailed descriptions of the physical characteristics of birds and the ways in which these have evolved to serve the needs of different types of bird in a variety of environments.



◀ BIRD BEHAVIOUR

Covering topics such as social behaviour, courtship, nesting, breeding, and migration, this section addresses all aspects of how birds behave.



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BirdLife International provided the text and maps for the species profiles in this book. The species texts were written by the following contributors:

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Andy Symes and Richard Thomas Additional editorial support.

HABITATS

This chapter opens with an overview of the biogeographical realms in which birds are distributed throughout the world, and the ways in which different groups of birds have evolved in different regions over millions of years. An overview of the variety of environments – or biomes – in which bird life exists is followed by a detailed description of each main type of habitat, from polar regions to deserts and urban environments. These accounts include information about the bird species that are adapted to these conditions and their lifestyle, including diet, nesting, and migration.



a map indicates the main areas of the world in which the habitat exists

◀ HABITATS

Pages such as the ones shown here describe different habitats and a selection of the typical bird species that are found in that habitat.

BIRD SPECIES

This final chapter is devoted to a detailed look at over 1,200 bird species. It opens with an overview of the different ways in which birds are classified. The rest of the chapter is organized according to taxonomic order, with the non-passerine orders being covered first, followed by the passerines. Introductory sections describing the different bird orders and, in the passerine section, bird families are followed by profiles of individual species within that group. In most cases each species profile includes a photograph of the bird, a map showing where it is found, summary data detailing its size, migration status, and preferred habitat. For the most threatened species, information is also given on status according to the IUCN Red List. The chapter is interspersed with illustrated accounts of great bird-watching sites around the world.

SPECIES PROFILES ▶

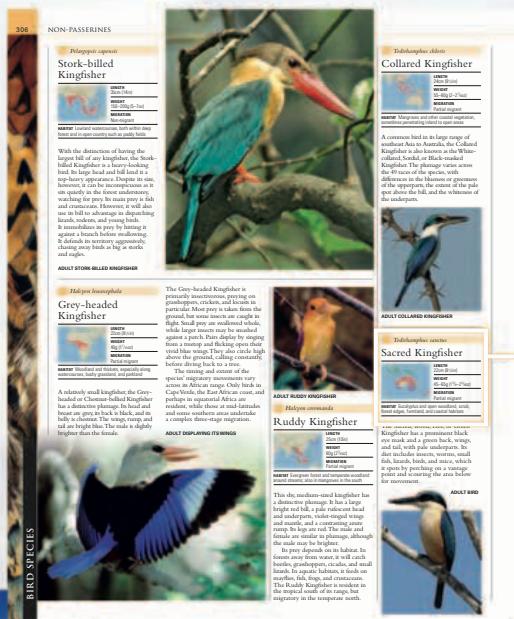
Pages such as the ones shown here contain descriptions of individual species of bird. All species profiles contain a text description and a distribution map, and in most cases a photograph of the featured bird.

panel shows position of group being described (indicated with white line) in the classification hierarchy

ORDER Pelicaniformes

FAMILY 8

SPECIES 64



scientific name
of the profiled
species

Sacred Kingfisher

LENGTH	22cm (8½in)
WEIGHT	45–65g (1½–2½oz)
MIGRATION	Partial migrant

HABITAT Eucalyptus and open woodland, scrub, forest edges, farmland, and coastal habitats

description of types of habitat in which species is found

widely accepted common name of the profiled species

length and weight figures are for adult birds, with ranges encompassing males and females

RED LIST CATEGORY

If the profiled bird species is judged to be Critically Endangered, Endangered, or Vulnerable according to the Red List of the IUCN (International Union for the Conservation of Nature) (see p.67), this information is given under a separate heading following the habitat description.

coloured panels provide additional information on the physiology or behaviour of the species, places where it is found, or on its relationship with humans



description of the site's location

map providing a visual indication of the location of the area

selected birds typical of the species that can be seen at the site are pictured



◀ INTRODUCTIONS TO BIRD ORDERS AND FAMILIES

All bird orders, as well as families within the passerine order, are described in overviews such as these. These introductions cover the common physical and behavioural features of the group.

GREAT SITES ▶
Throughout the world there are places that are famous for their bird life – either in terms of its rich variety or the sheer numbers of certain species that congregate there. These pages focus on a representative selection of these places from around the world. Other sites are described in panels within species profiles.





FOREWORD

BIRDS ARE NO MORE extraordinary than any other living organisms. Yet it is their greater familiarity with people that can make them seem so special. They fly, they sing, they are rich in colour and pattern, they are animated, and they are almost everywhere, almost always. No other group of animals can say as much of themselves, however interesting they are.

Bird superbly illustrates what astonishing diversity there is among birds. The male Great Bustard (page 207) holds the record for being the heaviest of all flying birds weighing in at 1,800g (40lb). At the other end of the scale are the hummingbirds – some of them so small that they can easily be mistaken for insects and the smallest of which bears an insect's name, the Bee Hummingbird (page 298), that weighs less than 2g ($\frac{1}{16}$ oz).

The familiarity of Birds has lead them to be a great source of inspiration to people throughout our shared history. They have a powerful place in our cultures as symbols of freedom and wisdom as well as spirituality. And the future of the world's 10,000 species of birds is inextricably linked to the welfare and livelihoods of people. One in eight bird species is threatened with extinction; the loss of even one diminishes us all. I hope that this beautifully produced encyclopedia will not only serve as a celebration of birds but also strongly encourage greater efforts to conserve them before it is too late.

DR MARCO LAMBERTINI, CHIEF EXECUTIVE, BIRDLIFE INTERNATIONAL

SOUND AND COLOUR

The Bearded Reedling (also known as the Bearded Tit) is a beautifully coloured inhabitant of wetlands. It usually gives its presence away with a ping-like call.





DAYLIGHT HUNTER

Like other birds of prey, owls are accomplished predators. Most are active at night, but the Great Grey Owl also hunts by day. It uses its exceptional hearing to find prey, which it can locate even beneath deep snow.



MOVING AROUND

Some birds rely on their legs and feet as much as their wings to move around. Jacanas have extremely long toes that allow them to walk on floating plants.





ORNAMENTED TOOLS

Birds have evolved bills in a vast array of shapes, mainly to exploit different food sources, but those of hornbills are also adorned with impressive ornaments.







HOLDING ON

The Coal Tit belongs to the huge group of birds called the passerines or perching birds. A unique foot design enables these birds to clasp even slender twigs.





KEEPING OUT THE COLD

Birds have adapted to life in all of the Earth's climate zones. Emperor Penguins are famed for the lengths to which they will go to protect their eggs and young from the harsh Antarctic conditions. This chick is sitting on an adult's feet to reduce heat loss to the ice beneath.

BATTLE OF WITS

Eating a diet of other animals provides birds with energy and protein, but it often also demands ingenuity. For example, to avoid being stung by their prey, bee-eaters rub or thrash bees against a branch until the sting is discharged. They will often use the same favoured perch to both watch for prey and later disarm it.

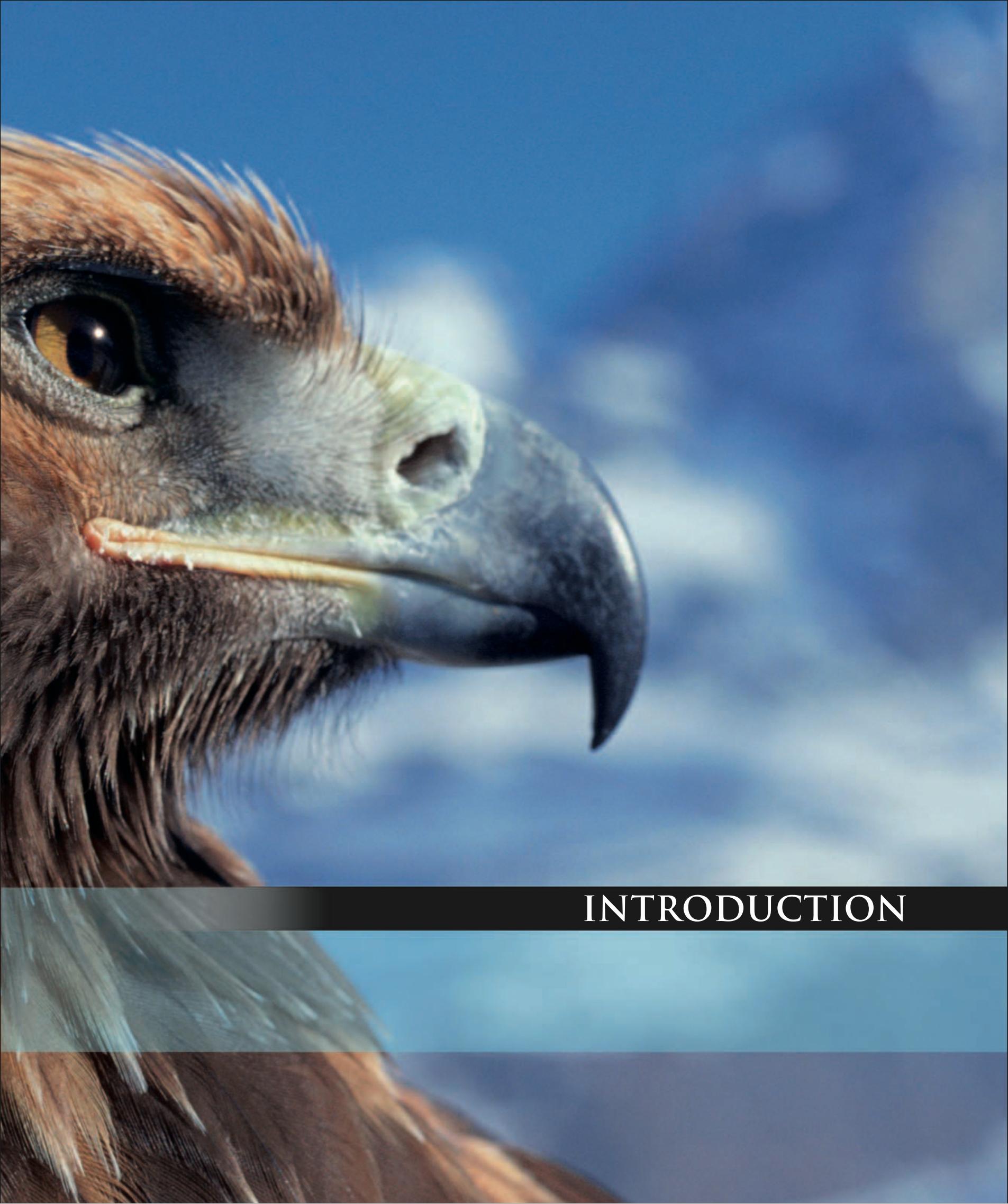




SHIFTING POPULATIONS

At any given time, great numbers of birds are migrating long distances to find food. These Whooper Swans are wintering in Japan; they breed elsewhere in Asia.





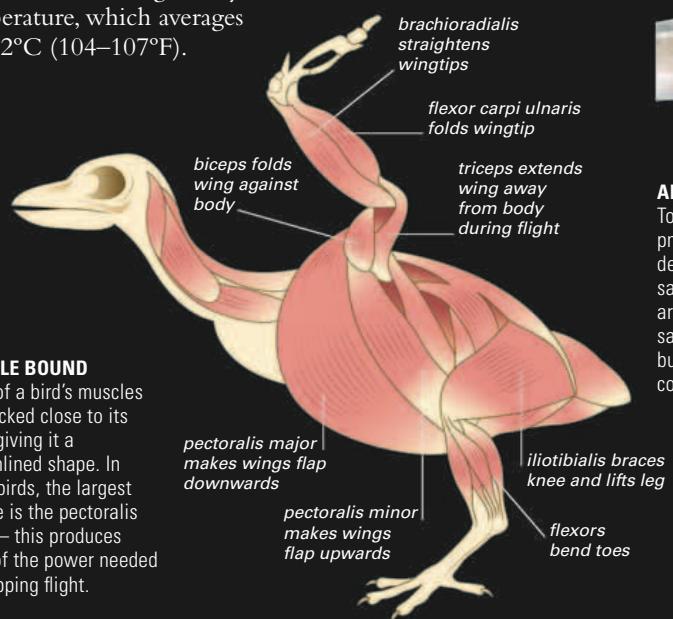
INTRODUCTION

BIRD ANATOMY

SOME GROUPS OF ANIMALS are easily confused, but there are no such problems with birds. They are the only animals that have feathers, and the only living vertebrates – apart from bats – that have evolved wings and powered flight. Internally, they have a range of special features, including hollow bones, powerful flight muscles, and a breathing system that extracts the maximum amount of oxygen from air. Thanks to these adaptations, some birds soar as high as passenger planes, while others spend years on the wing before finally landing to breed.

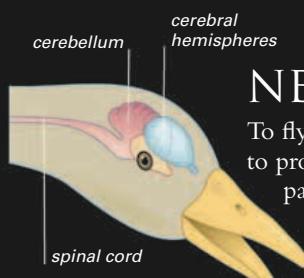
SKELETON AND MUSCLES

All birds have evolved from the same distant ancestors and, as a result, they share the same underlying body plan. Their skeletons contain fewer bones than a mammal's, and they have bills rather than teeth and jaws. Their wing bones are light and hollow, and end in a three-fingered "hand", while their legs have a Z-like shape, with a raised ankle joint that looks like a backward-pointing knee. In most birds, the ribcage is compact, but the breastbone has a large vertical flap, called a keel, which acts as an anchor point for the muscles that power the wings. In fast or powerful fliers, such as pigeons and doves, flight muscles can make up 40 per cent of the body's total weight. These muscles generate a large amount of heat, helping birds to maintain their high body temperature, which averages 40–42°C (104–107°F).



MUSCLE BOUND

Most of a bird's muscles are packed close to its body, giving it a streamlined shape. In flying birds, the largest muscle is the pectoralis major – this produces most of the power needed for flapping flight.

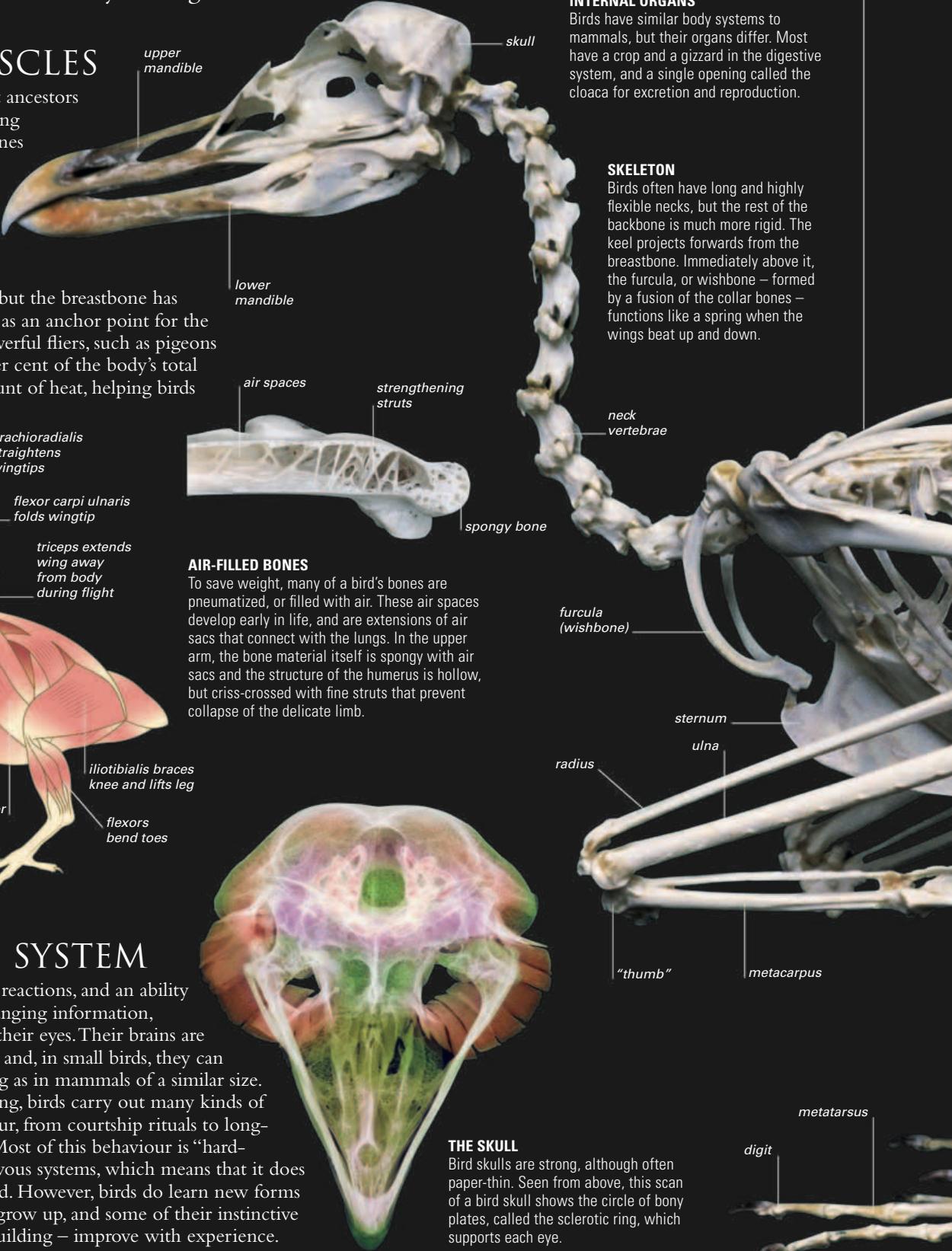


BRAIN AND SPINAL CORD

A large part of a bird's forebrain is devoted to vision. The large cerebellum deals with movement and balance.

NERVOUS SYSTEM

To fly, birds need fast reactions, and an ability to process rapidly changing information, particularly from their eyes. Their brains are well developed and, in small birds, they can be twice as big as in mammals of a similar size. As well as flying, birds carry out many kinds of complex behaviour, from courtship rituals to long-distance navigation. Most of this behaviour is "hard-wired" into their nervous systems, which means that it does not have to be learned. However, birds do learn new forms of behaviour as they grow up, and some of their instinctive skills – such as nest building – improve with experience.

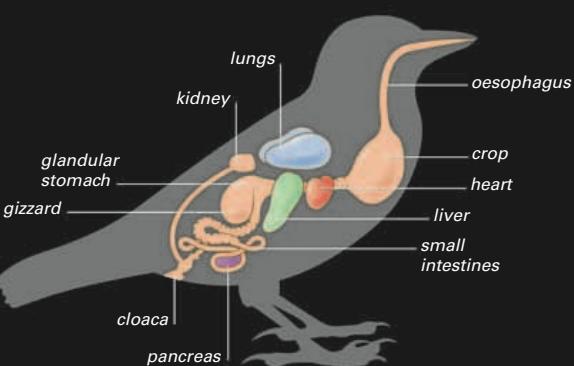


INTERNAL ORGANS

Birds have similar body systems to mammals, but their organs differ. Most have a crop and a gizzard in the digestive system, and a single opening called the cloaca for excretion and reproduction.

SKELETON

Birds often have long and highly flexible necks, but the rest of the backbone is much more rigid. The keel projects forwards from the breastbone. Immediately above it, the furcula, or wishbone – formed by a fusion of the collar bones – functions like a spring when the wings beat up and down.



AIR-FILLED BONES

To save weight, many of a bird's bones are pneumatized, or filled with air. These air spaces develop early in life, and are extensions of air sacs that connect with the lungs. In the upper arm, the bone material itself is spongy with air sacs and the structure of the humerus is hollow, but criss-crossed with fine struts that prevent collapse of the delicate limb.

THE SKULL

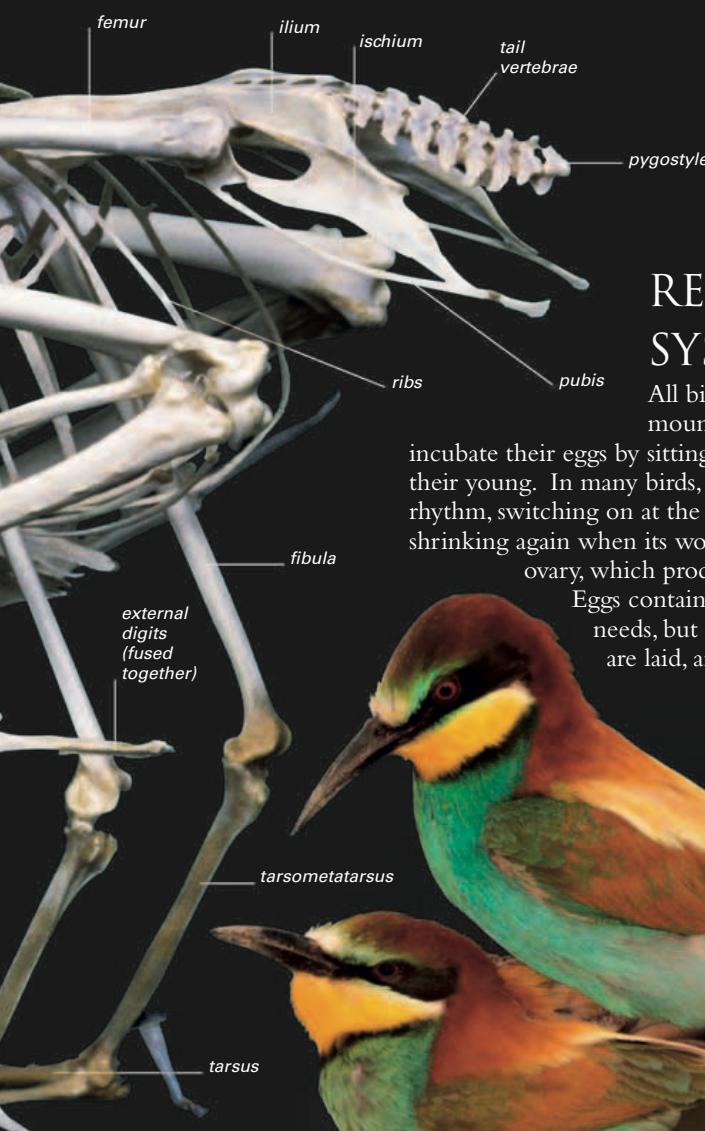
Bird skulls are strong, although often paper-thin. Seen from above, this scan of a bird skull shows the circle of bony plates, called the sclerotic ring, which supports each eye.



DIGESTIVE SYSTEM

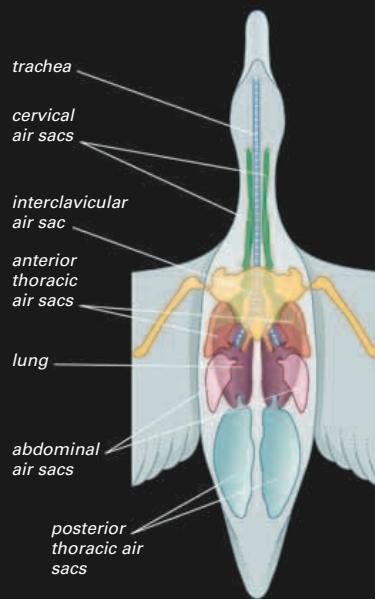
Some birds – such as crows and gulls – eat anything edible that they find, but most have specialized diets and digestive systems that have evolved to deal with particular foods. Because birds do not have teeth, the majority swallow their food whole. As it goes through the digestive system, food is stored in the crop before passing through a two-chambered stomach. The first chamber, the glandular stomach, secretes acidic digestive juices. The second chamber, the gizzard, has muscular walls which contract to grind up food. After this, nutrients are absorbed and waste expelled. Digestive systems are modified in different ways. Seed-eaters have large crops, so that they can eat rapidly and move on. Many seabirds also have large crops, to allow them to carry food back to their young. The Hoatzin's crop is enormous, and functions like a microbial fermentation tank, breaking down large quantities of leaves.

Glandular stomachs are largest in birds of prey, vultures, and fish-eaters. The big Lammergeier Vulture produces such powerful stomach acids that it can digest bones thicker than a human wrist. The gizzard is largest in birds that eat seeds and nuts: many of these swallow grit and stones that become lodged in their gizzards, helping to grind the food.



LUNGS AND BREATHING

When a mammal breathes, air flows into its lungs and back out again. Bird lungs work differently: air flows straight through the lungs, via a system of air sacs, before being exhaled. This one-way flow allows air and blood to move in opposite directions, known as countercurrent. As a result, bird lungs are more efficient at transferring oxygen and carbon dioxide than those of mammals, so that some birds can fly at over 10,000m (33,000ft) – an altitude where a mammal would lose consciousness. Most flying birds have nine air sacs, which connect with air spaces in major bones. Diving birds have poorly developed air spaces, but in some land birds – such as hornbills – they reach as far as the toes.

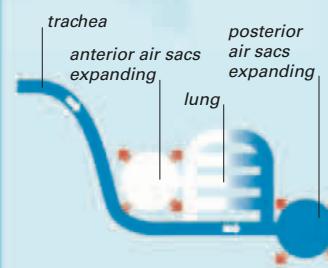


LUNGS AND AIR SACS

A bird's lungs take up less space than those of a mammal, but they are much more efficient. Air sacs act as reservoirs. Unlike the lungs, they do not absorb oxygen.

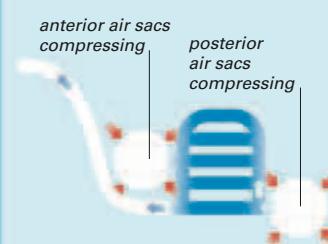
BREATHING CYCLE

Unlike mammals, birds take two complete breathing cycles to move a single breath in through the trachea, through the lungs, and back out of the body. When flying, their breathing rate can speed up by 20 times to power the extra energy required.



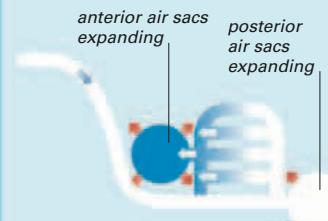
INHALATION 1

At the start of the cycle, the forward and rear air sacs expand. Inhaled air travels through the bird's trachea and into the rear air sacs.



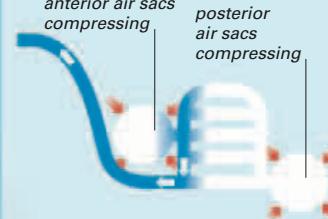
EXHALATION 1

Both sets of air sacs are now compressed, so air is squeezed out of the rear air sacs and into the lungs.



INHALATION 2

The air sacs expand again, drawing more air in through the trachea. Meanwhile, air already in the lungs moves into the forward air sacs.



EXHALATION 2

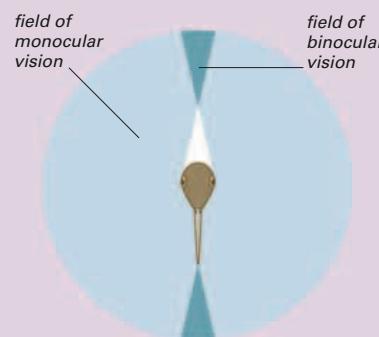
To finish the double cycle, the air sacs are compressed, driving the air in the forward air sacs back out through the trachea.

SENSES

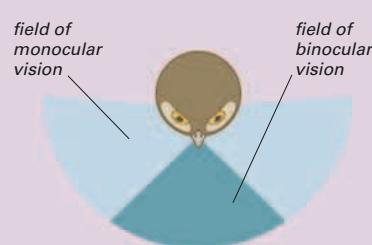
FROM THE MOMENT A BIRD starts life, it depends on its senses to survive. For all birds, vision is the key external sense, and one that uses up a large proportion of the brain's processing power. Hearing is also important, but for most bird species – apart from notable exceptions such as kiwis – smell and taste are not nearly as significant as they are for us. Specialized navigational senses, on the other hand, are vital tools for migrant species, while the sense of balance is essential for all birds, particularly when they are in the air.

VISION

Birds have excellent colour vision, and they can be up to three times better at picking out detail than humans. Their eyes often take up a large amount of space in the head, but they differ widely in their shape and positioning. Some bird eyes are spherical, but others are tubular, or even conical, flaring out inside the skull. In many birds they face sideways, but in owls and birds of prey they face forwards, giving a relatively large field of binocular vision. In birds, visual perception differs from our own. Birds are particularly good at spotting movement, but even in the open, they can fail to register motionless predators or prey.



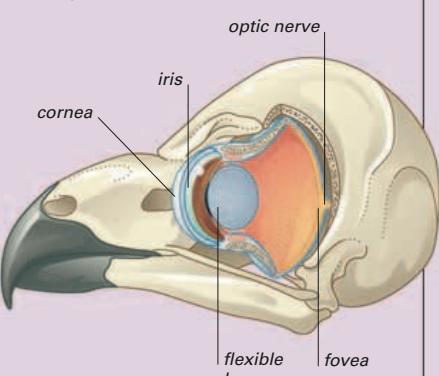
ALL-ROUND VISION
Sitting on its eggs, a Eurasian Oystercatcher has a complete view of its surroundings, so it is hard for predators to attack by surprise. This kind of vision is found in many birds.



FORWARD FOCUS
Like all birds, this Northern Goshawk has a sensitive area, called a fovea, at the centre of each retina. Some birds of prey have two foveae, while terns and swallows have three.

AVIAN EYES

Bird eyes have an adjustable iris, and a flexible lens that focuses light on the retina. The most sensitive part of the retina is the fovea – a central area packed with light receptors. Day-active birds have spherical or flattened eyes, but owl eyes are tubular, opening out inside the head. The surface of the eye is cleaned by the nictitating membrane, or "third eyelid", which flicks horizontally across the eyeball.

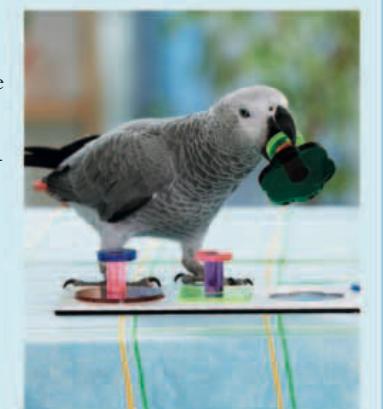


AVIAN INTELLIGENCE

Birds are far from stupid, although much of their behaviour is instinctive rather than learned. In captivity, several species – notably crows and parrots – demonstrate good problem-solving skills. Birds also have a good spatial memory, which is particularly well developed in nutcrackers and jays, which store food in hidden "caches" for later use.

INTELLIGENCE TESTS

Laboratory tests show that many birds quickly learn to relate particular colours or shapes with the promise of food.



HEARING

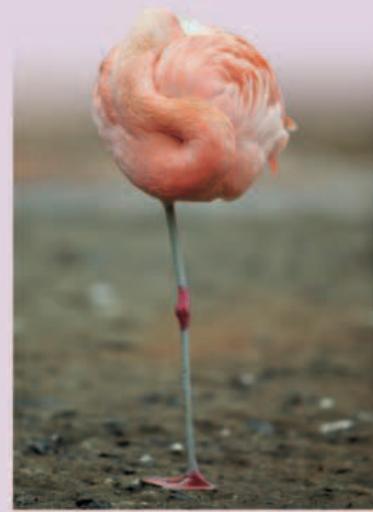
Like their reptilian ancestors, birds lack external ears; some owls have feathery ear tufts, but these have little or nothing to do with hearing. A bird's ear openings are typically funnel-shaped, and are hidden beneath its plumage, behind and below each eye. In general, bird hearing is not much more acute than our own, but some birds have special abilities linked to the way they live.

Barn owls, for example, are unusually sensitive to high frequencies, allowing them to home in on rustling sounds produced by small mammals after dark. Birds are also extraordinarily good at sound recognition. Even when dozens of different species are singing, songbirds can instantly pick out the calls of their own kind. Birds that nest in large colonies – such as gannets and shearwaters – show even greater discrimination. They often pinpoint their partners solely by their calls, although thousands of other birds may be calling at the same time.



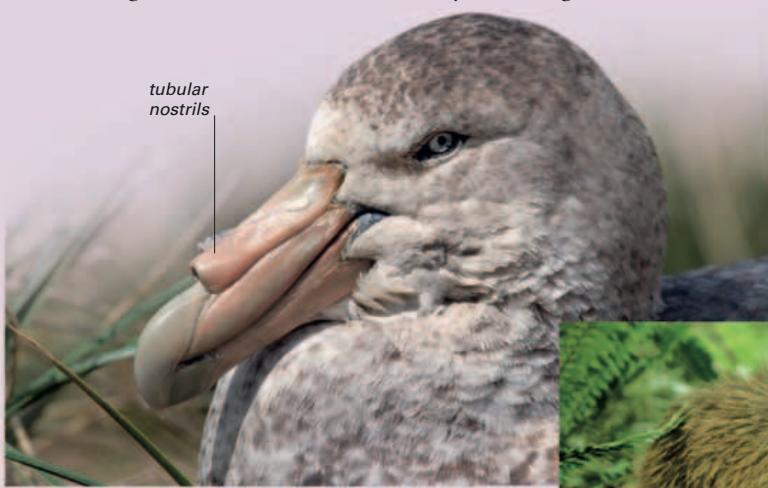
HUNTING BY HEARING

A Barn Owl's heart-shaped face helps to channel sound to its ears. Asymmetrical ear openings help the owl to pinpoint the source of the sound with accuracy.



BALANCING ACT

Standing on one leg is a simple matter for this flamingo, even when fast asleep. Like mammals, birds maintain their balance using fluid-filled cavities of the inner ear.



A NOSE FOR FOOD

With long tubular nostrils, the Southern Giant Petrel can locate food by day or by night while out at sea. Tubenoses are particularly attracted by the smell of floating animal fats.



SUBTERRANEAN SCENT

Kiwis are the only birds that have nostrils at the tips of their bills. They also have highly developed olfactory bulbs – the part of the brain that manages the sense of smell.

SMELL AND TASTE

For many birds, the chemical senses – smell and taste – play a relatively minor part in daily life. Most terrestrial birds have a poor sense of smell, and birds generally judge food by its appearance, rather than by its taste. They also have remarkably few taste buds: parrots have about 350, and blue tits just 24, compared with about 10,000 in humans. However, as with hearing, smell and taste are much better developed in some groups of birds than others. New World vultures can locate dead remains by

their smell, and tubenoses (albatrosses and their relatives) use smell to track down food on the open sea. Kiwis also sniff out their food, using nostrils at the tips of their bills. Honeyguides can smell beeswax – an ability that helps them to track down the bees' nests that supply their food.

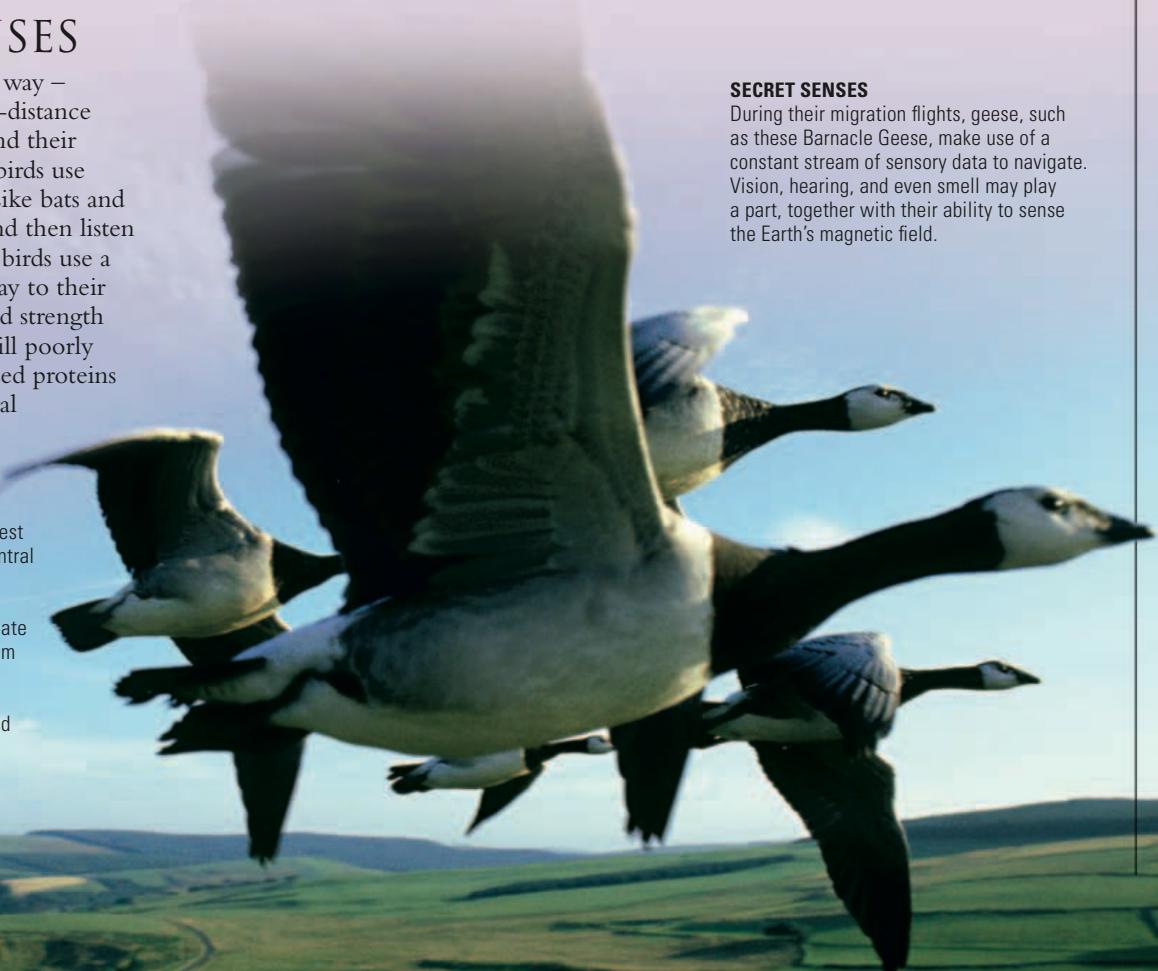
NAVIGATIONAL SENSES

Birds have a remarkable ability to find their way – whether they are close to home, or on long-distance migrations. On home ground, most birds find their way by sight, but a handful of cave-nesting birds use echolocation to navigate in total darkness. Like bats and dolphins, they emit short bursts of sound, and then listen for the echoes that bounce back. Migrating birds use a wide variety of sensory cues to find their way to their destination. One of these is the direction and strength of the Earth's magnetic field. This sense is still poorly understood, but it seems to involve specialized proteins in a bird's eyes, and tiny specks of the mineral magnetite, which are found in a bird's cranial nerves (see also Migration, p.58).



ECHOLOCATION

Oilbirds roost and nest deep in caves in Central and South America. Using echolocation, an Oilbird can navigate its way through 500m (1,650ft) of winding stone passages between its nest and the cave mouth.



SECRET SENSES

During their migration flights, geese, such as these Barnacle Geese, make use of a constant stream of sensory data to navigate. Vision, hearing, and even smell may play a part, together with their ability to sense the Earth's magnetic field.

FEATHERS

FEATHERS ARE THE MOST versatile body covering in the animal world. Even in the coldest habitats, they keep birds dry and warm, and, significantly, they enable birds to fly. Individual birds can have up to 25,000 feathers, but to stay airworthy, the majority of species replace most of their plumage at least once a year.



WHOOPER SWAN PREENING

Feathers are one of the most prominent features of a bird's anatomy. Through the processes of moulting or preening, feathers can change a bird's colour and markings, and even its apparent size.

STRUCTURE AND TYPES OF FEATHER

Feathers are made of keratin, the same protein found in human fingernails. The most important part of a feather is the hollow shaft, which is anchored in the skin. The base of the shaft is bare, forming the feather's quill, but in most feathers, the rest of the shaft has two rows of parallel branches, or barbs, arranged on either side. In down feathers, the shaft is often short, and barbs are loose and fluffy, creating a layer of insulation next to the bird's skin. In contour feathers, the barbs are stiffer, and they are locked together by microscopic hooks, creating a smooth surface known as a vane. Most of a bird's contour feathers are arranged like roof tiles, giving its body a streamlined shape. However, on the wings and tail, some are specially developed, with extra-large vanes. These are a bird's flight feathers – the unique feature that separates birds from their reptilian ancestors, and which enables them to fly.

TYPES OF FEATHER

Down feathers are short, and they often lack a vane. Typical contour feathers have a downy base, with a vane extending to the feather's tip. Flight feathers have a large vane that is often highly asymmetrical – a shape that helps to generate lift.



FEATHER STRUCTURE

A contour feather's many barbs lock together with struts called barbules. Those that point to the feather's tip have tiny hooks that mesh with the facing barbules on the next barb.

FEATHER FUNCTIONS

A bird's feathers are vital to conserve body heat, particularly in small species that endure cold winters. For example, Boreal Chickadees have a body temperature of about 42°C (107°F), and they manage to keep it at this level even when the winter air plummets to -35°C (-31°F), which is an amazing achievement for a bird that weighs less than 10g (½oz). Feathers also help to keep birds dry. Contour feathers are naturally water-repellent, but many swimming birds go one step further and make them fully waterproof by coating them with oil from their preen glands.

Feathers can also function as camouflage, or as visual signals, helping to attract a mate. Moult and feather wear enable the same bird to look strikingly different at different times of year. A bird's plumage is also highly sensitive to touch: in many species, this sense is accentuated by hair-like feathers called filoplumes, which are thought to detect movement of the other feathers around them. Some birds have stiff, vaneless feathers resembling bristles. Nightjars use these to sweep flying insects into their mouths, while in ostriches and hornbills, they function like eyelashes.



KEEPING WARM
By fluffing out its feathers, a bird can improve its own insulation. This female Red-winged Blackbird has its feathers fully fluffed, giving it a plump outline.



TREE SWALLOW NESTLINGS

These chicks are starting to grow their feathers. Like most birds, their plumage grows in defined areas called feather tracts, separated by bare skin.

MOULTING PENGUIN

Halfway through its first moult, this young King Penguin looks distinctly unkempt. Its brown juvenile down is replaced by waterproof adult plumage.

PLUMAGE DEVELOPMENT

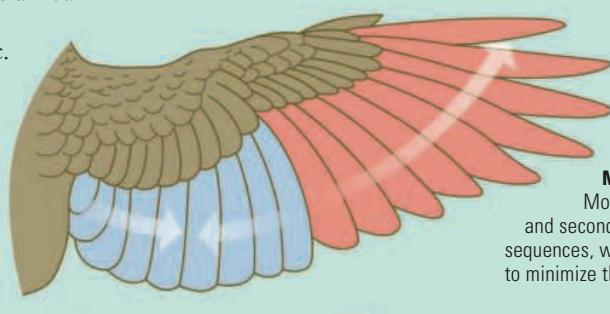
As a bird grows up, it goes through a series of plumage changes. Altricial birds (see p.54) often hatch naked, but rapidly grow a complete set of down and contour feathers. Precocial birds are better developed on hatching, and are usually covered in down, which is later replaced by the adult plumage. In most birds, the adult plumage is grown and replaced on an annual cycle. Many adult birds replace their plumage in a "prenuptial moult", which is the point when male birds adopt their bright courtship colours. When the breeding season is over, they moult a second time, and the male plumage becomes more subdued.

CARE AND RENEWAL

Feathers need constant cleaning and maintenance to keep them in good condition. Many birds regularly bathe in fresh water, although species that live in dry habitats often bathe in dust or sand instead. Throughout the day – but particularly after bathing – a bird will preen its feathers, arranging them correctly and wiping them with waterproof oil from a gland near the base of the tail. Birds that do not have preen glands, such as hawks and parrots, keep their plumage in good condition with specialized feathers called powder down, which release a fine dust that works like talc. When birds moult, they usually shed their flight feathers in a set pattern, which varies from one species to another. Most shed their wing feathers in symmetrical pairs, so that they can stay airborne as moulting progresses. However, many waterbirds moult all their primary flight feathers at once. For several weeks, they are unable to fly.



DUST BATHING
With all of its feathers fluffed out, a male Golden Pheasant gives itself a vigorous dusting. Gamebirds frequently bathe in dust, but never in water.



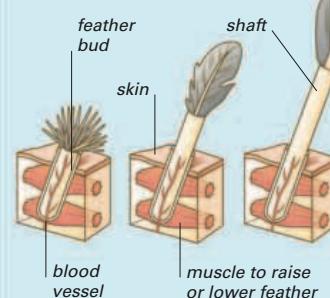
Secondary feathers moult towards centre of inner wing Primary feathers moult from "wrist" outwards to wingtip



MOULTING PATTERN
Most songbirds shed their primary and secondary flight feathers in two sequences, which occur simultaneously to minimize the impact on their flight.

HOW FEATHERS GROW

Feathers develop from follicles – small outgrowths in a bird's skin. Each one develops from the base upwards, forming barbs and barbules as it grows. When the feather reaches full size, growth comes to a halt. By this stage, the feather is largely dead, but it stays attached to the skin until moulted, when its working life comes to an end.



DEVELOPMENT OF A FLIGHT FEATHER

In early stages of development, flight feathers are protected by cylindrical sheaths. These fall away as the feathers take shape.

MISSING FEATHERS

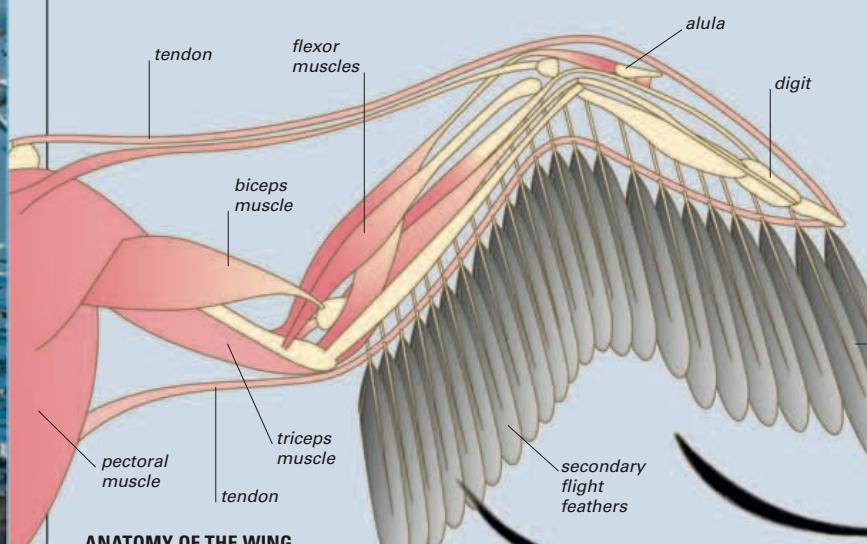
This Black Kite is in mid-moult, so has gaps in its wings where some of its flight feathers have been shed. Replacement feathers are already growing in their place.

WINGS

BIRD WINGS DEVELOPED from five-fingered limbs, but over millions of years, evolution has completely transformed them for flight. They are light and flexible, with an infinitely variable geometry, which gives the best performance over a wide range of different speeds. They can fold away when not in use, and their feathers replace themselves to make up for wear and tear. Bird wings vary hugely in size and shape, but stripped of their feathers, they are all constructed on the same plan.

STRUCTURE

Bird wings have an internal framework of hollow bones, anchored to the body at the shoulder – often the biggest joint in the skeleton. Apart from the shoulder, wings have two other main joints: one is equivalent to the human elbow, while one nearer the wingtip is equivalent to the wrist. These joints allow the wing to open and close, and also to swivel – crucial for flight. The muscles that power the wings are mainly in the chest, rather than in the wing itself. Several sets of tendons connect the muscles to the wing bones, moving like a system of cables. When a bird is in the air, its wings are constantly adjusted, fine-tuning the amount of lift produced. In most birds, these adjustments control height and speed; steering is carried out mainly by the tail. Swifts are an exception: they can twist and turn in the air by beating each wing at a different speed.



ANATOMY OF THE WING

A bird's wings are powered by the large pectoral muscles in the chest. The biceps muscle in the wing folds up the inner part of the wing, while the triceps spreads it out. Smaller muscles control the outer part of the wing.



FOLDED WINGS

A Western Yellow Wagtail splayes its tail while perching on a rock. Like most birds, its wings fold into a Z-like shape when not in use, so that they can be held flat against the body. In non-flying birds, such as penguins and ostriches, wings are less flexible, and rarely fold.

SIZE AND SHAPE

In the bird world there are many different wing shapes, which deliver a very different performance in terms of endurance, manoeuvrability, and speed. Gliding birds have long, narrow wings with only a slight bend at the “elbow” – a shape that combines strength and maximum lift. Birds that soar on thermals have broad wings, often with splayed flight feathers resembling extended fingers. Fast fliers, such as swifts, have backswept wings ending in a narrow point – a shape that reduces turbulence and therefore the energy needed to stay in the air. Most songbirds have short wings with a rounded rear edge, which gives excellent manoeuvrability.



LONG AND NARROW

The Black-browed Albatross has extremely long wings that it holds out stiffly, enabling it to soar and glide over the sea for hours.



POINTED AND BACKSWEPT

The Common Swift's elbow joints are very close to its body, and its extra-long, curving flight feathers give narrow, pointed wingtips.



BROAD WITH SPLAYED TIPS

“Slotted” flight feathers, separated by visible gaps, generate extra lift in the White-tailed Eagle and other large soaring birds.



SHORT AND ROUNDED

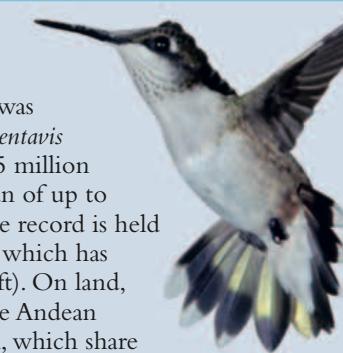
Songbirds such as the European Greenfinch have short, rounded wings for a rapid take-off and plenty of manoeuvrability in mid-air.

**LONG WINGS**

Wandering Albatrosses, shown here performing a greeting display, are supremely elegant fliers at sea, where their remarkable wingspan enables them to glide with barely a wingbeat.

WINGSPAN

The largest flying bird ever was an extinct species called *Argentavis magnificens*, which lived 12–5 million years ago and had a wingspan of up to 8m (26ft). Today, the absolute record is held by the Wandering Albatross, which has a wingspan of up to 3m (10ft). On land, the title is held jointly by the Andean Condor and Marabou Stork, which share a maximum wingspan of just below 3m (10ft). At the other end of the scale, the Bee Hummingbird of Cuba has a tiny wingspan of just 3cm (1½in) – far smaller than many insects.

**SHORT WINGS**

The Ruby-throated Hummingbird has tiny wings that give superb agility and flexibility.

SPECIES	WING LOADING (g/cm ²)
Leach's Petrel	0.11
Barn Swallow	0.14
Barn Owl	0.29
Golden Eagle	0.71
Mute Swan (below)	1.66

WING LOADING

The table above shows the wing loading for different birds of varying weight. Mute Swans weigh up to 15kg (33lb) and are among the heaviest of all flying birds. They need a long "runway" to become airborne.

WING LOADING

Although larger birds have larger wings, wing area and body weight do not increase in step. Instead, large birds typically have a greater wing loading, meaning that each unit area of wing has to carry more weight. Wing loading affects a bird's manoeuvrability and the amount of energy it requires to fly. The greater the wing loading, the harder birds have to work, unless they soar or glide. In the most extreme cases, including swans, bustards, and turkeys, taking off is a real struggle and the birds flap hard for several seconds to get into the air.

**FLIGHTLESS BIRDS**

If flight is no longer a great advantage to a bird, evolution can gradually make wings smaller, until flight is no longer possible. At least 13 bird orders, including ostriches, kiwis, grebes, penguins, auks, pigeons, and even parrots, contain species that have become flightless. In penguins and auks, the wings are well developed and are used like flippers for propulsion in water. By contrast, the wings of kiwis are so tiny that they are invisible under their plumage and have no function. Flightlessness is most common among birds that live on oceanic islands, where there are no mammalian predators. In the rail family, over a quarter of island species cannot fly. One of them, the Inaccessible Island Rail, is the world's smallest flightless bird, weighing just 30g (1oz). Many similar species have become extinct following the introduction of cats and other predators.

**MULTI-PURPOSE WINGS**

Although ostriches cannot fly, they use their well-developed wings for displaying, and for temperature control, exposing or covering up the bare skin on their legs.

**FLYING UNDERWATER**

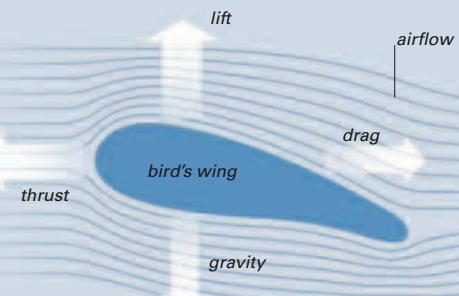
Penguins have stiff, compact wings that are highly effective flippers, allowing these Gentoo Penguins to reach speeds of over 25kph (16mph) under water.

FLIGHT

THE POWER OF FLIGHT GIVES ANIMALS huge advantages, particularly in the search for food. Over millions of years, it has evolved independently in several different groups of animals, including flying reptiles called pterosaurs, whose leathery wings were up to 12m (40ft) across. Today, the animal kingdom includes many species that can glide, but only three kinds of animal – birds, bats, and insects – can stay airborne by flapping their wings. Of these, insects are by far the most numerous, but birds lead the field in speed, endurance, load-carrying capacity, and total distance flown.

FLIGHT FORCES

Flapping flight is a highly complex form of movement, which is still not fully understood. However, the basic principles behind bird flight are well known. Like aircraft, birds have to generate two forces to fly. The first, known as lift, counteracts the downward pull of Earth's gravity. The second force, called thrust, counteracts air resistance or drag, and pushes the bird forwards. In both birds and aircraft, lift is produced by the stream of air moving over the curved surfaces of the wings, while in most birds thrust is produced by flapping. However, bird wings are highly flexible, and so flapping flight can involve many other factors as well. For example, pigeons generate extra lift by bringing their wings together on the upstroke, while hummingbirds can generate a constant downdraught by making each wing trace a path like a figure 8. Gliding birds (see p.34) are quite different: they exploit the air currents around them, saving much of the energy required in flapping flight.



WING AERODYNAMICS

Seen in cross-section, a bird's wing forms a shape called an aerofoil. Air moves over the upper surface faster than the lower one, causing a reduction in pressure that results in lift. If lift is greater than the pull of gravity, the bird rises, and if thrust exceeds drag, it accelerates forwards. But if each pair of forces is balanced, the bird stays at the same height and speed.



AIRLIFT

Birds have a strict "baggage allowance" that limits their own body weight, and also the weight of anything they carry into the air. The strongest lifters are birds of prey, which carry their victims in their claws. The large, fully grown trout that this Osprey is carrying may equal half its body weight.

TAKE-OFF AND LANDING

Body weight has a far-reaching effect on the way birds take off and land. Small songbirds can take off in a split-second with just a kick of their legs, but heavily built birds take much longer to get into the air. Pheasants and other gamebirds are a notable exception to this rule: powerful flight muscles give them an explosive take-off to escape from danger. Taking off can be hard work, and in heavy birds, the wing's geometry changes to maximize lift and minimize energy-wasting turbulence. These changes are reversed once the bird is in the air.

Landing requires careful coordination, and also plenty of space in the case of heavy birds such as bustards and swans. When birds land, they increase the angle of their wings, like an aeroplane lowering its flaps. The bird then swings its legs forwards, and if all goes to plan, it lands on them without toppling over. But for a heavy bird, such as a swan, it is very difficult to lose so much momentum in a short time. Instead, swans land on water, using their large webbed feet as brakes.

LIFTING OFF

When birds take off, their wings work in complex ways. Instead of pushing downwards and backwards like a pair of oars, a pigeon's wings twist at the bottom of the downstroke, helping to pull the bird through the air like a pair of propellers. To reduce turbulence, the primary flight feathers are spread apart and the alula, a small feathered flap that protrudes from the "wrist" of each wing, is temporarily raised.



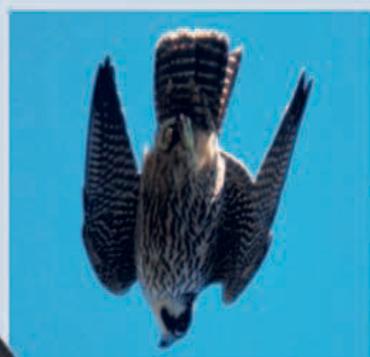
LANDING

To land, a songbird drops its airspeed until it is just about to stall. With its wings and tail both acting as brakes, it drops onto its perch. Small birds such as this European Robin weigh little, so come to a standstill quickly.



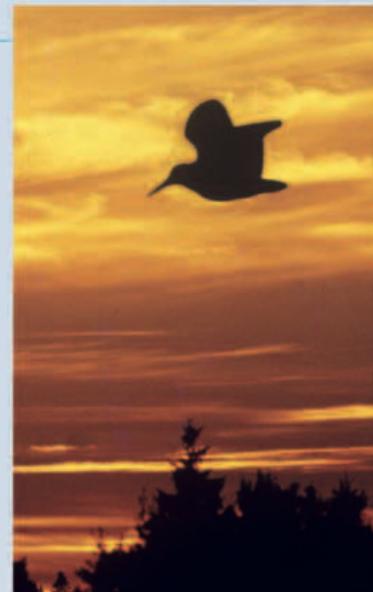
FLIGHT SPEEDS

The speed of a flying bird is difficult to measure, so many records from the early years of ornithology are now thought to be unreliable. Birds are also experts at taking advantage of prevailing winds, and wind-assisted flight can make some long-distance speed records misleading. However, there is little doubt that the Peregrine Falcon holds the absolute record for speed in the air. When it is diving, it probably exceeds 200kph (124mph). The fastest birds in level flight are ducks, geese, and swifts. Some of these can reach an airspeed of nearly 80kph (50mph). In general, birds rarely fly faster than 30kph (18mph). The slowest birds of all – woodcocks – can fly at a leisurely 8kph (5mph) without stalling, which is not much faster than a brisk walk.



POWER DIVE

With its wings partly folded, a Peregrine Falcon dives, or stoops, towards its airborne prey hundreds of metres below.



LEISURELY FLIGHT

At dusk a male Eurasian Woodcock carries out its courtship flight. This is the slowest bird flight not to involve gliding or hovering.



FLIGHT PATTERNS

Birds often have characteristic flight patterns, which can help to identify them when they are

on the wing. Some follow a level flight path, flapping their wings at a steady rate, varying from about 200 beats a minute for pigeons, to a much more leisurely 25 beats a minute for large birds such as herons. Many other birds intersperse flapping with short bursts of gliding, but some species dip up and down, flapping their wings in short bursts, and then holding them against their sides. This is common in finches, which have an undulating or “bouncy” flight path, and it is even more pronounced in woodpeckers and toucans.

FAST FLAPPING

Pigeons and ducks both have a fast, direct flight – a characteristic shared by auks and cormorants as they speed over the sea.

SLOW FLAPPING

A wide variety of birds, including harriers, gulls, and Barn Owls, flap their wings slowly so that they can scan the ground for food.

INTERMITTENT FLAPPING

This flight style produces an undulating path, and the longer the intervals between flapping, the more noticeable the undulations.

RANDOM FLAPPING

This flight pattern is typical of aerial insect-eaters, such as swifts and swallows, and also of some larger birds, including kites.

HOVERING

Only hummingbirds, kingfishers, and kestrels routinely hover for extended periods. Feeding at a flower, this Mangrove Hummingbird may beat its wings 50 times a second.

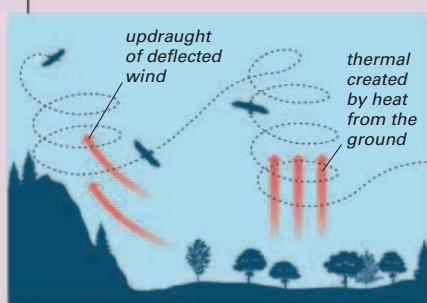
GLIDING AND SOARING

COMPARED TO FLAPPING FLIGHT, gliding and soaring are highly efficient ways of moving through the air. Gliding birds slowly coast towards the ground, but the largest soaring species – such as birds of prey and vultures – can climb to a height of several kilometres with barely a beat of their enormous wings. Many birds mix gliding, soaring, and flapping flight. The most aerial, including terns and swifts, can stay airborne for several years before they finally land to breed.

SOARING ON THERMALS

When the ground is warmed by the sun, the air above it warms as well. This creates columns of warm air called thermals, which rise through the cooler and denser air around them. Soaring birds seek out these natural elevators, and spiral around inside them to climb high into the sky. The commonest soaring birds are raptors, such as eagles, buzzards, and vultures, together with many larger storks. All of these birds have broad wings with “slotted” primary flight feathers – something that is particularly noticeable when they are seen from below. Most birds use soaring as an effortless way of locating food, but some species – such as

the White Stork – also save energy on their migrations by soaring, creating a dramatic spectacle as thousands of them spiral into the sky at the start of their journey.



THERMALS AND UPDRAUGHTS

Once a bird is inside a thermal, it can rise at speeds of up to 5m (16ft) a second. Having reached the top of one thermal, it glides down to locate another. Slope-soaring birds use updraughts created by mountainous terrain.



THERMAL RIDER

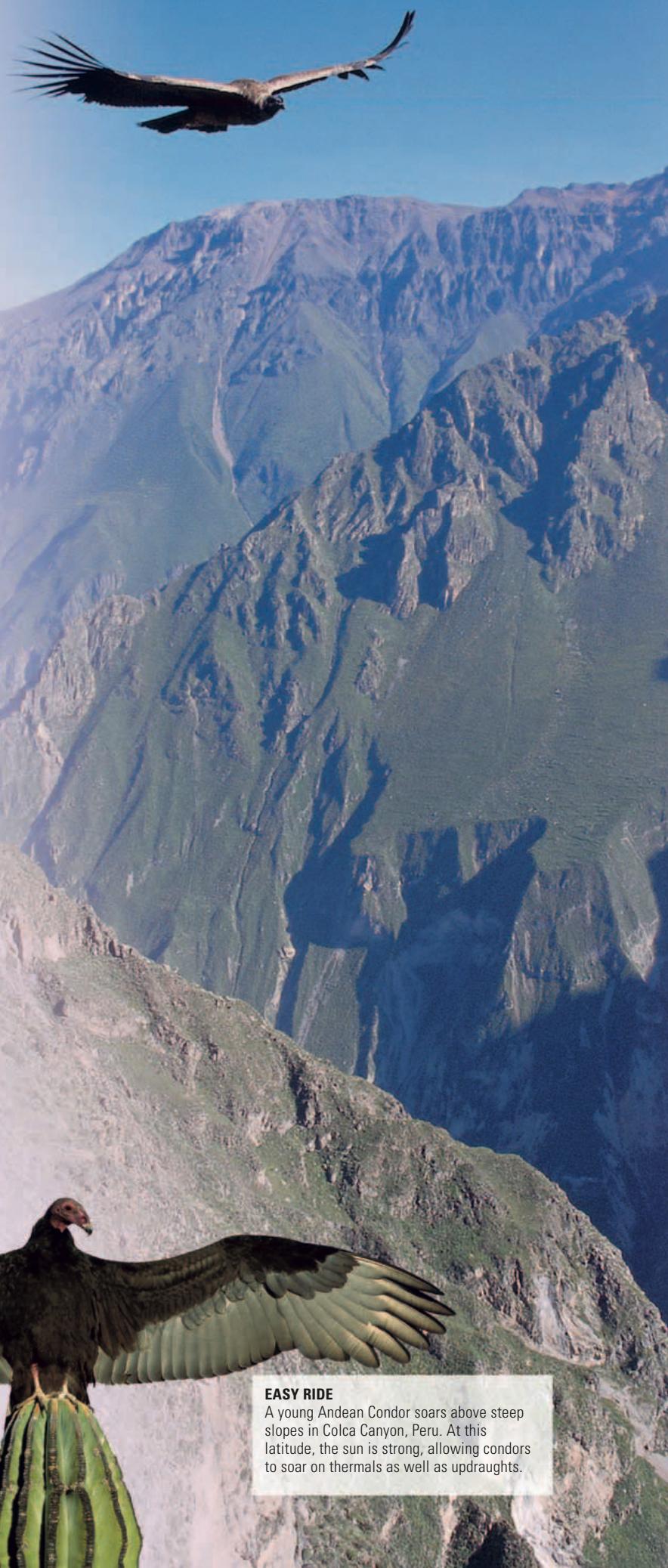
White Storks ride thermals to start their migration between Africa and Europe. At narrow crossings – such as the Straits of Gibraltar – they climb as high as possible before heading out across the water.

DELAYED TAKE-OFF

Before thermals can form, the ground first has to heat up. This heat then has to be transferred to pockets of air, which are thus given enough energy to rise through the air around them. All this takes time, particularly in desert and mountain regions, where night-time temperatures often fall below freezing. As a result, heavy soaring birds, such as eagles, vultures, and buzzards, rarely get off to a prompt start at dawn. Instead, they are grounded until the sunshine gathers strength. To give themselves a headstart, they often roost on cliffs, trees, or other tall plants for an easier launch. This perch may also be a vantage point for spotting prey.

GREETING THE DAWN

Perched on a tall cactus, a Turkey Vulture spreads its wings in the early morning sunshine. It warms itself up while waiting for the day's thermals to form.

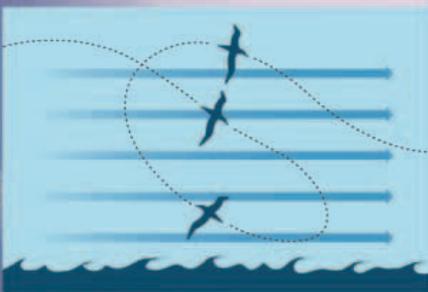


EASY RIDE

A young Andean Condor soars above steep slopes in Colca Canyon, Peru. At this latitude, the sun is strong, allowing condors to soar on thermals as well as updraughts.

SLOPE-SOARING

Cliffs and mountain ranges deflect the wind upwards, allowing birds to soar high above rough terrain. Unlike thermals, these updraughts often blow for months at a time, and they are present even when the weather is cold. This allows soaring birds to operate far away from the warmth of the tropics. The Andean Condor, for example, soars along the entire length of the Andes chain, from western Venezuela to Tierra del Fuego, while sea eagles soar over mountainous coasts in Scandinavia and Siberia. As well as eagles and vultures, slope-soarers also include a variety of smaller birds. Gulls and fulmars soar over coastal cliffs, while choughs and jackdaws often soar over cliffs and mountainsides inland. Choughs perform spectacular aerial displays during their breeding season in spring, with a characteristic tumbling flight.



DYNAMIC SOARING IN ACTION

An albatross rises and falls as it moves across the sea. Depending on the strength of the wind, it can rise to about 50m (160ft) before dropping close to the waves.



LONG-DISTANCE SOARING

The Wandering Albatross, the largest of all seabirds, may cover 10,000–20,000km (6,000–12,000 miles) in 10–20 days with its dynamic soaring flight, journeying right round the Earth in its search for food..



AERIAL ACROBAT

With its wings and tail splayed, an Alpine Chough rides on the mountain wind. Choughs are superbly acrobatic birds.

MIXED FLIGHT

Instead of using a single kind of flight, many birds use a mixture of flapping flight and gliding or soaring. This is particularly common in aerial insect-eaters, such as swifts and swallows. Flapping gives them the manoeuvrability they need to catch their food, while gliding helps them to save energy – an important capability for birds that spend much of their time in the air. Mixed flight is also common in seabirds. Gannets and Brown Pelicans, for example, characteristically mix bursts of flapping with long glides. Frigatebirds – among the most accomplished of all soaring birds – are quick to switch to flapping flight with their long, slender wings, when they are chasing other birds and trying to steal their food.



FLYING IN FORMATION

Despite their size, Brown Pelicans are supremely graceful in the air. On their way to feeding grounds, they often fly in lines, just skimming the sea.



ENDURANCE RECORDS

Energy-efficient flight allows some birds to spend an extraordinary amount of time in the air. The world's most aerial bird is thought to be the Sooty Tern. It feeds by snatching prey from the sea, rarely if ever settling on the surface. It may spend its first 8–9 years in the air, before setting foot on land to breed. On land, the record is held by the Common Swift. It remains airborne for 2–4 years, eating, sleeping, moulting, and even mating on the wing.

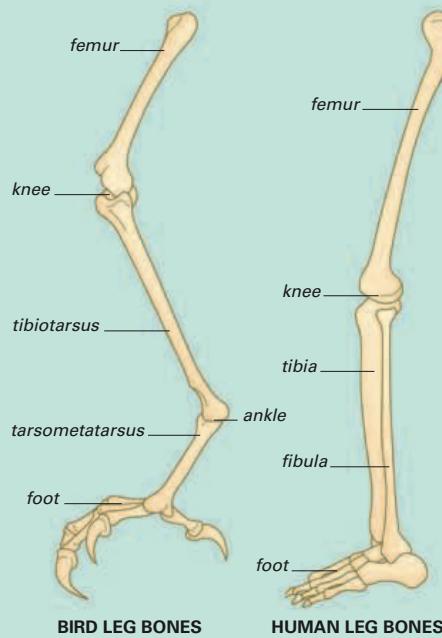
CHOOSING A LEVEL
Like other aerial insect-eaters, Cliff Swallows feed close to the ground in cool weather. In warm conditions they climb high into the sky, following insects that have been sucked up into thermals.

LEGS AND FEET

BIRDS ALL SHARE the same leg bones, but evolution has made the legs of different species even more varied than their wings. Some birds – such as swifts – have such tiny legs that they can barely use them to move on land, while some flying birds can run at over 30kph (18mph) and even a week-old duckling can swim as fast as a human can walk. This huge range of size and function enables birds to exploit many different habitats and sources of food.

ANATOMY

Compared to human legs, bird legs look as if they have backward-bending knees. However, the “knee” is actually the bird’s ankle joint; its true knee is usually hidden by plumage. The leg muscles are close to the body, near the centre of gravity. The lower leg, containing bones and tendons, is covered in scales and has little muscle, which is why birds’ legs often look pencil-thin. No bird has more than four toes, and some species have only two. The toes can be free and flexible, for perching, or they can be equipped with lobes or webs, for swimming or diving.



COMPARING LEGS

Unlike human legs, most bird legs are shorter above the knee than below it. Birds also have far fewer bones in their ankle joint. Several of these bones are fused, creating the tarsometatarsus – a compound bone that works as part of the leg, instead of part of the foot.

GRIPPING AND HOLDING

Because birds have wings, their legs carry out many of the tasks normally handled by front limbs. These include feather care – particularly in places where a beak cannot reach – and gripping perches, nesting materials, and food. Apart from ostriches, all birds have feet with opposable toes. Most have three toes facing forwards, and a single one that closes against them. Parrots and woodpeckers have two toes pointing in each direction, giving an unusually firm and stable grip, while Ospreys and owls can swivel their outer toe in either direction. Many birds grip food with their feet; raptors are armed with sharp talons enabling their feet to kill. Like humans, birds are right- or left-handed. In African Grey parrots (left), there are roughly equal numbers of each, but in other species, “left-handers” outnumber “right-handers” by three to one.



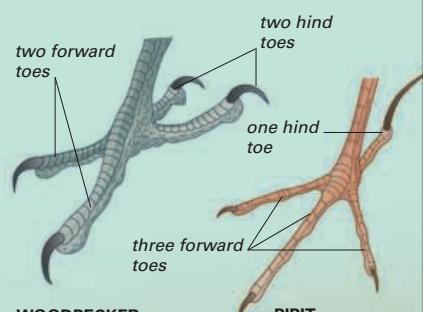
OSPREY CLAW

GRIPPING FOOD

Parrots are examples of birds that grasp food with one foot, lifting it up and then biting off pieces. Their toes are short and fleshy, but unusually strong and flexible.

ANTI-SLIP FEET

Ospreys feed on fish, and the soles of their feet have short, stiff spines that stop fish from wriggling out of their grasp. They also use their claws to pick up nesting material.



WOODPECKER

CLINGING AND PERCHING

A woodpecker’s feet give a firm grip on bark. Pipits have typical passerine feet, with slender and highly flexible toes.



STAYING BALANCED

A good sense of balance is essential for staying on a perch. Even asleep, these Sun Parakeets automatically monitor their own posture.

TENACIOUS GRIP

Blue Tits and other small songbirds have a remarkably strong grip and are able to hang upside down to feed – they can do this by one leg if the other is injured.



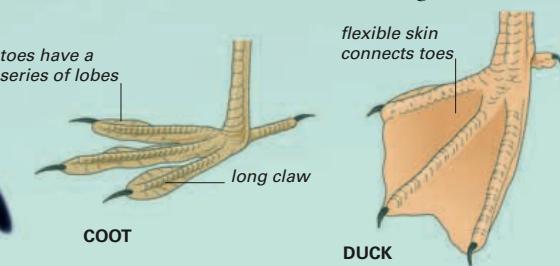


SWIMMING FOR LIFE

A duckling's webbed feet help it to escape trouble by fast swimming. This is useful, as duck mothers are famously careless of their young.

SWIMMING

Under threat, ducklings swim so quickly that they almost run over the surface of the water. This kind of speed is possible only with webbed feet. Webbing is a feature shared by many groups of waterbirds, and it can join the full length of the toes, or just part. In most species, the three forward-facing toes are webbed, but cormorants and their relatives have four webbed toes, leaving distinctive tracks when they walk across soft mud. Three groups of birds – coots, grebes, and finfoots – have rounded flaps attached to each toe, instead of webbing.



SWIMMING STYLES

Coots' toes have wide lobes that open when they kick backwards. Ducks have webbing linking the three forward-facing toes. Webbing gives faster propulsion, but lobes are better for walking on wet mud.

WALKING AND RUNNING

Most small birds hop, but above a certain weight, this becomes an inefficient way of moving on the ground. Instead, heavier land birds walk or run. Walking birds, such as ground hornbills and pheasants, have strong feet with short toes, which they often use to scratch up the ground. However, in the fastest runners – such as rheas and ostriches – evolution has reduced the size of the feet to minimize friction with the ground. Rheas have three toes, but an ostrich has just two. Its feet are the nearest thing to hooves among birds. At the other extreme, jacanas have four extraordinarily long and slender toes, spreading their weight as they walk across waterlily leaves.

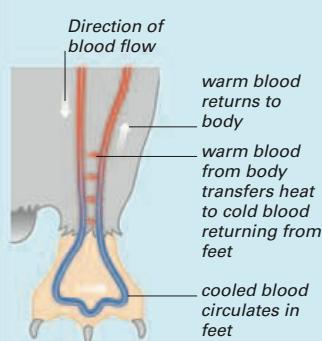


OSTRICHES ON THE RUN

Long, powerfully muscled legs and compact, hoof-like feet enable ostriches to hit record speeds when running across firm ground. Above the ankle joint are the powerful leg muscles that form a giant "drumstick". Bare skin on this part of the leg helps to prevent overheating when an ostrich is running at speed.

KEEPING WARM

Birds are widespread in cold habitats, and some – such as the Emperor Penguin – can spend weeks standing on ice. However, few apart from ptarmigans have insulated legs and feet. Instead, blood entering their legs flows through a "countercurrent" system, which removes most of its heat. As a result, a bird's legs and feet have less heat to lose.

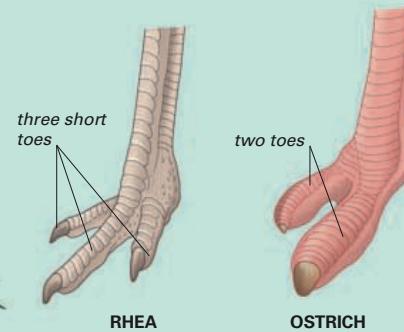
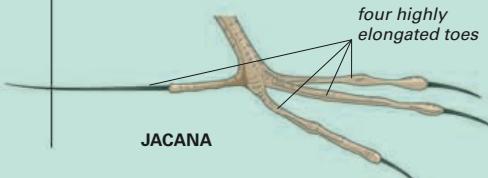


MOVING HEAT

High in a penguin's leg, a countercurrent reduces the temperature of blood flowing to the foot. Captured heat is kept within the body.

FEET FOR WALKING AND RUNNING

A jacana's long, thin toes spread its weight over delicate surfaces. The feet of a rhea or ostrich do exactly the opposite; they have fewer and shorter toes, with short, thickened claws for efficient walking and running.



WALKING ON WATER

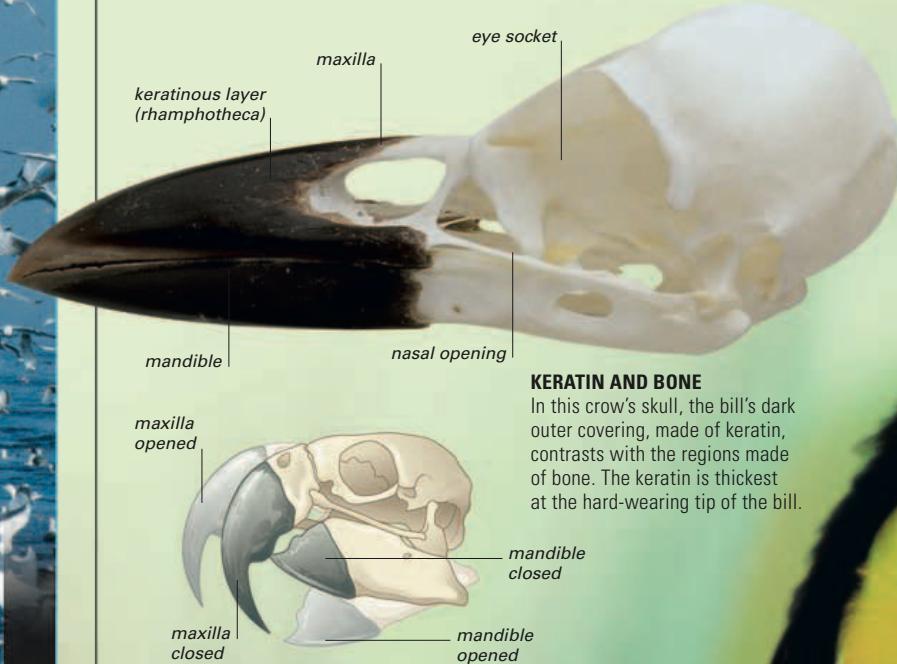
An adult African Jacana weighs less than 250g (9oz), so its huge toe span can support its weight on floating lily leaves. Males are nearly 50 per cent lighter than females, making them even less likely to sink.

BILLS

A BILL IS A MULTI-PURPOSE TOOL, used foremost for feeding, but also for preening, for building nests, and for keeping enemies at bay. Unlike mammals' jaws, bills do not contain teeth, but they do have a living outer covering, which grows constantly to make up for wear and tear. Bills have an extraordinary variety of sizes and shapes, and some are so distinctive that the birds can be recognized by their bills alone.

BILLS AND SKULLS

A bird's bill is an extension of its skull. The bill's upper and lower halves, known as the maxilla and the mandible respectively, have an underlying framework of bone, covered by a thin layer of nerves, blood vessels, and rapidly dividing cells. These cells produce keratin, the hard protein that makes up the outer part of the bill. Unlike the bony part of the bill, this hard covering – known as the rhamphotheca – grows throughout a bird's life. The growth compensates for the considerable amount of wear it endures, in the same way as growth compensates for wear on a bird's claws. When a mammal opens its mouth, only the lower jaw actually moves. But in many birds, both halves of the bill are hinged, allowing the upper half to open as well, widening the gape significantly.



KINESIS

Many birds can raise the upper half of their bill – something known as kinesis. This diagram shows how kinesis widens a parrot's gape, enabling it to grasp and crack open large nuts.

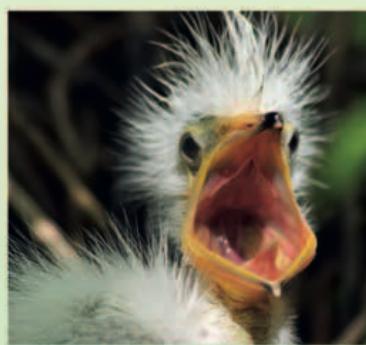
BILL DEVELOPMENT

When young birds hatch, their bills often look quite different from the adult form of the same species. Young songbirds typically have bills with a wide gape and brightly coloured margins – two adaptations that encourage the parent birds to cram them with food. Young herons hatch with short bills, while newly hatched flamingos show few signs of the adult's bent bill or "roman nose". These bill shapes develop by allometric growth – a form of growth in which some parts of the bill grow faster than others. During bird evolution, small variations in allometry have created the wide range of distinctive bill shapes that exist in some groups of birds.



RIGHT ON TARGET

A young Gouldian Finch opens its bill to reveal metallic spots – known as "reflection pearls" – that aid accurate food delivery.



NESTLING BEAK

When it hatches, an egret has a short bill with a funnel-like gape – useless for fishing, but ideal for receiving food deliveries.



ADULT BEAK

An adult egret's bill is long and slender – an ideal implement for spearing fish and catching frogs.

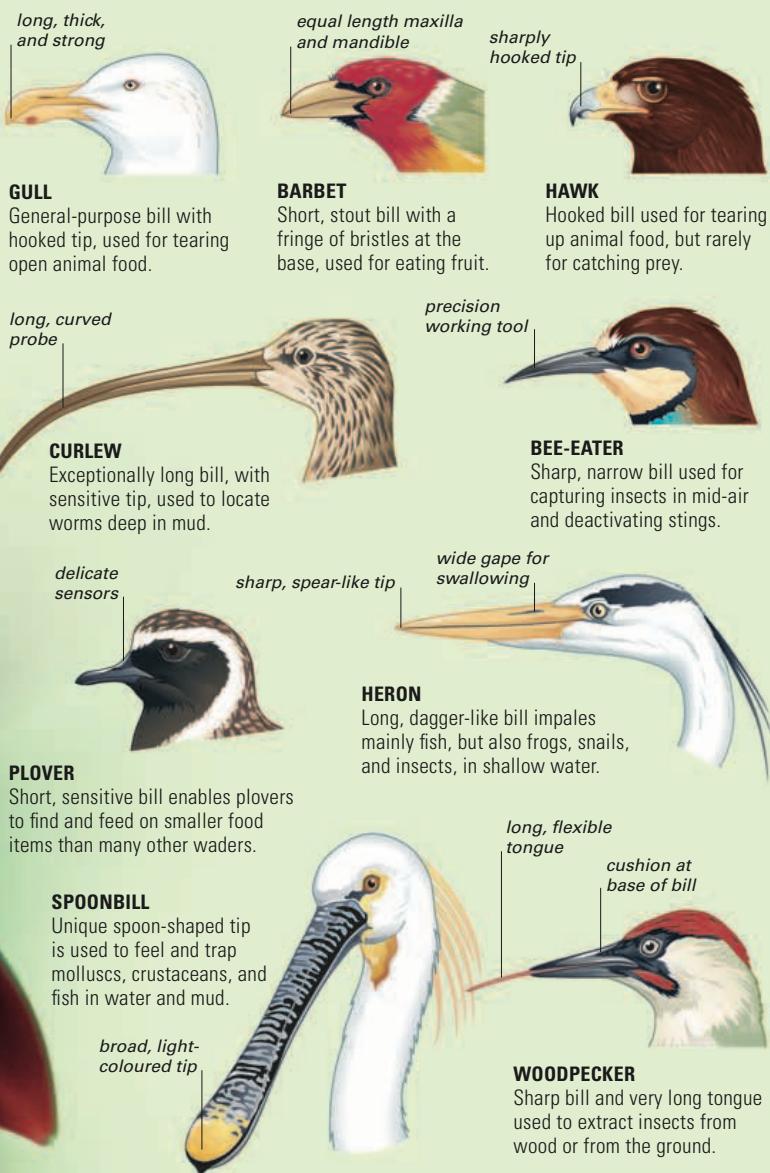


MARK OF DISTINCTION

A toucan's huge, flamboyant bill doubles as a feeding device and a visual signal, enabling each species of toucan to recognize its own kind.

TYPES OF BILL

Bill shapes have evolved hand-in-hand with different diets. General feeders, such as starlings, typically have straight, symmetrical, pointed bills, but the most specialized feeders, such as flamingos, have highly individual bills tailored to one specific diet. Birds like these are often unable to switch to any other type of food and are therefore very vulnerable to habitat change. In most birds, the bill follows the body's midline, and the upper part of the bill is equal in length to, or longer than, the lower part. However, there are two interesting exceptions to these rules: skimmers have a shortened upper part, or maxilla, while in adult wrybills, the tip of the bill curves to the right.



SENSITIVITY

Birds use their bills with great precision, thanks to nerve endings that make them sensitive to touch. This sensitivity is present from the moment that they hatch. Young songbirds, for example, often have fleshy "lips" around their bills: these are highly sensitive to touch, and make the bill spring open the moment the parent bird brushes it with food. In adult life, sensitive bills are particularly important for wading birds, which feed in muddy water or damp soil where it is difficult to see the prey. Their bills have nerve endings concentrated in the tip, while dabbling ducks have many along the sides. Using these nerves, a duck can sense things that move, and it can even feel the difference between seeds and inedible pieces of grit or mud.

BILL USES

Apart from their primary role in feeding, birds use their bills in many other aspects of daily life. One of the most important is preening (see p.29), or routine feather care. During preening, birds use their bills like a combination between a comb and a pair of tweezers, smoothing out their feather barbs so that they link up in the correct way. Waterbirds also use their bills to apply the oil that keeps their plumage waterproof. During the breeding season, many birds use their bills to build their nests. For penguins and grebes, this often involves little more than picking up a few dozen stones or some floating waterweed. At the other extreme, tailorbirds use their bills like needles, piercing large leaves and then sewing their edges together using plant fibres or the silk from spiders' webs.

Bills also play an important role in communication; either visual – for example, in toucans – or audible, in species that clatter their bills or drum them on hard surfaces. Just like plumage, bill coloration is often most pronounced at the beginning of the courtship season. Puffins, for example, sport splendidly coloured bills in early spring, but look much more drab six months later, when the outer, brightly coloured layers of the bill have flaked off. During courtship, some pairs of birds may caress each others' bills or feed each other, to help form and strengthen their relationship.



BALANCING ACT

The Sword-billed Hummingbird has the longest bill in relation to its body. To stay balanced, it holds its bill at a steep angle both when feeding and when perched.



EATING ACCESSORY

The Bald Eagle's bill acts like a piece of cutlery, rather than a weapon. Once it has landed a fish with its talons, it uses the hooked tip to tear up its food. Most other fishing birds swallow prey whole.



RAPID REACTIONS

Avocets scythe their bills through the water to catch small animals. Their reaction time, if they touch anything edible, can be as short as $\frac{1}{50}$ th of a second.

narrow maxilla

contracted skin of pouch

RECORD BREAKER

Pelicans have the largest bills in the bird world, up to 47cm (18½in) in length. The sides of the mandible are strong but springy, allowing them to bulge outwards when the pouch fills with water.



FEEDING ON ANIMALS

COMPARED TO MANY OTHER ANIMALS, birds have high-energy lifestyles, and so they need a large intake of food. For more than two-thirds of the world's birds, this consists mainly of animals. Animal food is high in energy and in protein, but it has one major drawback: it takes skill and time to catch.

MEAT-EATERS

Two unrelated groups of birds – birds of prey and owls – hunt by catching prey with their talons, either on the ground, in water, or in mid-air. Known as raptors, they all have hooked bills, and use them to tear up prey that is too large to be swallowed whole. Raptors feed mainly on vertebrates, but the smallest species, such as falcons and the Elf Owl, catch dragonflies, beetles, and moths. Most raptors are solitary hunters, but a few, such as Harris's Hawk, cooperate to make kills.

Some meat-eating birds are scavengers. This lifestyle requires long periods spent searching for dead animals, or carrion, but it avoids the energy-draining effort of more active hunting. Vultures rely entirely on scavenging, but many other scavengers eat both carrion and live food. They include several storks, including the Marabou and the Greater and Lesser Adjutants.

CARRION-EATERS

Hunched over the remains of a wildebeest, two Marabou Storks digest a recent meal. By soaring, they can scan huge areas for carrion, in much the same way as vultures.



KLEPTOPARASITES

Rather than catch their own prey, some birds specialize in stealing food that other birds have caught. They are known as kleptoparasites, which literally means "thief parasites", and are most common in coastal habitats, where they chase other birds for fish. Kleptoparasites include skuas, jaegers, and frigatebirds.

NEST ROBBER

In subantarctic waters, skuas rob food from penguins, and also steal their eggs. Here, a Gentoo Penguin is trying to fight back.



FISH-EATERS

Birds that fish for a living can be found almost wherever there is water, from ponds, rivers, and lakes to the furthest reaches of the open ocean. Many search for fish on the wing, and attack from the air. Terns and kingfishers often hover before they dive, but gannets and boobies slam into shoals of fish like a salvo of arrows, giving their prey little chance of escape. Diving birds chase fish underwater, and to help them swim faster have adaptations to reduce their buoyancy. Anhingas and cormorants have "wettable" feathers, a feature that drives out pockets of air from their soaked plumage, and penguins have unusually dense bones compared to the lightweight skeletons of other birds.



CARRYING PREY

Gripping a fish in its talons, a White-tailed Eagle heads back towards the shore. Unlike diving birds, which swallow their prey straight away, birds of prey and owls almost always return to a perch before eating their catch.



SPEARING FISH

Anhingas use their bills like daggers, impaling fish rather than gripping them. Having made a catch, they toss the fish into the air, then swallow it headfirst.

INSECT-EATERS

Invertebrates are by far the most numerous animals on land, which explains why so many birds use adult insects and insect grubs as their main source of food. In temperate regions, most insect-eaters are migrants, but in the warmth of the tropics, birds can survive on insects all year round. Many insect-eating birds feed on little else – apart from other small animals such as spiders – but plant-feeding birds often catch insects as well, particularly when they are raising a family. They do this because insects provide the protein young birds need for growth. Insects are also a vital supplement for nectar-feeders such as hummingbirds, because although sugary nectar is high in energy, it lacks necessary protein.

The majority of insect-eaters search for food on foliage or on the ground. The smallest of them are so sharp-eyed that they can spot individual insect eggs, or pick up aphids one by one. Larger birds often specialize:

North America's Black-billed Cuckoo eats hairy caterpillars, for example, and several species of woodpecker target ants. Insect-eaters also include aerobatic hunters such as swifts, swallows, bee-eaters, and nightjars. Swifts, and their night-time equivalents the nightjars, Hoover up the small flying insects that make up clouds of "aerial plankton".

VENOMOUS PREY

Bee-eaters are expert at feeding on stinging insects. Before it swallows the bee, this Little Bee-eater will thrash it against the branch to squeeze out the insect's venom.

WADERS AND FILTER-FEEDERS

Apart from fish, water contains a wide variety of other animals eaten by birds. This is particularly true in the shallows and on tidal mudflats – habitats that attract large flocks of waders (or shorebirds). Many waders search for buried worms and molluscs, which they locate mainly by touch. A wader's bill is far more versatile than a simple pair of pincers: it functions as a highly sensitive probe, and at its tip the two mandibles can often separate while the rest of the bill is closed, enabling the bird to grip buried animals without getting a mouthful of sticky mud or sand. Another common system for finding food in water is filter-feeding. Instead of catching animals one at a time, filter-feeders sieve them in bulk from the water. Some ducks use a simple form of filter-feeding when they sift small animals from mud, while prions also filter animals at sea. However, the most specialized filter-feeders are flamingos, which live in fresh water, salt lakes, and brackish lagoons. Flamingos use their bills and bristle-edged tongues to filter out a range of small organisms, from crustaceans and insect larvae to microscopic algae called diatoms.

USING TOOLS

Relatively few species of bird use tools, and when they do it is almost always to get at animal food. The most renowned avian tool-user is the Woodpecker Finch of the Galapagos Islands, which snaps off a cactus spine to help it prise hidden insects out of wood. Egyptian Vultures throw stones to crack open ostrich shells, while Song Thrushes batter snails against a stone "anvil" to break them apart. The Green Heron has one of the most remarkable tool-using techniques: it crouches by the water's edge, then throws bait onto the surface to attract minnows. Its commonly used bait includes earthworms, insects, and feathers.

Tool-using behaviour was once thought to be "hard-wired" into birds' brains – in other words, it did not have to be learned. But now most ornithologists think the true situation is more complex than this. In captivity, Galapagos ground finches have learned how to use cactus spines by watching Woodpecker Finches, and in Egyptian Vultures, stone-throwing also seems to be a cultural trait (as opposed to an inherited trait) that is passed on when one bird imitates another.

MID-AIR FEEDING

Many small falcons catch insects on the wing. This Eurasian Hobby has just caught a dragonfly, and has transferred it from its talons to its bill to dismember in mid-air.



SWEEPING UP FOOD

Avocets (such as these Pied Avocets) are unlike most waders in that they filter feed by rhythmically sweeping their fine, upturned bill from side to side to sift tiny shrimps out of shallow water.



SMASH AND GRAB

The Eurasian Oystercatcher feeds mostly on molluscs such as mussels and limpets. It hammers the shellfish open on rocks, or deftly cuts the muscle that holds the shell closed, then stabs the soft animal inside.



BREAKING EGGS

Using a stone, a young Egyptian Vulture tries to break into an ostrich egg. During the learning process, it will often throw the stone in the wrong direction, missing the egg.



TWEEZING GRUBS

By holding a cactus spine, the Woodpecker Finch can overcome the disadvantage of having a short bill and winkle insect grubs out of crevices in tree bark.

FEEDING ON PLANTS

UNLIKE MAMMALS, FEW BIRDS EAT LEAVES, but many rely on other types of plant food. The most important vegetarian foods for birds are seeds and fruit, and in warm parts of the world many species feed on nectar and pollen. Plant food is often seasonal, which means that birds tend to use a series of different food sources throughout the year. Some birds are omnivorous – they eat more or less whatever they can swallow and digest, which makes them successful colonizers in towns and cities.



FEEDING AT FLOWERS

More than 1,500 species of bird feed mainly or entirely on flower nectar and pollen. The majority live in the tropics, but they also include migrants such as the Rufous Hummingbird, which has a summer range that extends north to within a few hundred kilometres of the Arctic Circle. Australia also has a large number of flower-feeders, many of which pollinate its trees and shrubs. Most of the birds that feed at flowers, such as hummingbirds, honeyeaters, and sunbirds, have long bills and tongues for reaching into blooms to suck up nectar. Lorikeets have a different technique. These parrots crush flowers in their bill, then lap up the nectar and pollen using their brush-tipped tongues.



SIPPING NECTAR

Clinging tightly with its feet, a Malachite Sunbird sips nectar from the flowers of an aloe plant in southern Africa.

VITAMIN SUPPLEMENT

For many plant-eating birds, such as this Ashy-headed Goose from Patagonia, flowers are a source of extra vitamins, not a staple food.

SEED-EATERS

Seeds are packed with nutrients, and they are easy to digest – two factors that explain why more birds eat them than any other plant-based food. Seed-eaters include a vast range of small songbirds, such as finches, weavers, and sparrows, as well as larger birds such as nutcrackers and jays. Most seed-eaters have short, heavy bills. In finches, the upper half has a grooved edge, and the bird rolls the seed inside it to crack away the outer husk. Nuthatches use a more forceful technique, wedging seeds in crevices and then pecking them apart. Many small seed-eaters feed in flocks, and some species are so abundant that they can be major agricultural pests. Unlike fruit or leaves, seeds remain edible for a long time if they are stored, and in regions with cold winters birds often bury seeds so that they can retrieve them when food is in short supply. This behaviour, known as caching, is particularly widespread in crows, jays, and nutcrackers. Clark's Nutcracker, from western North America, can store over 30,000 seeds in a single year and relocate its caches under several centimetres of snow.



SEED FEAST

The European Goldfinch has a fine, sharply tipped bill with which it dexterously extracts seeds from the dozens of tiny holes in flower heads.



STORING NUTS

In western North America, Acorn Woodpeckers store food in "granary trees". They collect masses of acorns and force each one into a hole drilled in the wood or bark.

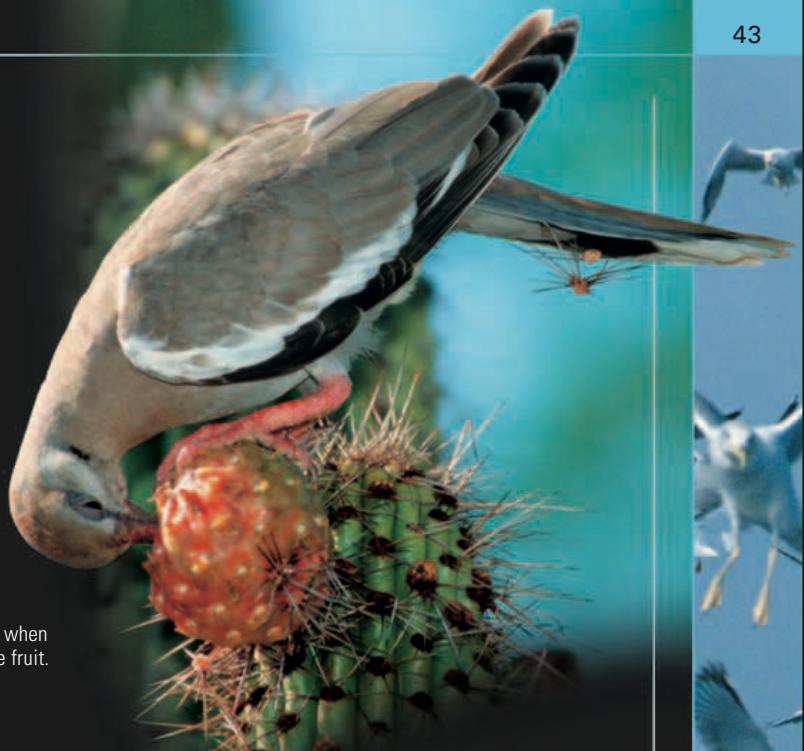


CRACKING OPEN FRUIT

Thanks to their massive bills, macaws can feed on hard-shelled fruit, splitting it to reach the nutritious kernels inside. These Hyacinth Macaws are eating the fruit of the Acuri Palm in Brazil's Pantanal wetland.

FRUIT-EATERS

In temperate regions, insect-eating birds often develop a taste for fruit during the autumn and early winter. Many thrushes, including the Eurasian Blackbird and American Robin, make the most of this seasonal harvest until the supply finally runs out. But in the tropics and subtropics, different trees come into fruit at various times throughout the year, and so many birds there feed on fruit all year round. They include birds such as toucans, trogons, and turacos, a large number of parrots, and also many pigeons and doves. In rainforests, a large fruiting tree soon attracts flocks of these birds, which rapidly strip the tree, often in the company of squirrels and monkeys. One unusual fruit-eater in the tropics – the Oilbird of South America – feeds at night and finds ripe fruit by smell alone. Most fruit-eaters swallow their food whole. Once a bird has digested the flesh, it scatters the seeds in its droppings, helping its food plants to spread. Small berries are easy for birds to tackle, but in the tropics, some pigeons gulp down wild figs and palm fruit measuring up to 5cm (2in) across.



MIGRATION FUEL

Fruit can be an important food for migratory birds. White-winged Doves time their journey through North America's Sonoran Desert for when the Saguaro Cactus bears ripe fruit.

DIGESTING PLANT FOOD

Birds do not have teeth, so they cannot chew their food. Instead, most of them swallow it whole. The food's first stop is often a sac-like elastic chamber called the crop, just in front of the bird's furcula or wishbone. The crop is a temporary store that enables birds to feed in a hurry, reducing their chances of being spotted and attacked; once swallowed, food reaches the crop very quickly and it can be digested later when the bird is in a safe place. In carnivorous birds, the food then travels into the upper part of the stomach, called the proventriculus, where it is broken down by powerful acids. But in plant-eaters, this simply softens up the food, and the real task of breaking it down is carried out by the lower part of the stomach, a chamber called the gizzard. This has thick muscular walls, and it crushes the food, gradually reducing it to a pulp. To help this process, seed-eating birds often swallow grit or small stones that lodge in their gizzard. These hard fragments form an abrasive paste that aids digestion.

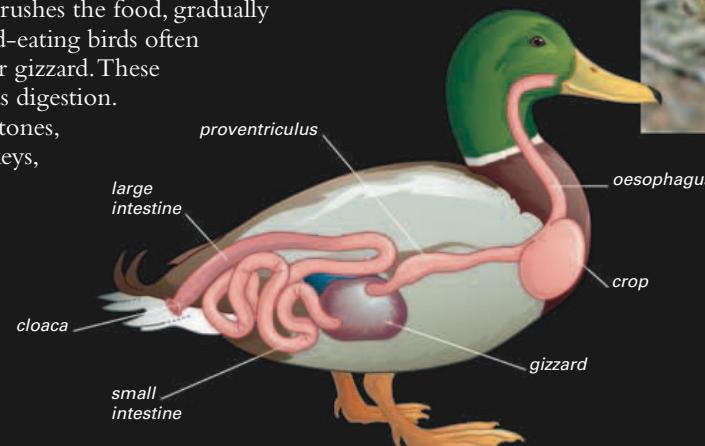
Ostriches carry up to 1kg (2½lb) of gizzard stones, and may even swallow metal objects such as keys, which their gizzard is strong enough to bend.

In predatory birds, the gizzard has a different role. It collects indigestible remains, such as fur, feathers, or beetle wing-cases, and squeezes them into slippery pellets. The bird brings the pellets back up, showing exactly what it has been eating. For

some rare forest owls, pellets retrieved from the ground are the only source of information about their diet.

DIGESTION AID

This female Grey-headed Bullfinch from China is gathering grit on the ground. Grit is particularly important for seed-eating birds such as this, because without a regular supply their digestive system does not work at peak efficiency.



ANATOMY OF A BIRD'S DIGESTIVE SYSTEM

The digestive systems of all birds are made up from the same parts, but the relative size of each structure varies between species according to its diet. The Mallard duck, shown here, is omnivorous and has a well developed crop and gizzard.

OMNIVORES

The Common Starling is a classic example of an omnivorous bird. Bold and aggressive, it eats whatever it can find, from seeds and insect grubs to scraps of leftover food. This versatility helps to explain its rapid spread across North America, and other parts of the world where it has been introduced. Many other urban birds, such as crows and gulls, show the same kind of behaviour, although not all omnivores are this bold. In freshwater habitats, ducks often eat a mixture of seeds, aquatic plants, and small animals, which they obtain from the water or wet mud. On land, some of the most widespread omnivores are gamebirds, which often scratch up their food with their feet. Domestic chickens share this typical gamebird trait: when left to range freely, they eat seeds, flowers, insects, earthworms, and even slugs – one of the widest diets in the bird world.



STARLINGS FLOCKING

Some omnivorous birds have benefited hugely from human changes to the natural world. For example, open pasture, playing fields, and airfields are ideal feeding grounds for Common Starlings. They also thrive in urban areas and in winter often gather in large flocks to roost.

COMMUNICATION

IN THE BIRD WORLD – just as in the human one – the main methods of communication are sight and sound. Birds use visual signals to recognize each other, attract potential mates, and keep rivals at bay. The same is true of their calls and songs, but this kind of communication has one crucial advantage: the message stills gets across when a bird is hidden or some distance away.

VISUAL COMMUNICATION

Birds cannot produce facial expressions, and they have limited scope for gesturing in other ways. Instead, their feathers play a key role in visual communication. Brightly coloured plumage works like an identity badge, and in some species, such as lyrebirds and birds of paradise, the males seem to transform themselves completely when they carry out displays. Less eye-catching, but just as important, are the many subtle signals that birds send out at close quarters. For example, many songbirds convey aggression or excitement by raising their head feathers, or by spreading their tails. These movements may last for just a fraction of a second, but this is long enough for other birds to notice and respond.

PATTERNS AND COLOURS

Birds have superbly detailed, full-colour vision (see p.26), which is why plumage colours are often a key feature that enable birds to identify their own kind. In European Robins, the sight of an intruding male's breast will often trigger a resident male to stage an attack. This instinct is so strong that robins will even attack a red sponge fixed to a stick. Young European Robins have brown breasts, and so until they moult into adult plumage are safe because they do not provoke the same belligerent response. Another illustration of birds' instinctive reaction to bright coloration is provided by parent songbirds. Their nestlings have red or orange mouth linings, which stimulate the adults to push more food into them.



SPECTACULAR TRANSFORMATION

Most of the time, the male Superb Lyrebird keeps its tail closed and is hard to spot. But it is impossible to miss during its noisy courtship display, as it rotates on the spot with its lacy tail plumes held up high.



MALES FIGHTING

When male European Robins come this close, a fierce skirmish is sure to follow. Females have exactly the same coloration, but males can tell they are potential mates, rather than rivals, by the way they behave.

**SPRING SOUNDS**

Passerines, such as this Golden-winged Warbler, sing energetically in spring to establish a territory, especially on sunny days, but seldom in winter.

danger or to ensure that birds remain in a group, and are normally short and simple. By contrast, songs are usually produced only by male birds, although females may join in to form a duet. Songs are often far more elaborate than calls, and are used to claim territories and attract mates.

CALLS AND SONG

Bird sounds range from simple calls to songs of extraordinary beauty and complexity.

The loudest songs – a deep booming produced by large species of bittern – can be heard up to 5km (3 miles) away. But, for their size, small songbirds are even more impressive. The Winter Wren, for example, weighs as little as 10g ($\frac{1}{3}$ oz), but its explosive song is often audible from hundreds of metres. In general, birds produce two kinds of sound. Alarm calls and contact calls are made by both sexes, to signal

**SYRINX**

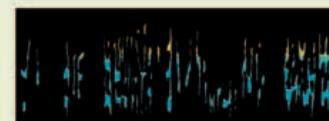
Bird calls and songs are produced by the syrinx. This is usually positioned at the top of the chest, where the trachea or windpipe divides into two bronchial tubes on its way to the lungs. As a bird exhales air, the tympanic membranes in its syrinx vibrate, producing the tone of the call or song. The pitch is controlled by rings of cartilage, which tighten or relax to change the air pressure inside the clavicular air sac in the centre of the syrinx.

COMPETITION FOR MATES

Male Three-wattled Bellbirds perform their song from a high perch – often a broken-off branch. Rival bellbirds use their metallic, powerfully resonant song as a form of sonic combat, to vie for the attention of the listening greenish-yellow females.

SONG DEVELOPMENT

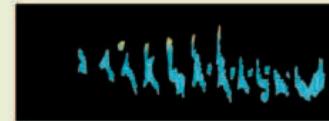
Birds hatch with the instinct to sing, and in some species, such as pigeons and doves, little or no learning is needed. But in most songbirds, fledglings inherit only the basics of the song. As they grow up, they refine their singing technique by listening to adults around them. The spectrograms below show how a Common Chaffinch's song develops as it grows up. At first, the song is unstructured and erratic, but the adult bird's song has clear phrases repeated each time it sings.



EARLY JUVENILE



LATE JUVENILE



ADULT

**GREY PARROT**

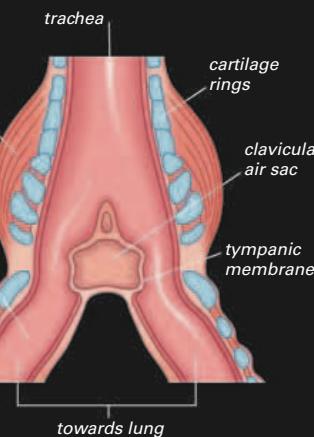
In captivity, this parrot can pick up a vocabulary of more than 100 words. It seems to be able to communicate simple ideas.

**NORTHERN MOCKINGBIRD**

This North American mimic can copy the calls and songs of up to 30 species of bird, building them into a melody of its own.

**COMMON HILL MYNA**

A popular cage-bird, the Hill Myna belongs to the starling family – a group known for their loud and often expert mimicry.

**MIMICRY**

MIMICRY

Parrots and mynas are famous for their ability to mimic human speech, but mimicry does not only occur in captive birds. A wide variety of wild songbirds, from Marsh Warblers to mockingbirds, incorporate mimicked sounds in their calls or songs. Male Marsh Warblers have been known to imitate up to 80 other species of bird – some from their breeding range in Europe, and others from their winter range in Africa. Birds also mimic all kinds of background sounds, from machinery to mobile phones. Until recently, mimicry was thought to involve nothing more than simple copying by rote. However, research shows that Grey Parrots can learn to communicate through human speech, and they may have linguistic skills as advanced as those of a Chimpanzee.

MECHANICAL SOUNDS

Bird sounds are not restricted to calls and songs – many birds can also make non-vocal sounds, which they use for communication. One of the simplest is wing-clapping – a signalling technique used by many birds, including pigeons and doves. Male woodpeckers make loud drumming sounds by hammering with their bills, while courting grouse often stamp with their strong feet. But some of the most extraordinary sounds are made by birds that have specially modified feathers. The Common Snipe makes loud bleating sounds with its outer tail feathers as it dives through the air, and some hummingbirds whistle with their wings. Male manakins can produce bizarre snapping and buzzing sounds, by rubbing together their inner wing feathers, which have thickened shafts.

BILL CLATTERING

With their heads raised, a pair of White Storks clatter their bills in a greeting ceremony at their nest. Such displays can be seen throughout the breeding season.



DEFENCE

BIRDS ARE CONSTANTLY IN DANGER from predators, yet only a handful have effective weapons. For this reason, most birds take flight or run to cover at the least sign of trouble. In the breeding season, they stand their ground with much more determination. Many breeding birds are weaker and smaller than their enemies, but they have some fascinating ways of protecting their nests and putting predators off the track.

EMERGENCY ESCAPES

For all birds, survival depends on perpetual vigilance and readiness to flee. Ground-feeding birds have a limited view of their surroundings, and so they spend much time nervously looking up – in a flock of grazing geese, for example, there are always several alert birds acting as sentries. When threatened, most birds immediately fly or run away, but gamebirds often sit tight before bursting into the air at the last moment.

Birds that feed above the ground have a better view, so are harder to catch by surprise. However, after dark they turn into easy targets because they are reluctant to fly. Many predators, including tree snakes, owls, and martens, exploit this weakness by hunting roosting birds at night.

NEST DEFENCE

Splashing furiously, a Eurasian Coot tries to protect its nest from a Grey Heron. Coots are naturally aggressive, and this one stands a good chance of driving off the intruder.

DISTRACTION DISPLAYS

A few songbirds fight back if their nests are threatened, but most abandon their eggs or young rather than risk their lives. It makes more sense to start again and raise another brood than to die for a hopeless cause. However, many ground-nesting birds try to lure predators away from their nests with special distraction displays. For example, waders often limp from their nest, holding out a fluttering wing as if it is broken. With luck, a predator will follow the “injured” parent and can be led away from the eggs.



CONFUSING PREDATORS

This Eurasian Dotterel is carrying out a distraction display. The aim of this high-risk strategy is to divert the attention of a potential predator, so that it leaves the bird's nest alone.



FIGHTING BACK

Among the handful of birds able to inflict serious damage on their enemies is the flightless Southern Cassowary, which can deliver slashing wounds with the long, sharp claw on its innermost toe. Terns are notoriously aggressive if their nests are threatened, and take off to dive-bomb any intruders, including people, who stray too close. They may make contact with their sharply pointed bill, often drawing blood. Birds without such a formidable weapon must adopt different defensive tactics. Some ground-nesting birds protect their vulnerable eggs by appearing more dangerous than they actually are – usually by rearing up with outstretched wings. This display is enough to prevent cattle trampling the nest, but is less successful with carnivorous mammals. Songbirds and gulls rely on strength in numbers to harass predatory birds such as hawks, owls, or ravens, by swooping around them in a gang until they eventually leave the area. This form of collective defence is known as mobbing.



MOBBING

A pair of Hooded Crows mob a passing Eurasian Sparrowhawk. Eventually, the relentless harassment by the crows will drive the bird of prey elsewhere.

HUMAN IMPACT

RECOGNIZING DANGER

Birds start life with an instinctive ability to recognize predators. Nestlings can often identify birds of prey, while many birds have a fear of snakes. However, these instinctive recognition systems are not foolproof. In the past, many seabird colonies were decimated by hunters, because the birds did not perceive people as a threat.



SITTING TIGHT

These Laysan Albatrosses are nesting on a golf course on Midway Island, Hawaii. They have no instinctive fear of humans.

CAMOUFLAGE

Compared to mammals, many birds are brightly coloured, which makes camouflage seem like an unlikely kind of defence. In reality, even some of the world's most eyecatching birds, such as trogons, cotingas, and fruit pigeons, can be remarkably difficult to see in their natural habitat. Their vivid colours make them extremely conspicuous in the open, but they seem to disappear altogether against a background of sun-dappled leaves. However, camouflage is best developed in birds that feed at night and roost by day. Owls, nightjars, and potoos all use it to help them blend in with trees or open ground while sleeping during the day, and bitterns and rails use their camouflage to hide among reeds. Male songbirds are often colourful, while females have more muted plumage in shades of grey or brown. This difference has evolved because – in most cases – the female is the sole or chief incubator.

Sitting on her nest for hours at a time, she relies on camouflage to avoid being seen. The male, on the other hand, can fly away from danger, which offsets the risk of being easy for predators to see.

VANISHING ACT

When a Eurasian Bittern senses danger, it stretches upwards with its bill pointing skywards, to emphasize the reed-like streaks in its superbly camouflaged plumage.

EVADING PURSUIT

For birds, even the air is unsafe, because some predators specialize in catching birds on the wing. Small songbirds are the most frequent victims, and so they are particularly aware of this danger. If they spot a bird-eating hawk or falcon, they disappear into cover almost instantly, often giving a hurried alarm call to alert other birds nearby. They remain completely still and silent until the hawk has moved on. In the open air, flocking birds such as waders and Common Starlings bunch together if a bird of prey appears, twisting and turning in a tight aerial formation – an amazing display of timing and coordination. This behaviour makes it much more difficult for the predator to select a target bird from the confusing mass of moving bodies in the group.

DOUBLE DEFENCE

Snipe have a two-track strategy for dealing with danger. Initially, they crouch down and rely on their camouflage to escape detection – sometimes until almost trodden on. If a snipe is flushed from cover, it flies away in a zig-zag path (left) to shrug off its pursuer.



BREEDING

REPRODUCTION IS THE MOST important task in a bird's life. It is a challenging process with many stages, from setting up a territory and attracting a mate, to making a nest, incubating the eggs, and finding enough food for the young. Sometimes these tasks are shared fairly equally, but bird breeding systems are very varied. In some species, the male participates fully, and in others the female raises her family alone. During the breeding season, timing is critical, particularly in the far north and south where the window of opportunity may be just a few weeks long.

TOGETHER OR APART

The manner in which birds breed is often affected by the availability of nesting sites. Seabirds typically nest at very high densities in large colonies, partly because suitable sites may be few and far between. Every year, the birds return to the same location, often meeting up with the same mate from the year before. Their loyalty to the site can be extraordinarily strong. For example, Juan Fernandez Petrels wander over most of the west and central Pacific, but all of them come together to breed on Robinson Crusoe Island – a remote outcrop of volcanic rock 675km (420 miles) west of Chile. Site faithfulness also stretches far back in time. Frozen Adelie Penguins, found entombed in Antarctic ice, prove that some of this species' breeding sites have been in use for at least 600 years.

Birds that live on land face fewer restrictions when looking for a home, and so many species breed in individual territories, setting up a new one each year. But for some land birds, nesting sites are not always easy to find. Hole-nesters require a suitably sized cavity in a tree, cliff, or building, and these are in limited supply. Often there is such strong competition that if a resident bird is absent – even for a few minutes – another may take over and move in.

BREEDING SEASONS

On and near to the equator, many species of bird breed more or less all year round. But in the rest of the world, particularly in temperate and polar regions, the breeding seasons of birds are often sharply defined. They are triggered mainly by changes in day length, although rising temperatures also play a part. If all goes

well, the outcome is that birds raise their young when the food supply is at its peak. Most birds are not simply reluctant to breed at other times – they are physically incapable of doing so. This is because their reproductive system shuts down and shrinks, an adaptation that helps flying birds to save weight. The main exception to this rule are nomadic desert species, such as Zebra Finches and Budgerigars. These can "switch on" their breeding cycle within days of rain to make the most of the sudden breeding opportunity.

When the breeding season is in progress, different species divide it up in different ways. Most seabirds raise a single brood, often consisting of one offspring. In warm regions, however, songbirds may raise several families in a few months. In an exceptionally good year, a pair of House Sparrows can raise five successive broods – a marathon reproductive effort.



EARLY START

Dusted with snow, a Southern Giant Petrel incubates its single egg. Like most polar birds, it begins to breed before winter is over because its offspring takes a long time – up to 130 days – to leave the nest.



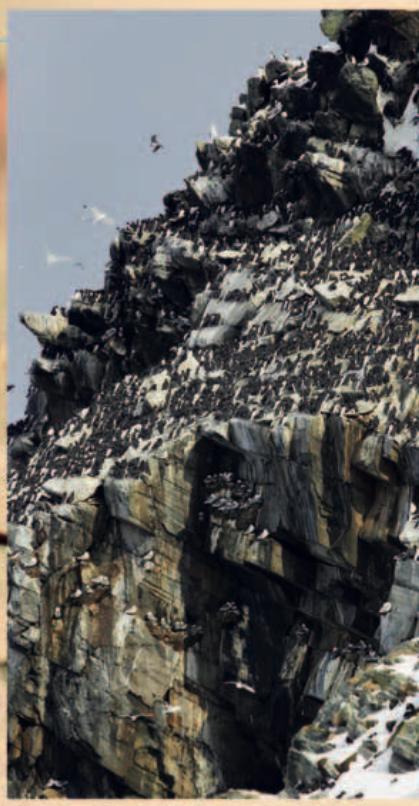
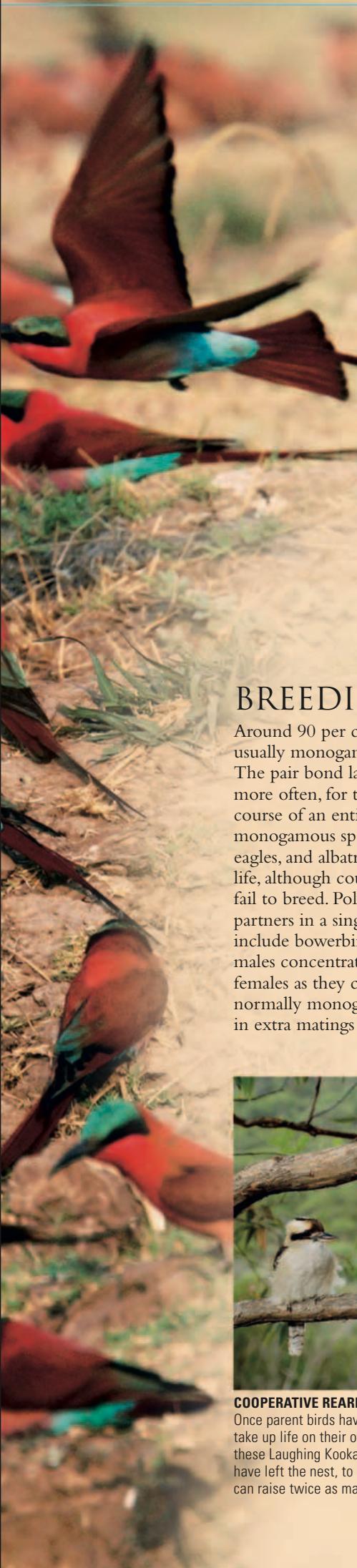
RIVALS IN THE COLONY

Like many seabirds, Mediterranean Gulls nest close together, but each breeding pair claims its own territory within the colony. Parents have to be on their guard because their neighbours may try to eat unattended eggs or chicks. Noisy squabbles are a frequent occurrence.



EXCAVATED NEST SITES

Southern Carmine Bee-eaters need sandy river banks to dig their nesting burrows, and where conditions are ideal dozens of birds breed in close proximity.

**SMALL TERRITORIES**

When crammed together on a sea cliff to breed, guillemots have some of the smallest territories of any bird. They lay their eggs directly on the rock, and each pair "owns" a section of cliff just a few centimetres across.

BREEDING SYSTEMS

Around 90 per cent of all species of bird are usually monogamous: they have one partner. The pair bond lasts for a single nesting, or more often, for two or more broods over the course of an entire breeding season. In a few monogamous species, such as storks, swans, eagles, and albatrosses, the pair bond lasts for life, although couples may "divorce" if they fail to breed. Polygamous birds have several partners in a single breeding season. They include bowerbirds and grouse, in which the males concentrate on mating with as many females as they can. Most species that are normally monogamous may also take part in extra matings outside their pair bond.

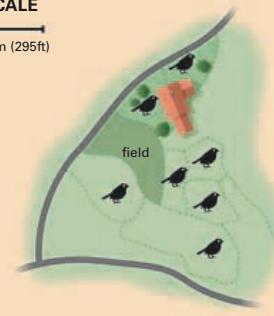
**COOPERATIVE REARING**

Once parent birds have successfully raised their young, the juveniles normally take up life on their own. However, in at least 300 species of bird – including these Laughing Kookaburras – young birds remain with their parents after they have left the nest, to act as helpers with their next brood. Parent kookaburras can raise twice as many young when they have this kind of assistance.

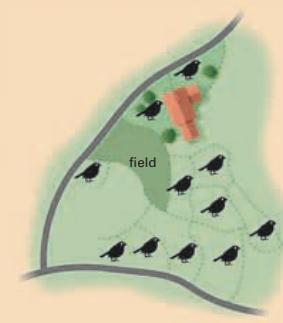
TERRITORIES

When a male bird is ready to breed, it starts by establishing a territory – a piece of ground that it defends from its rivals. For species that nest in groups, territories can be less than 90 square cm (144 square in), but for large eagles they may be several kilometres across. Territories serve as mating grounds, and often – but not always – as places for nesting and gathering food. A good territory helps to attract females, and if they are impressed enough, they mate and move in. Because territories belong to individual birds, they change with time. The most extreme form of this occurs in species whose males display to females in communal leks (see p.50). Here, territories are reduced to symbolic patches of ground, and the owner of a desirable patch may hold it for as little as half an hour.

SCALE
90m (295ft)

**ROBIN TERRITORIES IN SPRING**

A study of European Robins shows how territories change through the year. There are fewer territories in early spring because many birds die in the winter; some territories are quite large.

**ROBIN TERRITORIES IN WINTER**

Nine months later, young robins have swelled the population and so there are more birds competing for the same amount of ground. As a result, several new territories have been set up, mostly carved out of existing ones.

**MONOGAMOUS BIRDS**

White Storks mate for life, and often perform greeting displays to reaffirm their pair bond. Each pair of storks also returns to the same nest year after year. The species is traditionally associated with longevity and fidelity throughout its Eurasian breeding range.

POLYGAMOUS BIRD

A Winter Wren sings from a tree stump to attract partners. Male Winter Wrens are often polygamous, building several nests in their territory, one for each of their mates. But they can only do this if food is plentiful because they usually help to feed the young – to raise several broods, a male has to be able to find food quickly.



COURTSHIP

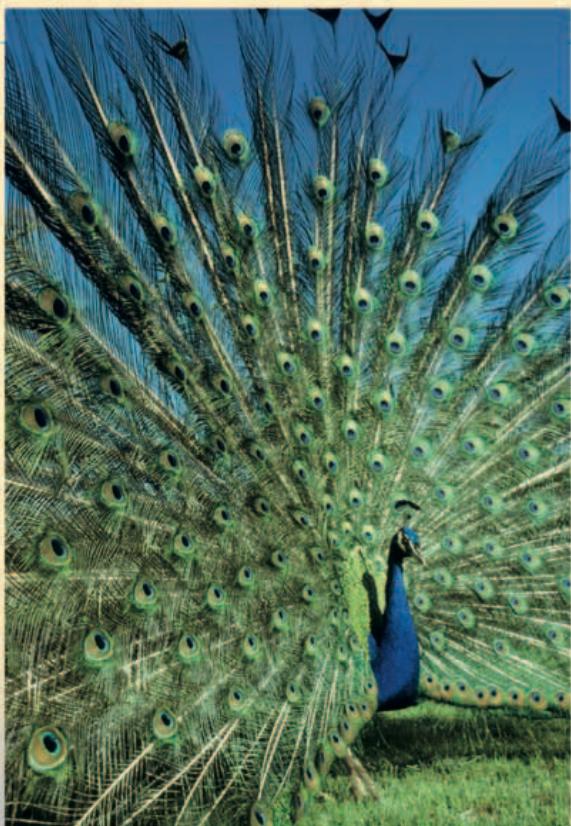
FEW ASPECTS OF ANIMAL BEHAVIOUR are as eye-catching as the courtship displays of birds. These remarkable rituals enable birds to attract partners and form a pair bond – the essential prelude to mating. Courtship ensures that birds choose partners of the same species, and it defuses the instinctive aggression between birds. Most courtship rituals are private affairs with just two participants, but some species gather in groups at traditional display grounds called leks.

MALE DISPLAYS

During courtship, it is usually the female that chooses the male. In many species, her choice is based on a combination of factors. These include the male's physical appearance, his talent as a singer, and also a range of more practical assets, such as his territory and nest-building skills. In polygamous species (see p.49), the male often plays no part in family life, so the female's choice is not based on practical qualities. Instead, her decision is based entirely on appearance and courtship display. Over countless generations, this has made the males more flamboyant, and their courtship displays ever more complex. Ruffs, birds-of-paradise, and peafowl are examples of birds that have evolved in this way.

FLAMBOYANT DISPLAY

Male Indian Peafowl contribute nothing to breeding, apart from the act of mating. All of their energy is devoted to staging unbeatable courtship displays, using a fan made from highly modified tail coverts.



LEKS

Some birds do not display in separate territories but assemble at collective courtship grounds, or leks. The males travel to the lek from the surrounding area, usually in the early morning or occasionally in the evening, and once there begin to carry out elaborate displays. Closely watched by the females, they vie with each other to claim a territory nearest the lek's central point. Males nearest the centre will mate with the most females, while those at the edge often do not mate at all. Lekking is common in gamebirds, but it has also evolved in a variety of other species that have polygamous males. Among them are Ruffs and various snipes, which display on the ground, and cotingas, manakins, and hummingbirds, which display on branches or in mid-air.

MALES AT THE LEK

During the breeding season, male Ruffs congregate at a lek to display. Each bird has a unique courtship plumage and a differently coloured face and bill, and the same lek site may be used for years.



PREENING AND FEEDING

Normally preening is an activity that birds carry out on their own. However, during courtship potential partners sometimes preen each other – an activity that can continue long after the pair bond has formed. Known as allopreening, this is common in birds such as parrots (see p.252) and waxbills (see p.458), which seem to enjoy physical contact and often perch close together. Courtship feeding is another behaviour that often occurs when a pair bond has formed. In terns, either sex may feed the other, but courtship feeding is usually triggered by the female, which imitates a noisy begging chick.



PREENING RITUAL

A Red-browed Finch, from Australia, preens its partner's plumage. This ritual helps to defuse the aggression that is often triggered if another bird comes close.



MATING

Unlike mammals, male birds do not have a penis (the exceptions are Ostriches and some ducks). Mating is usually brief. The male normally stands on the female, twisting his rear end so that their body openings – known in both sexes as cloaca – are able to touch momentarily. The time between mating and egg-laying varies from as little as 10 days in small songbirds to several months in some seabirds and owls.

COURTSHIP DANCES

When a male has attracted a female, the stage is set for pair formation to begin. In some species, the female simply watches the male's performance, but in many, the prospective partners join in ritualized dances that help to cement their bond. These dances can last for a few seconds, or be played out over many hours. Grebes have some of the most elaborate courtship rituals of all birds. Their ritual is divided into several separate dances, each with its own carefully choreographed steps. If either partner carries out one of the dances incorrectly, the performance ends; if the ritual does not come together after repeated attempts, the pair bond is likely to fail. Different species of grebe have different dances, so following the correct steps prevents cross-breeding.



RUSHING DISPLAY

The courtship rituals of Great Crested Grebes include furious paddling and splashing, brief "confrontations", and equally rapid retreats.



THE "PENGUIN DANCE"

Paddling hard, the two grebes rise up in the water to present a billful of weed to their partner – a ritual called the penguin dance.



HEAD-SHAKING CEREMONY

During this dance, the two birds come face to face with their necks fully extended, and flick their heads from side to side.



COPULATION

While he mates, a male European Turtle Dove flutters his wings to balance on the female's back. The male's sperm fertilizes the female's egg cells while they are at an early stage of development, before their shells have formed.

BOWERS

In New Guinea and Australia, bowerbirds have evolved some of the strangest courtship behaviour in the bird world. The males are polygamous, but unlike other males with multiple partners, their plumage is usually subdued. Instead, they attract females by building extraordinary structures, called bowers, on the forest floor. Bowers are made of sticks and stalks, and their shapes vary between species. Some are like avenues, but the largest kinds – built by "gardener" bowerbirds – look like thatched cottages with pointed roofs and can be over 1.5m (5ft) high. When a bower is complete, the owner decorates it with bright objects, such as pebbles, fruit, or flowers, and waits for females to inspect his work. After mating, the females fly away to build a nest alone elsewhere.

FEMALE INSPECTING A BOWER

Satin Bowerbirds decorate their bowers with all kinds of blue objects, including plastic litter. Unusually for their family, the males are brightly coloured; females are dull green.



NESTS AND EGGS

UNLIKE MAMMALS, ADULT BIRDS rarely make homes for themselves. Instead, most of their nests are used solely for raising young. Some birds lay their eggs directly on the ground or in a tree hollow, but many make elaborate structures from an immense range of building materials, including twigs, leaves, mud, spiders' webs, saliva, and even rotting seaweed. A nest helps to conceal vulnerable hatchlings, and it also insulates them – a crucial feature if they have no insulation of their own.

NESTING OFF THE GROUND

Songbirds are usually blind and featherless when they hatch, so a robust nest is essential for their survival. The majority of species nest off the ground, chiefly in trees and bushes, but songbirds also nest on rocks, in caves, and even behind waterfalls. Their nests are typically cup-shaped, but evolution has produced all kinds of refinements to this basic design. One of the commonest is the domed nest with an entrance at one side. Even more effective, in security terms, are nests that hang from the ends of slender branches. Weavers often build nests like these, but the largest are made by oropendolas in tall tropical trees. Shaped like an extended pouch, their nests can be up to 2m (6½ft) long, with the living quarters hanging up to 50m (160ft) above the ground. However, songbirds are not the only tree-nesters: this behaviour is widespread in many other birds. Ovenbirds, which also belong to the passerine order – build some of the most complex nests of all. Shaped like an old-fashioned clay oven, the nests have a slit-like entrance and a curving corridor leading to the nest chamber inside. Non-passerines typically make crude platform nests from sticks. Even elaborate nests are built quickly. A structure that requires thousands of billfuls of moss or leaves can be complete in a couple of days.

WEAVER AT WORK

Nest-building is controlled by instinct, but requires enormous skill. Using strips of grass, male Southern Masked Weavers build ball-shaped nests that hang from the tips of branches. Once the nest is complete, the male hangs upside down beneath it, and flutters his wings to attract passing females.

CAVITY NESTERS

Tree-holes and other natural cavities are used as nests by a wide range of birds. At one extreme, these include small songbirds such as tits; at the other are 1m- (3ft-) long hornbills, and macaws. Woodpeckers excavate holes themselves, but many other birds take them over once the original owners have moved on. Hornbills have a particularly unusual form of cavity nesting behaviour. Having found a suitable nest hole, the female moves in. The male then seals the entrance with a wall of mud, leaving a small hole so he can supply his mate with food. Cavity nesters also include birds that burrow into the ground, or into riverbanks, or sandy cliffs. Most use their beaks to peck their way through the earth, although the North American Burrowing Owl excavates with its feet. Bank-nesters, such as kingfishers, often give their tunnels a slight upward slope to prevent them from becoming flooded.

STARTING FROM SCRATCH

Woodpeckers can chisel holes in healthy, living wood. Once the hole has been opened up, the wood eventually begins to rot, allowing other birds to expand the nest in subsequent years. A Eurasian Three-toed Woodpecker is pictured.



BUILDING WITH MUD

Safely beyond the reach of most predators, these Cliff Swallow nests are made of mud mixed with saliva – a material that becomes rock-hard as it dries, and lasts for years.



**ANCESTRAL PILE**

A Bald Eagle looks out from its nest high in a pine tree. Bald Eagles make the world's biggest nests – the largest one ever measured was nearly 3m (10ft) wide and over 6m (19½ft) deep. These giant nests are often built by several generations of birds.

PERMANENT NESTS

Songbirds usually abandon their nests when their young have fledged, and build new ones next time they breed. This sounds wasteful, but it is a good way of avoiding the attention of predators and reducing parasite infestation. Birds of prey are different: they frequently return to the same nest year after year. With each breeding season, they add more sticks, increasing the size of the nesting platform. Because these birds are long-lived, the largest species – such as Bald Eagles – can end up owning nests of a colossal size. White Storks also reuse their nests, but the most remarkable permanent nests are made by the African Hamerkop. Although only about 30cm (12in) high, this marshland bird builds an immense spherical nest out of sticks, up to 2m (6½ft) across. The Hamerkop's nest is multi-chambered, and is so strong that it can support the weight of an adult man.

**MALE IN CHARGE**

Ostriches lay their eggs directly on the ground. Several females contribute to the clutch, which is guarded by a single male. Eventually, the nest may contain over 50 eggs. Only half of them are incubated – the ones at the edge do not hatch.

COMMUNAL NESTS

Many birds nest in groups, but a few species build nests that are physically attached to each other. The result is a giant communal nest, like a building with lots of self-contained apartments. In Africa, Sociable Weavers make communal nests out of grass; in South America, Monk Parakeets use sticks.

**SHARED ACCOMMODATION**

The communal nests of Sociable Weavers are usually built in isolated trees. They can contain up to 300 separate nesting chambers, each with its own downward-pointing entrance.

**HOME SECURITY**

Standing by its nest, this Gentoo Penguin is not only guarding its egg, but also its nesting materials. Neighbours are quick to help themselves if materials are in short supply.

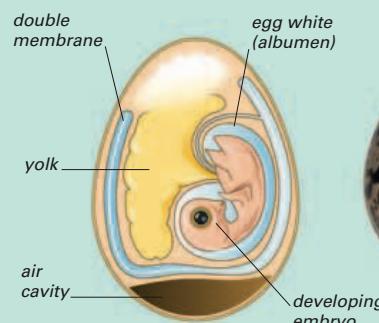
GROUND NESTERS

A large number of birds – particularly in open habitats – lay their eggs on the ground. Many use no nesting material, relying instead on camouflage or out-of-the-way nest sites to protect their eggs and young. These birds include many seabirds and waders, as well as nightjars, some vultures, and large flightless birds, such as ostriches and emus. Some excavate a shallow depression called a scrape, but guillemots and razorbills do not have this option. They breed on cliff ledges, and lay a single egg directly on the bare rock.

In addition to these "non-builders", ground-nesting birds include many species that have at least some construction skills. Penguins often breed on rocky shores, gathering small piles of stones or sticks. Waterfowl and gamebirds show greater expertise, building bowl-shaped nests from plants. The largest structures are built by megapodes: their mound-shaped nests can be over 10m (33ft) across and up to 5m (17ft) high, containing several tonnes of leaves.

EGGS

A bird's egg is a single giant cell, protected by watertight membranes and a porous shell. The embryo starts to take shape during incubation, when the original cell divides repeatedly, creating the tissues and organs of a developing bird. Seabirds often produce a single egg, while gamebirds lay the largest clutches: some species, such as quails and partridges, can produce over 20 eggs each time they breed. There is no straightforward connection between a bird's size and the size of its eggs. The Bee Hummingbird produces the smallest eggs – as little as 7mm (⅓in) long – while the Ostrich's are the largest, weighing up to 1.5kg (3½lb). However, the Kiwi's solitary egg is the biggest in relative terms, measuring about a quarter of the female's weight. The eggs of cavity nesters are often white, while those of ground-nesters are usually camouflaged.

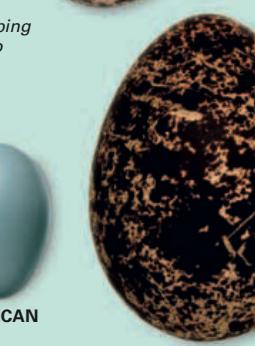
**INSIDE AN EGG**

An egg is lined with a series of membranes that help to keep water in, but which let oxygen and carbon dioxide pass through the shell. As the embryo grows, the yolk (which provides nourishment) shrinks, and the air space enlarges. The shell thins, as its calcium is used for the embryo's skeleton.

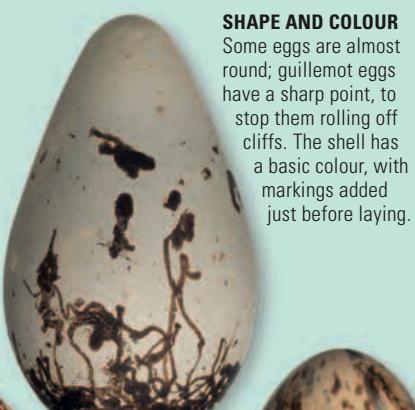
AMERICAN ROBIN



REDSHANK



GUILLEMOT



OSPREY



MAGNIFICENT RIFLEBIRD

SHAPE AND COLOUR
Some eggs are almost round; guillemot eggs have a sharp point, to stop them rolling off cliffs. The shell has a basic colour, with markings added just before laying.

PARENTAL CARE

THE ONLY BIRDS ABLE TO fend for themselves from the moment they hatch are the Australasian brush turkeys, or mound-builders (see p.108). In all other species, young birds depend on parental care to survive.

This care starts with incubation, and it continues after the young have hatched, until they are fully self-reliant. The amount of time that parents devote to these duties varies enormously, from as little as three weeks in small songbirds to almost a year in the largest albatrosses. However, brood parasites avoid this work entirely by laying their eggs in other birds' nests.

INCUBATION

The process of incubation keeps eggs at a steady warm temperature, so that development can take place. It does not necessarily start as soon as the first egg has been laid – in many species of bird, the parents wait until their clutch is complete (see Hatching Intervals, right). However, once incubation is underway, it must continue around the clock, or the developing embryos will die. During the breeding season, many parent birds develop bare areas on their breasts. These are called brood patches and make it easier for the parents' body heat to be transferred to the eggs. Some seabirds, such as gannets and boobies, lack brood patches and incubate their eggs by wrapping their webbed feet around them, but the Emperor Penguin is the only bird to incubate its egg on top of its feet, under a fold of skin. In most birds, incubation is carried out by both parents, or by the female alone. In a small minority, including the Emperor Penguin, Emu, and rheas, the male incubates on his own.

INCUBATION PERIODS

When incubation has started, it follows a precise timetable that varies between species. Woodpeckers have some of the shortest incubation periods, while the longest belong to albatrosses, which can sit on their eggs for over 2½ months.

EGG TURNING

Incubating birds periodically turn their eggs to ensure that they are equally warmed. Here, a Great Crested Grebe stands up on its floating nest to carry out this essential task.

SPECIES	INCUBATION PERIOD
Great Spotted Woodpecker	10 days
Domestic chicken	21 days
Great Crested Grebe	28 days
Golden Eagle	44 days
Wandering Albatross (below)	82 days



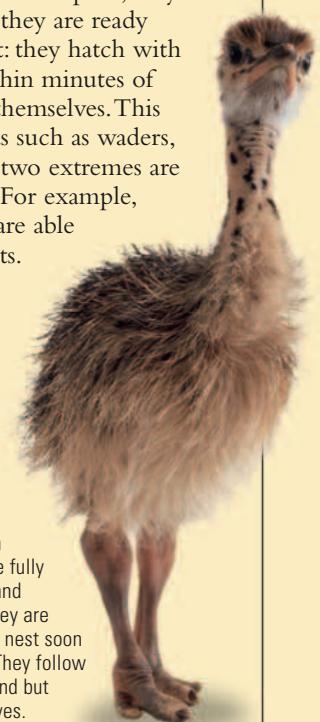
JUVENILE DEVELOPMENT

Birds hatch at very different stages of development. In general, the shorter their incubation time, the less developed the young are when they break out of their shells. Altricial species, which include most songbirds, hatch at a very early stage. Naked, blind, and helpless, they depend on their parents for food and warmth until they are ready to leave the nest. Precocial young are quite different: they hatch with functioning eyes and a covering of fluffy down. Within minutes of hatching, they are on the move, and soon can feed themselves. This type of young are produced by ground-nesting birds such as waders, ostriches, waterfowl, and gamebirds. Between these two extremes are intermediate species that do not fit either category. For example, gulls and terns hatch with a covering of down and are able to walk, but stay at the nest to be fed by their parents.



ALTRICIAL BIRD

Like most songbirds, Winter Wrens depend on frequent food deliveries by their parents while they complete their development.



PRECOCIAL BIRD

Ostrich chicks are insulated by down feathers, and have fully functioning eyes and leg muscles, so they are ready to leave the nest soon after they hatch. They follow their parents around but find food themselves.

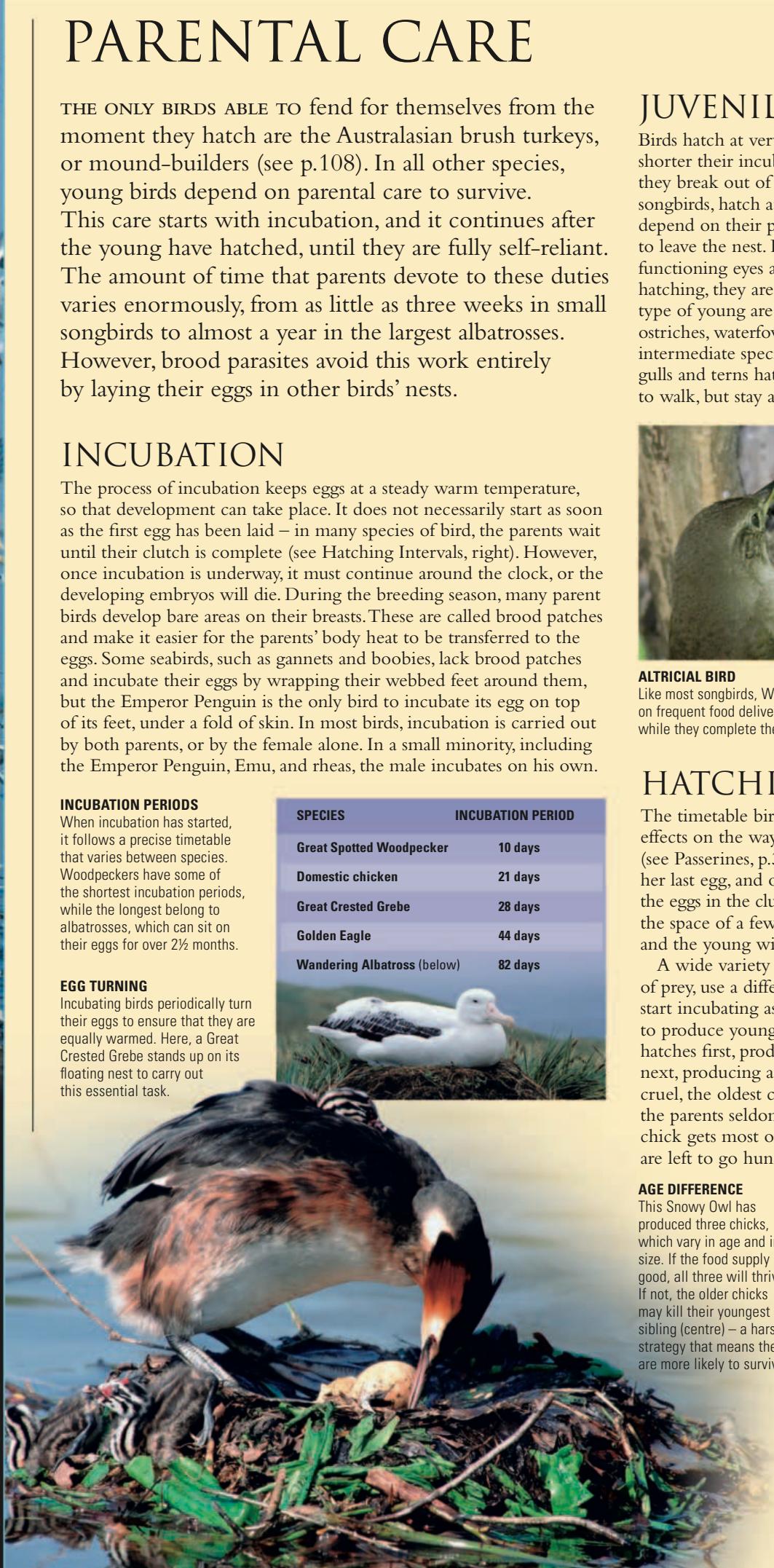
HATCHING INTERVALS

The timetable birds use to incubate their eggs can have far-reaching effects on the way in which their families develop. Nesting songbirds (see Passerines, p.330) instinctively know when the female has produced her last egg, and only then do they begin incubating. As a result, all of the eggs in the clutch develop in step. The entire brood will hatch within the space of a few hours – a system known as synchronous hatching – and the young will all be ready to leave the nest at the same time.

A wide variety of other birds, including pelicans, owls, and birds of prey, use a different system, called staggered hatching. The adults start incubating as the first egg is laid, and the eggs hatch in a sequence to produce young of different ages and sizes. The first egg to be laid hatches first, producing the oldest, largest chick, the second egg hatches next, producing a slightly smaller chick, and so on. Although it seems cruel, the oldest chick is able to bully its younger, weaker siblings, and the parents seldom do anything about it. If food is scarce, the oldest chick gets most or all of it, while the youngest are left to go hungry and often die.

AGE DIFFERENCE

This Snowy Owl has produced three chicks, which vary in age and in size. If the food supply is good, all three will thrive. If not, the older chicks may kill their youngest sibling (centre) – a harsh strategy that means they are more likely to survive.



FEEDING EFFORT

The Wood Thrush of North America feeds its helpless young for 12 days in the nest, and in this time each parent makes several thousand feeding trips.

**FEEDING THE YOUNG**

After their young have hatched, adult birds face a monumental task to keep their growing family fed. Every day, a pair of thrushes may make several hundred return flights with billfuls of food, while smaller birds, such as tits or chickadees, can make two thousand or more trips daily. However, this feeding technique – widespread among songbirds – only works if food is easy to find and is available close to the nest. Birds that find food further afield cannot afford to shuttle backwards and forwards in this way. For example, birds of prey make fewer journeys to and from the nest, but depending on their size, they can usually carry larger prey in their talons. Seabirds often swallow their food, making it easier to transport on the long flight back to the nest. During this journey the food is partly digested, so the parent feeds its young by regurgitating the remains. Pigeons have a unique solution: they produce a fatty secretion called crop milk, which their young drink by reaching into their throats.

BROOD PARASITES

For any bird, reproduction involves a large amount of time and energy. This is sometimes also true of brood parasites, which lay their eggs in other birds' nests, tricking the unwitting foster parents into taking care of the incubation and feeding of their young. In brood parasites, the "work" can involve searching the area for suitable host nests, and then waiting for the chance to sneak in and lay their egg. Around one per cent of the world's bird species rely partly or fully on this breeding technique. They include cowbirds, whydahs, indigobirds, some ducks, and many Old World cuckoos.

**FOOD DELIVERY**

A Young Brown Pelican reaches into its parent's throat pouch for a meal of partly digested fish. This efficient way of delivering food is widespread in birds that fish at sea.

CRECHES

Young precocial birds sometimes form large groups for defence by joining together with the young of other families. These groups, known as creches, are supervised by one or more adults. Creches are common among flamingos, pelicans, and penguins, and also among flightless land birds such as ostriches and rheas.

**OSTRICH CRECHE**

When ostrich families meet, the chicks all rush towards each other, forming a creche that adult males compete to control.

OUTSIZED OFFSPRING

An adult European Reed Warbler feeds a Common Cuckoo chick, oblivious to their huge disparity in size. Female cuckoos can lay their eggs in seconds when a nest is unguarded.

LIVING TOGETHER

ACCORDING TO THE FAMOUS PROVERB, birds of a feather flock together. But why should some birds live together when others seem to survive equally well on their own? The answer is that, for birds, being sociable depends on a balance of different factors. Some favour flock formation, while others encourage birds to live apart. Only a small number of species, such as weavers, form flocks all year long. The majority of species flock together at certain times of the year, or even particular times of day – for example, when sleeping.

FLOCKS

Bird flocks can be enormous. The largest, formed by Red-billed Queleas in Africa, may contain over a million birds. In the past, the now-extinct Passenger Pigeon travelled across North America in even larger flocks, sometimes of over a billion birds – a large proportion of the entire species. At the other extreme, many flocks consist of only a dozen or so birds, which stay in a loose group as they search for food. Most birds form flocks for two reasons: flocking makes it harder for predators to attack by surprise; and it helps birds to exploit large supplies of food.

However, flocking is not suitable for catching prey by stealth. It also encourages food theft, particularly in species that eat food in sizeable pieces, which their neighbours can snatch and carry away. Taken together, these factors explain why flocking is common in seed-eaters, flamingos, and waders, but much rarer in birds of prey.

CHAIN REACTION

Alarmed by a disturbance, Red Knots burst into the air. In flocks, some kinds of behaviour are highly contagious, so the reactions of a single bird can make a whole flock follow suit.



PERSONAL SPACE

Parrots are happy to rub shoulders with their neighbours, and so are some other flock-formers, such as bee-eaters and finches. But for most birds, this kind of behaviour would trigger retaliation, because it would infringe their personal space. Personal space varies from species to species, and is often directly related to how far a bird can peck. However, it is not entirely fixed. It often increases as birds grow older, but decreases when a flock is under attack. In all birds, breeding also involves a temporary relaxation of the “rules”, so that partners can get used to physical contact.

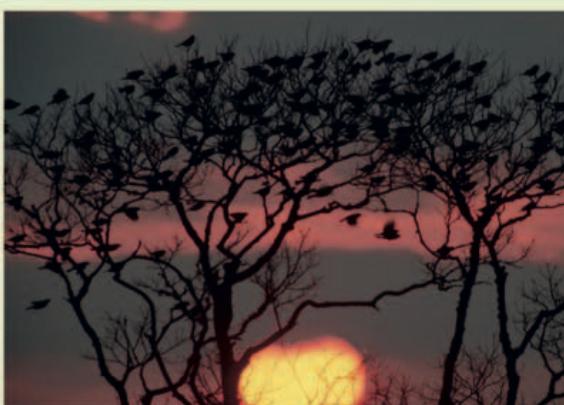


SPACE TO LAND

This Glaucous-winged Gull has found a vacant slot on a roof, out of pecking range, so can safely land.

ROOSTING

With the exception of polar species during the perpetual daylight of summer, very few birds are busy around the clock. During their “time off”, birds seek a safe place to roost. Most birds roost off the ground, and they can be remarkably effective at hiding. Many species roost in groups, especially in winter. Starlings often roost in city centres, gulls head for offshore islands and reservoirs, and many other birds roost in reeds. In cold weather, small birds such as wrens huddle together to keep warm.



NIGHT ROOST

Silhouetted by the setting sun, more Brewer's Blackbirds arrive to join those already settled down for the night in the branches of a tree. These American blackbirds can form huge roosting flocks that contain tens of thousands of birds.

DAYTIME ROOST

Black-crowned Night Herons hunt after dark, and roost together by day. This group has birds of different ages – the adults are black and grey, and the young birds are brown.

PECKING ORDER

For generations, poultry farmers have noticed the way chickens organize themselves in flocks.

Young chicks relate to each other on equal terms, but adults develop a strict "pecking order". One bird dominates the flock, while the least fortunate chicken is pecked at by all the rest. As time goes by, the order of rank gradually changes, as the oldest birds gradually weaken and die, and younger ones move up in the ranking to take their place.

Pecking orders, also known as dominance hierarchies, are found in many birds that form flocks, and they have evolved as a way of stabilizing life in social groups. Where there is no pecking order, birds waste a lot of time and energy fighting.

Once a pecking order is established, however, disputes are avoided and the birds can spend more time searching for food.

AGGRESSIVE POSTURING

Two Great Black-backed Gulls fight to assert their dominant position. Gulls have relatively weak pecking orders, and often squabble over status and food.



COOPERATIVE FEEDING

These American White Pelicans have spread out in a line to catch fish. After the line has formed, the pelicans paddle towards the shore together. This drives all the fish into shallow water, where they are easy to catch.



FEEDING IN A GROUP

Although birds often flock together to feed, they rarely cooperate in any structured way. Within a flock, each bird looks after itself, even if that means stealing food from its nearest neighbours. However, there are several exceptions. Some pelicans cooperate to catch fish, and cooperative hunting is also found in Harris's Hawk, and perhaps also some other birds of prey. These hawks operate in small flocks, with some of the birds flushing prey from cover so that the "catchers" can move in to make the kill. A few birds, such as Acorn Woodpeckers, team up to create and defend communal food stores.



MIGRATION

OVER HALF THE WORLD'S BIRD SPECIES carry out long-range movements or migrations. Travelling alone or in flocks, they navigate with precision, dividing their lives between places that are far apart. Unlike many other animals, birds need abundant food all the year round. Migration allows them to exploit seasonal changes, and to breed where the food supply is best.



WHITE STORK



RED-BILLED TOUCAN

RESIDENTS AND MIGRANTS

Wherever they live, birds can be divided broadly into two categories: resident species and migrants.

A resident species lives in a particular region all year round. A migrant species breeds in one region, but spends its non-breeding period somewhere else, often thousands of kilometres away. Near the equator, most birds are resident, because there is a reliable food supply all year round. At higher latitudes, where seasons are more clearly differentiated, the proportion of migrants increases, with the largest percentage being found near the poles. However, not all species follow this clear-cut split. Partial migrants, such as the Eurasian Robin, are migratory in some parts of their range, but resident in others.

This variation reflects differences in local climate. In Finland, for example, most robins migrate south to escape the severe winter. But in the British Isles, where winters are milder, most robins stay all year round.

TRAVELLERS AND STAY-AT-HOMES

The White Stork breeds in Europe and parts of Asia, wintering in Africa, Pakistan, and India. The Red-billed Toucan is a resident species, confined to northern South America; seasonal movements are small-scale and vary from year to year.

COSTS AND BENEFITS

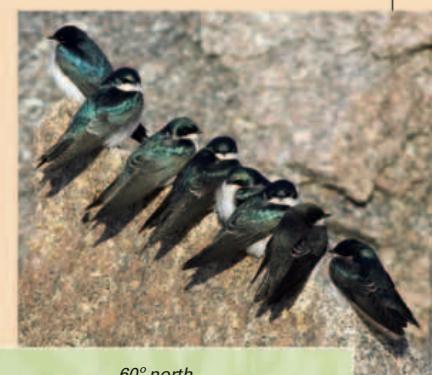
Migration is an arduous and dangerous undertaking. Every year, millions of migrating birds are blown off course, and many more die of starvation. Migrants also risk being attacked by falcons and other predators, which gather along migration routes. The combined effect of these losses is staggering. With small songbirds, such as the Barn Swallow, up to three-quarters of the current year's young may fail to make the return journey to their birthplace. However, this enormous toll is offset by the fact that migration pays big dividends, particularly for species that breed at high latitudes. Here, migrants can exploit the huge surge of food that comes with the long days of spring and early summer, often in less crowded conditions than they would experience in the tropics. This explains why migration has evolved in many bird species, despite the high price that individual migrants pay.

PURPOSEFUL FORMATIONS

By forming in a V-shaped skein, migrants can reduce the energy spent in migration. Here, a skein of ducks is about to make an overnight stop.

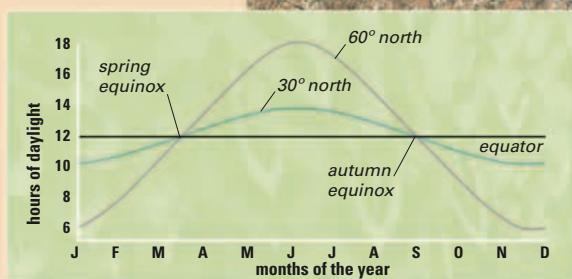
TIMING

Migrating birds instinctively know when the time has arrived to set off. In the weeks leading up to their departure, most migrants store extra body fat – high-energy fuel that powers their flight. They become increasingly restless, and some species form excitable flocks that may make several "false starts" before their journey actually begins. A late brood of chicks may have to set off almost as soon as they leave the nest. In most species, "pre-migration" behaviour is triggered by an internal biological clock, which is kept in step by changes in day length. However, birds do not rely on day length alone. If the weather is poor, they wait for better conditions, and if it is unusually warm, they may set off early. Variability has become particularly noticeable in recent years, as birds respond to the effects of global warming.



READY TO GO

Clustered together, Tree Swallows prepare for their autumn flight from Canada to Central America. Parents gather their newly hatched young to wait.



RIGHT ON TIME

Changes in day length follow a predictable pattern. Day length barely alters on the equator, but at a latitude of 60°, the rate of change reaches nearly five minutes a day during spring and autumn equinoxes.



EMERGENCY LANDING

This migrating Honey Buzzard has touched down, exhausted, on a beach in Mauritania – an alien and unwelcoming environment.

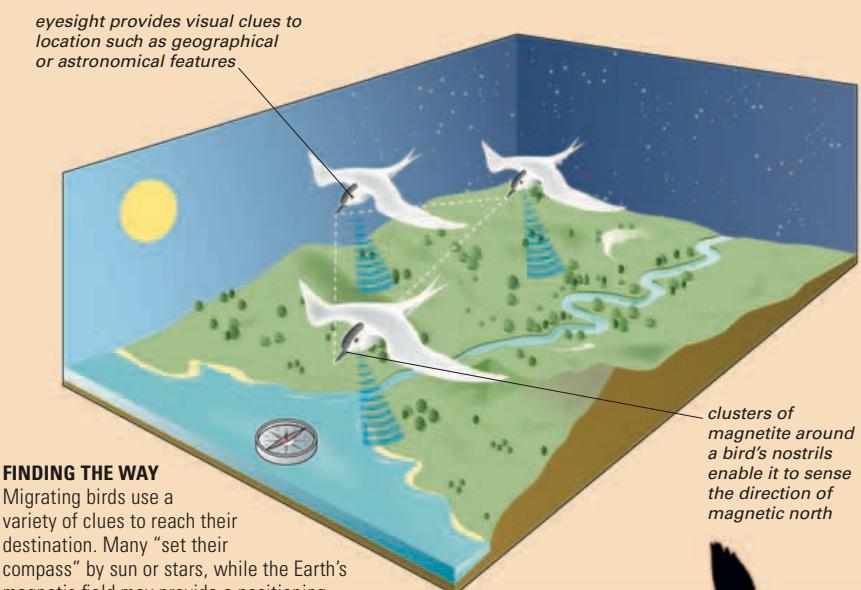


NOMADIC BIRDS

Not every long journey qualifies as true migration. Some birds from high latitudes – such as Snowy Owls and waxwings – spread far beyond their normal range when their food is scarce. These events, known as irruptions, often occur in cycles of between four and ten years. Unlike true migration, irruptions are sporadic, and once they are over, the birds do not necessarily return to their point of departure. In dry habitats, such as deserts and scrubland, some birds have an even more marked tendency to wander. Instead of having a fixed “home”, they keep on the move, travelling constantly between places where rare rainstorms produce a flush of food. Many nomads are small seed-eaters but, in Australia, they include even pelicans and swans affected by the changing water levels in rivers.

NO FIXED HOME

Australia is particularly rich in nomadic species. Wild Budgerigars fly hundreds of kilometres in search of seeds.



FINDING THE WAY

Migrating birds use a variety of clues to reach their destination. Many “set their compass” by sun or stars, while the Earth’s magnetic field may provide a positioning system. On familiar territory, landmarks help.



DIRECTION FINDING

Young birds often fly with their parents, but some species, such as cuckoos, migrate entirely alone and find their way to places they have never visited before. To find its way, a bird needs two skills. Firstly, it must be able to orient itself, or point in the correct direction. Secondly, it needs to be able to navigate, or judge its position, while on the wing. In many birds, orientation is quite well understood, and is based on the sun or stars. Navigation over open ocean is much harder to explain. Homing birds, such as shearwaters and pigeons, seem to navigate by sensing the Earth’s magnetic field, and it seems likely that this sense is important in migratory birds.



NIGHT FLIGHT

Many birds migrate at night, when there is less risk of attack by predators. Here a flock of migrating Barnacle Geese is picked out against the full moon.

HOMING INSTINCT

In 1953, a Manx Shearwater was taken from its nest off the coast of Wales and carried by plane to Boston, Massachusetts, on the opposite side of the Atlantic Ocean. Just 12 days later, it was back in its nest, having flown 5,470km (3,400 miles) over unfamiliar water. On its way east, it overtook the letter sent from Boston announcing its release. All species of shearwater have an unusually strong attachment to their nest sites.



MIGRATION ROUTES

MIGRATION ROUTES HAVE EVOLVED over millions of years. Few are the shortest paths from A to B. Instead, migration routes are shaped by factors which vary from one species to another. Some birds migrate non-stop, flying straight over deserts and other obstacles. Others follow landmarks such as rivers and coasts, and need frequent refuelling breaks. Seabirds roam the ocean, but their routes are influenced by currents and wind direction. All these differences create a complex web of migration routes that stretches across the globe.

FLYWAYS

Major migration routes over land – known as flyways – are typically oriented in a north–south direction. Some of them follow coasts or large river valleys, such as the Mississippi or the Nile. As the journey progresses, birds are often funnelled into narrow corridors that avoid long and dangerous sea crossings. In the Americas, the busiest by far is the Isthmus of Panama. Here, millions of land birds travel over a neck of land that is only about 60km (40 miles) wide. In Europe, huge numbers of birds converge on the Strait of Gibraltar, cutting out a long journey across the Mediterranean. Oceanic birds also travel huge distances – sometimes literally circling the globe. Many of these journeys are similar to migration over land, because they follow recognizable routes.

However, many seabirds spread out over a wide area once they have finished breeding. This behaviour, known as dispersal, can last for several years, until a bird eventually returns to the site where it hatched.

The majority of birds breed in the northern hemisphere, principally because this contains most of the world's land. An exception is the Short-tailed Shearwater; this is one of many migratory seabirds that nest on islands scattered across the globe. The migration distances shown in the bird profiles are maximum values for a complete round trip. They are not exact because migrants set off from widely scattered departure points, and arrive at different destinations.

VAGRANT SPECIES

Some birds – known as vagrants – get blown far off course, and end up thousands of kilometres outside their normal range. This happens particularly during fierce winter storms or other unusual weather conditions. Sometimes the individual will rest and then continue its journey, slowly finding its way back on to its normal route. Occasionally an individual may remain where it is to die, or to live among groups of other species; these individuals are, of course, unable to breed. If several vagrants are blown off course into the same area, this may lead to a new colony of breeding birds.

BLOWN OFF COURSE

The Killdeer originates in North America but vagrants are occasionally seen in winter on meadows or sandy shores in the British Isles.



RUFOUS HUMMINGBIRD *Selasphorus rufus*

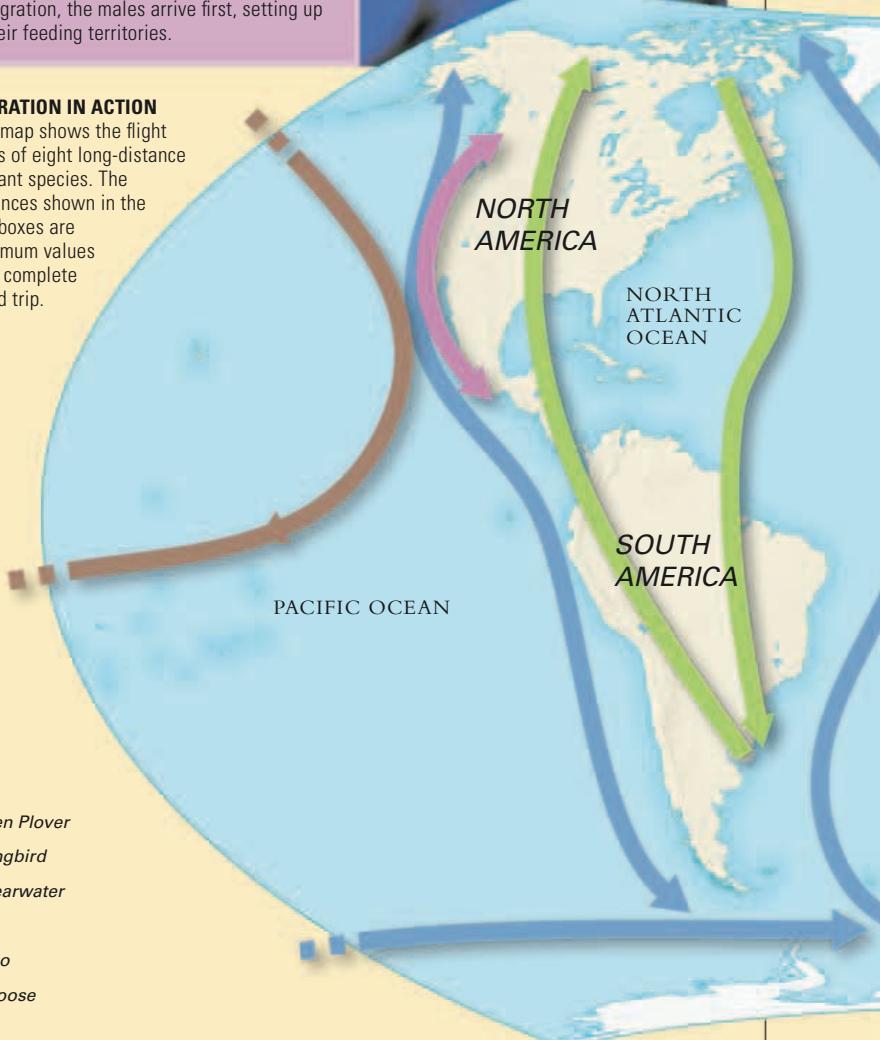
BREEDING RANGE Northwestern North America
NON-BREEDING RANGE Southeastern USA, Mexico
MIGRATION DISTANCE 6,000km (3,700 miles)

This tiny migrant, only 9cm (3½in) long and weighing less than 3.5g (½oz), has the longest migration route and breeds further north than any other American hummingbird. Its summer range extends as far as Alaska's Kenai Peninsula, just 750km (470 miles) from the Arctic Circle. During the northward migration, the males arrive first, setting up their feeding territories.



MIGRATION IN ACTION

This map shows the flight paths of eight long-distance migrant species. The distances shown in the text boxes are maximum values for a complete round trip.



KEY TO ROUTES

- American Golden Plover
- Rufous Hummingbird
- Short-tailed Shearwater
- Arctic Tern
- Common Cuckoo
- Red-breasted Goose
- Eastern Curlew
- Eleonora's Falcon

SHORT-TAILED SHEARWATER *Puffinus tenuirostris*

BREEDING RANGE Tasmania and islands in Bass Strait
NON-BREEDING RANGE Circumpacific
MIGRATION DISTANCE 32,000km (19,000 miles)

Like most shearwaters, this species breeds on islands (in burrows), and spends the rest of its life at sea. With an adult wingspan of approximately 1m (3½ ft), and a body weight of only 500g (1lb), this is a spectacular flier. Its migration route follows a huge figure-of-eight, taking it northwards from Tasmania towards Japan, and then around the entire perimeter of the northern Pacific, before crossing the ocean and heading home. Youngsters fly with the breeding flock soon after leaving the burrow, but first breed at five years old.



AMERICAN GOLDEN PLOVER
Pluvialis dominica

BREEDING RANGE North American Arctic
NON-BREEDING RANGE Uruguay, eastern Argentina
MIGRATION DISTANCE 20,000km (12,500 miles)

Many American Golden Plovers carry out a loop migration, with different routes north and south. On the flight north, they fly overland, feeding on the way. On the flight south, when food is scarcer, they head out over the Atlantic, making their landfall on the northern coast of Brazil. This is one of the longest migratory routes of any land-based bird.

**COMMON CUCKOO**
Cuculus canorus

BREEDING RANGE Europe, temperate Asia
NON-BREEDING RANGE Southern Africa, Southeast Asia
MIGRATION DISTANCE 10,000km (6,200 miles)

The Common Cuckoo breeds in Europe and temperate areas of Asia, including China and Japan, and winters in equatorial regions of Asia and in southern Africa. On migration, the parents leave first, followed later by their young (which fly alone). This species is very rarely seen on migration, suggesting that it perhaps crosses the Mediterranean Sea and the Sahara Desert in a single non-stop flight.



ARCTIC OCEAN

EUROPE

ASIA

AFRICA

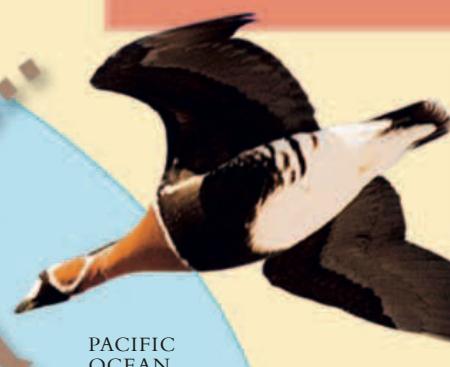
INDIAN OCEAN

PACIFIC OCEAN

AUSTRALASIA

SOUTH ATLANTIC OCEAN

ANTARCTICA

**ARCTIC TERN**
Sterna paradisaea

BREEDING RANGE Arctic and adjoining regions
NON-BREEDING RANGE Southern Ocean
MIGRATION DISTANCE 40,000km (25,000 miles)

Flying non-stop for eight months of each year, the Arctic Tern migrates farther than any other bird. It divides its time between the northern and southern polar regions, making maximum use of summer and daylight hours around the globe. While on migration, it usually travels over shallow coastal waters, feeding as it goes, and can rest on the sea. Breeding in colonies in the rocky Arctic, adults continue to feed their young with fish as the migration begins; this helps the young birds on the first leg of their extensive migrations.

**ELEONORA'S FALCON**
Falco eleonorae

BREEDING RANGE Mediterranean region
NON-BREEDING RANGE Coastal East Africa and Madagascar
MIGRATION DISTANCE 9,500km (6,000 miles)

This lightly built, agile falcon specializes in attacking songbirds on migration. Unusually, it breeds in late summer, so that its chicks hatch when European songbirds are beginning their migration south. This breeding strategy ensures that the parents are able to catch the maximum amount of food – in fact they often catch more birds than are needed and store the surplus for later use. During its own migration, and in its winter quarters, the Eleonora's Falcon feeds mainly on insects.

RED-BREASTED GOOSE
Branta ruficollis

BREEDING RANGE Russian Arctic
NON-BREEDING RANGE Eastern Europe and Caspian Sea
MIGRATION DISTANCE 10,000km (6,200 miles)

Compared to most geese, this species has a highly restricted migration range. It breeds in the arctic tundra of the Taymyr Peninsula of northern Siberia, in northeast central Russia, and overwinters near the shores of the Caspian and Black Seas. Migrating via Bulgaria, Romania, or Kazakhstan, occasionally it may be seen as far south as Greece. Like other migrants with narrow ranges, it is highly vulnerable to habitat change caused by shifts in agricultural practices and by climate change.

EASTERN CURLEW
Numenius madagascariensis

BREEDING RANGE Eastern Siberia
NON-BREEDING RANGE Southeast Asia, Australasia
MIGRATION DISTANCE 20,000km (12,500 miles)

Curlews are all long-distance travellers, often migrating along coastlines where there are plenty of opportunities to stop and feed on the shore and wetlands. The Eastern is the largest species of curlew. It breeds inland in the freshwater marshes of the far east of Russia, but its non-breeding range reaches southwards as far as the estuaries and salt marshes of New Zealand, with most individuals wintering in Australia. Flying in large flocks, often in V formation, groups of calling curlews are an attractive and welcome sight.



BIRDS UNDER THREAT

RECENT ESTIMATES PLACE 12 per cent of the world's birds – over 1,200 species – at threat of extinction. This is catastrophic, and not only for birds themselves, because their changing fortunes mirror the health of the global environment. Birds are threatened in many ways, but most current problems have the same root cause: human-induced changes to the natural world.



RHINOCEROS HORNBILL

Hornbills are threatened by a wave of deforestation that is sweeping southeast Asia.



HARPY EAGLE

Fragmented habitat threatens large birds of prey throughout Central America.



RED-HEADED PICATHARTES

Forest fragmentation in Africa now endangers both species in this small family.

HABITAT LOSS

The destruction of natural habitats is the biggest threat that birds face today. Farming and forestry are the main driving forces, followed by the growth of cities, and development of coasts. Most birds are adapted to a particular habitat and cannot survive elsewhere. As a result, widespread birds become more localized, while those that were localized to begin with risk becoming extinct.

Habitat destruction is not new – it dates back to the start of farming, about 10,000 years ago. However, it has never taken place on the scale seen today. Deforestation in the tropics hits the centre of bird diversity, while the growth in cities and infrastructure takes its toll on bird life all around the world. When cities spring up on what used to be forest or wetlands, the environmental damage is clear to see. But habitat destruction also occurs in less visible ways. For example, oil palms or fast-growing conifers are often grown on land where the natural forest cover has been cleared. These plantations may look green and lush, but their bird life is only a faint echo of the richness in natural forest habitats.

INTENSIVE AGRICULTURE

With over 6 billion people to support now, and over 9 billion expected by the middle of this century, food production has never been more important. Increasingly, food is supplied by intensive farming – a form of agriculture that depends on the routine use of artificial fertilizers and pesticides. Intensive farming produces high yields, but this comes at a high price to the environment. With wild plants and insects kept at very low levels, birds soon run short of food. As a result, species that were once a common sight in rural areas are in rapid decline. In Europe, intensive agriculture has had a particularly damaging effect on ground-nesting species such as the Eurasian Skylark and Northern Lapwing, and similar declines have affected farmland birds in many other regions.



CLEAN SWEEP

Modern combine harvesters are highly efficient, and leave little or no waste grain for birds to glean. Intensive farming also compacts the soil, reducing the supply of earthworms and small animals.



ON DANGEROUS GROUND

In intensively farmed areas, larks such as this Eurasian Skylark face a double threat to survival. Food is hard to find, and as ground-nesters, they also risk having their eggs or nestlings destroyed by tractors.

TOTAL DESTRUCTION

Deforestation affects birds worldwide. Charred stumps are all that remain of these eucalypt trees cut for timber in the Central Highlands of Victoria, Australia.

EXPLOITING BIRDS

Throughout the world, birds are exploited for food, for sport, and for the cage-bird trade. Hunting can be particularly damaging, because the targets are often birds on migration, which are easy to pick off where they cross mountains or coasts. Even in countries where the hunting season is controlled, regulations designed to protect migrants are often ignored. The cage-bird trade affects some bird families far more than others. For example, over 50 species of parrot – out of a total of 352 – are in serious danger. Some other commercial activities, particularly fishing, also have damaging effects. Some birds, such as gulls, thrive on fishing waste, but the picture is very different for diving birds, such as guillemots and puffins, which face increased competition for food. Albatrosses are in a steep decline, following the growth of long-line fishing. Every year, many thousands of albatrosses drown after taking long-line baits and becoming hooked.



HUNTING FOR SPORT

On a hillside facing the Mediterranean, two Maltese hunters pick off migrating birds. Often defended on the grounds of tradition, this destructive “sport” has been attacked by conservation organizations, leading to a tightening of regulations in recent years.



UNCERTAIN CATCH

Albatrosses and gannets swoop around a trawler off the coast of South Africa. The huge growth in fish catches has had damaging effects on birds’ food supply.

INTRODUCED SPECIES

Over the centuries, humans have accidentally or deliberately introduced alien species to far-flung parts of the world. For birds, this mixing up of the world’s biodiversity has had extraordinarily damaging results. Since 1500, about 150 species of bird have become extinct, and in half these cases, introduced species have been the chief cause. In some cases, these undesirable aliens are predators that have a direct and deadly effect on local birds. Cats and rats are often the culprits, particularly when they arrive on remote islands that have no native mammals of their own. Both are highly efficient predators, not only of adult birds, but also of nestlings. More subtle, but no less dangerous, is the effect of introduced grazing and browsing animals, such as goats. These can strip islands of their native vegetation, which removes the cover that many birds need to breed. Finally, introduced species may bring disease. In the Hawaiian Islands, for example, introduced mosquitoes brought with them avian malaria and avian pox. At low altitudes, where mosquitoes are abundant, many of the islands’ native birds have disappeared.

ORGANIC POLLUTANTS

Pesticides and other organic pollutants are a major threat to the world’s birds. In southern Asia, vultures have declined by up to 95 per cent in less than a decade – a side-effect of the veterinary drug Diclofenac finding its way into dead remains.



VULNERABLE GOOSE

Like many migrants, the Red-breasted Goose has a sharply defined distribution, which has evolved over many thousands of years. Its main breeding area lies in the remote Taymyr Peninsula in northern Siberia, a region that is currently experiencing rapid climate change.



CLIMATE CHANGE

In the coming decades, climate change threatens to become the biggest challenge facing the world’s birds. As climate patterns change, natural habitats are likely to shrink or shift, making it harder for birds to find

food and to breed. The outcome of this is hard to predict – all that can be said with any certainty is that birds with highly specific

ecological needs are likely to be the hardest hit. These needs can take many forms. For example, the Red-breasted Goose breeds in tundra in one part of northern Siberia, and relies on this habitat for its survival. If the region continues to warm at its present rate, this goose’s breeding habitat will shrink dramatically, making its population plummet. Many other species will be affected by changes in vegetation, or by shortages of food at the time when they normally breed. At sea,

gradual warming is likely to disrupt normal patterns of plankton growth. As a result, fish supplies will become less reliable, creating food shortages for seabirds. The outcome, for birds, is a world where there are some winners, but far more losers. In the long run, a substantial proportion of these risk becoming extinct.



A SHRINKING HABITAT

This map shows projected changes in the tundra of northern Siberia, assuming that the current warming trend continues. By the year 2070, up to three-quarters of the area of the Red-breasted Goose’s nesting grounds are likely to be invaded by trees, thereby preventing it from breeding.

CONSERVATION

WITH SO MANY SPECIES currently under threat, bird conservation is more important than ever. On every continent, work is under way to save threatened species, and – just as importantly – to improve the state of the environment for birds as a whole. Already, there have been some remarkable success stories, with critically endangered species brought back from the brink of extinction. However, much more remains to be done.

PROTECTING AND MANAGING HABITATS

By far the most effective way to protect birds is to protect the habitats on which they depend. At a national level, key bird habitats are often protected by nature reserves and national parks. On a global level, several international agreements – such as the Ramsar Convention on Wetlands – help to safeguard key bird areas. To protect birds, habitats may also have to be actively managed – for example, by eradicating introduced animals or plants. On island habitats, this work frequently involves getting rid of rats, but introduced predators also include much more appealing animals, such as hedgehogs, foxes, or cats. Wherever it is carried out, this kind of conservation causes controversy. However, when mammalian predators are removed, the result is usually a spectacular recovery in the numbers of indigenous birds.



CAUGHT ON CAMERA

Red Foxes are a major problem for ground-nesting birds. In Australia, foxes have been successfully excluded from the Peron Peninsula.

PROTECTED AREAS

On Aldabra Atoll, a remote World Heritage Site island in the Seychelles, visitors come face to face with protected nesting birds and giant tortoises.

EMERGENCY INTERVENTION

For some critically endangered species, direct intervention is the only way of reversing the imminent threat of extinction. In some cases, the remaining birds may be relocated to a safer area, or captured and used as breeding stock. These measures have saved a number of species, such as the California Condor, the Nene (Hawaiian Goose), and New Zealand's Kakapo – the world's only flightless parrot. The Black Robin, endemic to the Chatham Islands, was successfully rescued after its total population dropped to just five birds. For species that are further from the brink, successful conservation starts with research to identify the causes of the decline. Once these have been established, often quite simple steps can be taken to remedy the situation.



READY FOR RELEASE

Fitted with a tag and a radio transmitter, this captive-bred California Condor is preparing to taste life in the wild. Birds bred in captivity often have to be trained how to find food, so that they can survive when released.



KEEPING TRACK

In southern California, a researcher uses a tracking device to follow the movements of captive-bred condors that have been released into the wild.



PROTECTING MIGRANTS

Migratory birds are particularly vulnerable to hunting and habitat change. To protect them, international agreements regulate hunting and give special protection to key feeding or refuelling grounds. In North America, one of the earliest bilateral agreements was signed between the US and Canada in 1916. On a global level, the most important is the Convention on the Conservation of Migratory Species of Wild Animals – known as the Bonn Convention – a UN treaty that came into effect in 1983. Since it was drawn up, it has been signed by over 100 countries. Treaties like these vary in their effectiveness but, nevertheless, migratory birds now have better legal protection than ever before. In 1995, that protection was further strengthened by the African-Eurasian Waterbird Agreement, which safeguards 235 species of waterbird that migrate between Africa, Europe, and Asia. Many of these birds now have protected status right across their range, from wintering grounds in southern Africa to breeding sites in the Arctic tundra.

STOP-OFF POINT

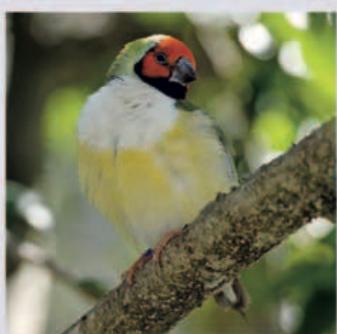
In North America, the Platte River is a vital stopover point for migrating Whooper Cranes. Water flows on the river are to be managed to help a surviving migratory flock of only about 230 birds.



HUMAN IMPACT

SPECIES RECOVERY PLANS

Popular as a cage-bird, the Gouldian Finch has declined rapidly in the savanna grassland of northern Australia. The Gouldian Finch Recovery Project is a major conservation effort. Updates posted on the internet show the finch's current status.



GOULDIAN FINCH

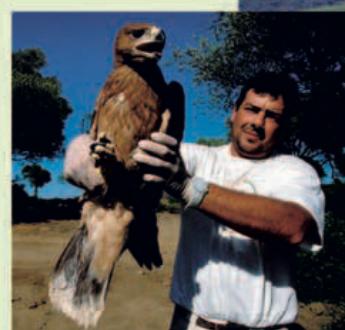
This tropical finch has a remarkable variety of distinctive colour forms – something that used to encourage trapping for the cage-bird trade.

HAZARD REDUCTION

Today's birds face many hazards that were unknown a century ago. Low-flying birds, such as the Barn Owl, are often hit by cars, and for ground-dwelling species the situation is worse. Traffic noise is also a problem. Research has shown that busy roads can reduce the level of bird life up to 3km (2 miles) away. With traffic on the rise, these risks are difficult to reduce, but where other hazards are concerned, small technical changes can sometimes lead to enormous improvements in bird survival. Electricity pylons can be lethal to large birds, but devices can be installed to reduce the risk of electrocution. Wind turbines are another cause for concern. Here, careful siting of wind farms can do much to reduce potential problems. At sea, simple changes to fishing methods can lead to a huge drop in bird deaths from long-line fishing. Tests of an advanced "bird-scaring line", carried by a Norwegian fishing boat, showed that bird deaths dropped to almost zero, and fish catch actually went up.

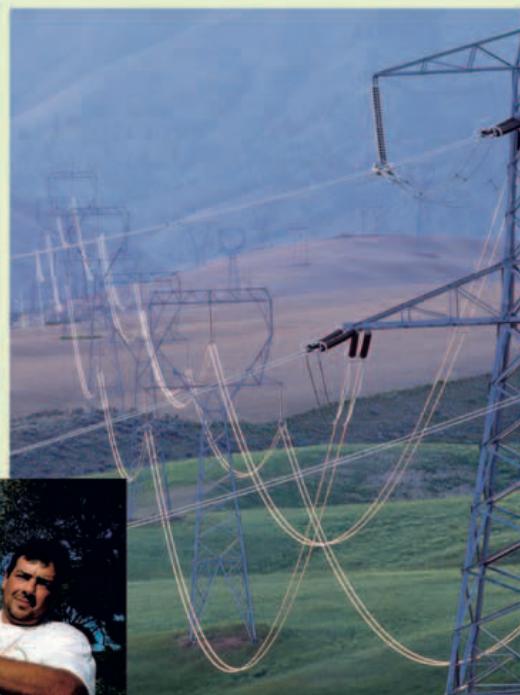
ENDANGERED EAGLE

With a wingspan of over 2m (6½ft), the Spanish Imperial Eagle is at risk from power lines. In Spain, over 14,000 pylons have been modified to reduce the danger of electrocution.



AERIAL HAZARD

Electricity lines can kill birds, but their exact position has a big effect. In any stretch of line, some pylons typically cause most deaths.



PROMOTING CONSERVATION

One of the oldest bird conservation movements – Britain's Royal Society for the Protection of Birds – began life in 1889, in a wave of anger about the use of grebe skins in fashionable clothing. In America, the Audubon Society was founded in 1905, with the mission of protecting birds, as well as other animals and their habitats. Today, conservation organizations represent a powerful force worldwide, and are responsible for keeping wildlife and its welfare at the top of the political agenda. BirdLife International forms an umbrella group for conservation organizations in over 100 countries, helping to maintain habitats and biodiversity. An important part of this work is the

MINDO CLOUDFOREST

The Masked Tropic bird, and many other birds, are found only in the Mindo Cloudforest of northwest Ecuador. Local landowners are working to preserve this key bird habitat.

EXTINCT BIRDS

EXTINCTION IS A NATURAL PART of evolution, because success for some species inevitably means failure for others. Since birds first appeared on planet Earth, over 180 million years ago, thousands of species have evolved, flourished, and then disappeared. However, in recent history, the rate of bird extinction has soared, and today birds are dying out far faster than ever before. This wave of extinction has been triggered by human activity, and research shows that it is most pronounced in remote habitats, where birds have evolved in isolation from the rest of the world.

PASSAGE TO OBLIVION

Extinction usually happens in stages, and a species can be destined to die out long before the final few individuals disappear. The first stage is local extinction, which splits a species into fragmented groups. As the groups shrink, they become increasingly isolated, inbred, and at greater risk from threats of all kinds – from food shortages to habitat change. This is the situation facing many endangered birds today. The Northern Bald Ibis, for example, was once widespread in the European Alps, North Africa, and the Middle East, but is now restricted to a handful of widely scattered locations, with a total population in the wild of about 400 birds. Once a species has declined this far, it risks dropping below its minimum viable population – the number of birds needed for any chance of long-term survival. Minimum viable populations vary from one species to another, because they are influenced by factors including the stability of the bird's habitat, and its reproductive behaviour. Some birds breed successfully as separate pairs, but colonial species – such as the extinct Passenger Pigeon – breed successfully only in groups. For these species, extinction can be inevitable even when thousands of birds are still left in the wild.

NORTHERN BALD IBIS

After a precipitous drop in numbers during the 20th century, the Northern Bald Ibis faces a struggle for survival in the wild. The only significant numbers are found on the Atlantic coast of Morocco, with a few dozen birds in Turkey, and a handful in other parts of North Africa and the Middle East.



EXTINCT GIANTS

Many extinct birds survived until relatively recently, but died out before they could be studied scientifically. These include a large number of flightless giants. Elephant birds of Madagascar were the heaviest birds ever to have existed, weighing over half a tonne. Moas (left), in New Zealand, stood 3m (10ft) tall, with no trace of wings. Over a dozen species were alive when the first human settlers arrived in New Zealand, about a thousand years ago. Eyewitness accounts suggest that the last species of moa may have clung on until the early 1800s.



MAURITIUS KESTREL

One of the greatest success stories in bird conservation, the Mauritius Kestrel had the closest brush with extinction ever recorded in birds, but its forest habitat continues to be threatened.

RESCUED FROM THE BRINK

Emergency action has saved a number of birds from extinction. One of the most remarkable examples involved the Mauritius Kestrel, a distinctive bird of prey from the Indian Ocean. Found only on the island of Mauritius, it was affected by deforestation and introduced species. By 1974, its population dropped to just four individuals, making it the rarest bird in the world. However, following a successful captive breeding programme, its population has now climbed to over 800 – more than enough to rescue the species, and to repopulate the remaining areas of its natural habitat. If a species does disappear, there is always a chance that some birds remain hidden in the wild. Sightings of “extinct” birds are made every year, generating great excitement, but most turn out to be erroneous. However, there are examples of birds on the extinct list coming back to life. One is New Zealand’s flightless Takahé, which

was presumed extinct, and then rediscovered in a remote mountain range in 1948. Since then, a breeding programme has increased its numbers to about 130 birds.

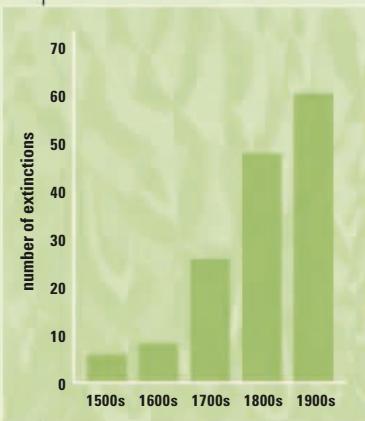
TAKAHÉ

Threats facing this giant rail came from introduced mammals. Stoats feed on its eggs and young; red deer browse the mountain tussac grass that is its main source of food.



EXTINCTIONS SINCE 1500

The year 1500 is often taken as a dividing line in the rate of bird extinctions, because it marked the start of scientific collection and record keeping, and of global exploration at sea. Since that time, nearly 130 species are known to have become extinct, and about 20 further species are probably extinct, although these extinctions have yet to be confirmed. Between 1500 and 1900, the vast majority of these extinctions involved species that lived on remote islands. Almost all of these died out following the introduction of alien mammals, such as cats and rats. Since 1900, the rate of extinction on islands has dropped, almost certainly because the most vulnerable species have now disappeared. By contrast, the extinction rate on continents has climbed – a result of worldwide changes in natural habitats.



AN UPWARD CURVE

Since the 1500s, the rate of bird extinctions has risen sharply. The 21st century has not begun well; the last wild Spix's Macaw disappeared in the year 2000, and the last surviving Hawaiian Crows vanished in 2002.

BIRDS OF THE PAST

Despite recent advances in gene technology, extinct species cannot be brought back to life. As a result, knowledge of them is based on contemporary accounts, and also on stuffed specimens, bones, and other remains. The most famous of them – the Dodo – has become a byword for extinction. A giant flightless pigeon, it was a classic example of a flightless island bird that fell victim to hunters and introduced predators. The Great Auk was also flightless, but its demise was brought about by hunters and egg collectors, rather than by habitat change. The Passenger Pigeon was also a victim of hunting, carried out on an unprecedented scale. At one time, it was probably the most abundant bird in the world, with a population of about 5 billion. Its disappearance was the steepest decline ever recorded in bird extinction.



DODO

The ground-nesting Dodo lived on the island of Mauritius, where it fed on fruit. Discovered by visiting Dutch sailors in 1598, it became extinct in the late 1600s. The Dodo is often portrayed as portly and dull-witted, but this is probably based on overweight birds that were kept in captivity.

HUMAN IMPACT

IUCN RED LIST CATEGORIES

For over 40 years, the World Conservation Union or the IUCN (International Union for the Conservation of Nature and Natural Resources), has published a Red List of threatened species. Like all listed species, threatened birds are assigned categories that show how much danger they face. The principal categories are shown here. A further category, Least Concern, includes species that are not under threat. BirdLife International is responsible for providing the Red List evaluations for the IUCN.

EXTINCT

Definition Species for which there is no reasonable doubt that last individual has died.
Number of birds in this category About 150 (since 1500)

EXTINCT IN THE WILD

Definition Species that have died out in the wild, but which still exist in captivity.
Number of birds in this category 4

CRITICALLY ENDANGERED

Definition Species that face an extremely high risk of extinction in the wild.
Number of birds in this category 181

ENDANGERED

Definition Species that face a very high risk of extinction in the wild.
Number of birds in this category 351

VULNERABLE

Definition Species that face a high risk of extinction in the wild.
Number of birds in this category 674

NEAR THREATENED

Definition Species that are close to qualifying as above or likely to qualify in the near future.
Number of birds in this category 795



PASSENGER PIGEON

This North American pigeon was a highly social bird, feeding and nesting in vast flocks. The birds were hunted with firearms, traps, and nets, and by the mid-1800s, tens of millions of birds were killed every year. The population collapsed, and the last survivor – named Martha – died in a zoo in 1914.



GREAT AUk

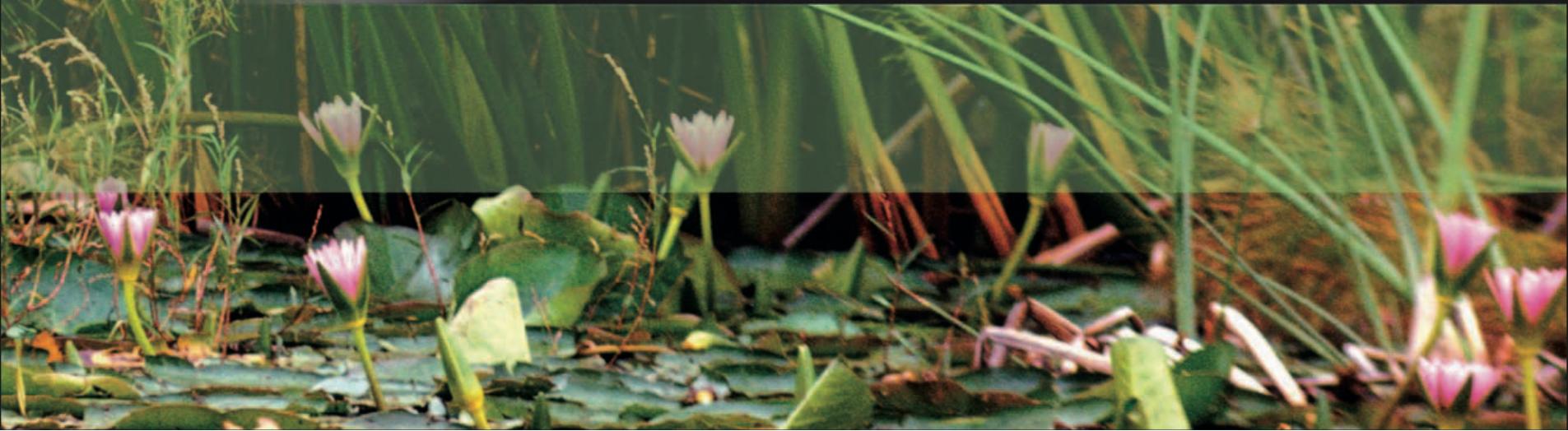
A flightless relative of puffins and guillemots, this northern seabird stood about 75cm (30in) high. It nested in large colonies, which made it easy for people to hunt for its meat and its eggs. The last breeding pair was killed on the island of Eldey, off Iceland, in 1844. A number of stuffed Great Auk specimens exist in museums.







HABITATS



BIRD GEOGRAPHY

BIRDS ARE THE MOST MOBILE ANIMALS on Earth. They can cross continents and oceans, and some routinely fly tens of thousands of kilometres during their annual migration. But, paradoxically, few birds are found all over the globe. Instead, the majority of species are restricted to particular regions; some are confined to tiny specks on the map, such as remote oceanic islands. This patchiness is a key feature of bird geography. It has come about over millions of years, as birds have evolved and adapted to a changing world.

BIOGEOGRAPHICAL REALMS

The world's wildlife can be divided between eight regions known as biogeographical realms. Realms may share similar habitats, such as forest or grassland, but each has its characteristic wildlife. This distinctiveness results from factors including climate, topography, and – over the much longer term – the rearrangement of Earth's landmasses by continental drift. The totals given for each realm include both endemic families and species (see below) and those shared with neighbouring realms.

DIVIDED WORLD

Biogeography dates back to the mid-19th century, when naturalists began to recognize striking differences in the bird life of different regions of the world. The boundaries between realms are not fixed precisely, but indicate transition zones where marked changes in bird life occur.

NEARCTIC
FAMILIES: 61
SPECIES: 732

Low in bird diversity, the Nearctic has no endemic families. Its bird life has strong links with the Palearctic realm, but includes hummingbirds and tanagers originating in South America. Most birds are migratory, reflecting a cold winter climate.



OCEANIC
FAMILIES: c.35
SPECIES: c.200

For their size, islands in the Oceanic realm are home to an exceptionally rich variety of birds, but only 2 per cent of the global total. As well as marine species, such as albatrosses and tropicbirds, they include many endemics, such as flightless rails.

ANTARCTIC
FAMILIES: 12
SPECIES: 85

Antarctica's tiny species total masks a great abundance of bird life. The overwhelming majority of its species are marine. Penguins remain within its borders all year, but most seabirds – including skuas and terns – are summer migrants.

NEOTROPICAL
FAMILIES: 95
SPECIES: 3,370

This realm has more bird species than any other. A third of families are endemic, including tinamous, curassows, puffbirds, toucans, and several families of primitive passerines. Neotropicals include many fruit and nectar feeders.

AFROTROPICAL
FAMILIES: 73
SPECIES: 1,950

With large expanses of desert and grassland, this realm is rich in terrestrial birds and seed-eaters. Endemic families include ostriches, mousebirds, and turacos. There are strong links with families in the Indomalayan realm.

AUSTRALASIAN
FAMILIES: 64
SPECIES: 1,590

There are 13 endemic families here, including cassowaries, emus, lyrebirds, birds-of-paradise, and honeyeaters, plus large numbers of terrestrial and nomadic species, and nectar-feeders. Kingfishers, parrots, and doves are abundant.



PINK PIGEON
Endemic to the island of Mauritius, the Pink Pigeon came close to extinction in 1990, with only 10 birds left in the wild. Thanks to captive breeding, the population now stands at several hundred.



GLOBAL SPECIES
The Barn Owl and the Osprey are among the few birds whose natural range includes every continent except Antarctica. Some coastal birds, such as the Ruddy Turnstone, are almost as widespread. The House Sparrow and the Common Starling are found across the globe, but largely as a result of human intervention.

PALEARCTIC
FAMILIES: 69
SPECIES: 937
Despite being the largest realm, the Palearctic has just one endemic family – the accentors. It has a large number of insect-eaters, including Old World warblers, the biggest single family in this region. The majority of birds are migrants.

INDOMALAYAN
FAMILIES: 69
SPECIES: 1,700
Only four families – the leafbirds, bluebirds, ioras, and bristleheads – are endemic to this region, but its bird life is rich and varied. The climate is almost entirely tropical, and its birds include many species that feed on fruit and seeds.

ENDEMICS

An endemic family or species is one that is restricted to a particular locality. Bird families are often endemic to individual realms – for example, toucans are found only in the Neotropical realm, while cassowaries are found only in the Australasian realm. Families can be spread across wide areas, but the range of endemic species can be extraordinarily small. One of the most restricted is the Floreana Mockingbird, which lives on two tiny islands in the Galapagos, with a combined area of less than 1 square km (0.4 square mile). Many endemics are island species, but endemic species can also be found in isolated locations on land. For example, the Scissor-tailed Hummingbird is found only in forest in the Paria Peninsula of northeast Venezuela, a mountainous spine of land only about 20km (12.5 miles) wide.

CONTINENTAL DRIFT

Over millions of years, continental drift has slowly reshaped the Earth's surface. Although these changes are extremely slow, they seem to have played a significant part in the way birds are distributed today. In the Triassic Period, before birds first appeared, all of today's continents were united in a single landmass, called Pangea. By the late Jurassic Period, when the primitive bird *Archaeopteryx* was alive, the continents were beginning to split apart, carrying their plants and animal life with them. This process helps to explain some intriguing peculiarities in bird geography. For example, there is some evidence that ratite birds – such as ostriches, rheas, and emus – are descendants of a group of birds that lived in the southern supercontinent, Gondwanaland. After this split up, they became widely separated. Continental drift has also brought distinct bird faunas close together. One example of this occurred when Australasia moved northwards and came into contact with southeast Asia. However, today – millions of years later – the region's bird life still changes abruptly at a biological frontier known as Wallace's Line.

ON THE RIGHT SIDE
Cockatoos are found only on the Australasian side of Wallace's Line. The Sulphur-crested Cockatoo – shown here – lives in northern and eastern Australia, and in New Guinea, but not in Indonesia.



WALLACE'S LINE

Nineteenth-century pioneering biogeographer Alfred Russel Wallace identified this frontier between Indomalayan birds, to the west, and Australasian birds, to the east. In Indonesia, the line runs between Bali and Lombok.



CLEAR WATER BIRDS

Brown Pelicans fish by spotting prey from the air. They are common along the Atlantic and Pacific coasts of the Americas, but absent from estuaries where water is heavily laden with silt.

BORNE ON THE WIND

Albatrosses occasionally manage to cross the equator, soaring on unusually strong winds. These conditions are infrequent, however, so they have only a very small chance of making the return trip.

BARRIERS AND STEPPING STONES

Despite being able to fly, birds are often "kept in place" by physical or biological barriers. Southern hemisphere albatrosses are one example: they can circle the Earth in the Southern Ocean, but they hardly ever manage to cross the doldrums – a zone of slack winds around the equator – that separates them from the albatrosses of the northern Pacific. At the other extreme, some land birds are reluctant to go anywhere near the sea. In Europe, for example, the Black Woodpecker is found throughout the continent, but it has never managed the short flight across the sea to reach the British Isles. For some birds, islands can act like stepping stones, helping them to spread. One of the best examples of this is in the western Pacific, where atolls and islands are scattered far out to sea. Some land birds, such as lorikeets, have successfully travelled from island to island, slowly extending their range.



MOUNTAIN CORRIDORS

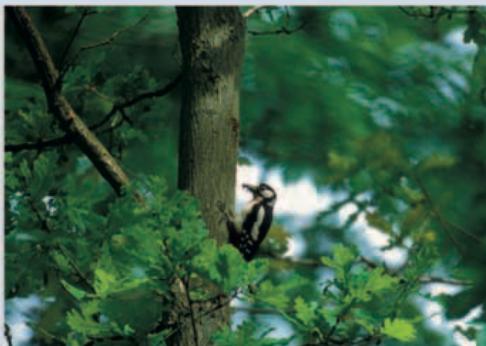
Instead of acting as barriers, mountains can form corridors for soaring birds. Andean Condors are found along the whole of western South America, but they never venture into the low-lying ground further east.

BIRD HABITATS

A BIRD'S HABITAT PROVIDES it with food, somewhere to breed, and everything else that it needs to survive. A small number of birds live in a wide range of habitats. However, most non-migratory birds are restricted to just one habitat, while migrants typically live in two similar habitats at different times of the year.

HABITATS OF THE WORLD

Strictly speaking, a habitat is the environment occupied by a single species, whether it is a bird or any other living thing. However, the term is commonly used in a much broader sense, to mean a distinctive type of living environment, or biome. There are many ways of classifying biomes. Some kinds, such as coasts, have sharply defined boundaries. Others, such as scrubland and grassland, often merge with each other, creating transitional zones with their own characteristic mix of wildlife. In terms of bird species, the richest land habitats are tropical forests, followed by scrublands and grasslands. Colder habitats generally have fewer species, but during the breeding season some birds can be present in enormous numbers. The map on these two pages shows the natural spread of the world's major habitats. Many of them – particularly forests and grasslands – have been transformed by agriculture and development, leaving them much more fragmented than they originally were, and accordingly presenting problems to their bird populations.



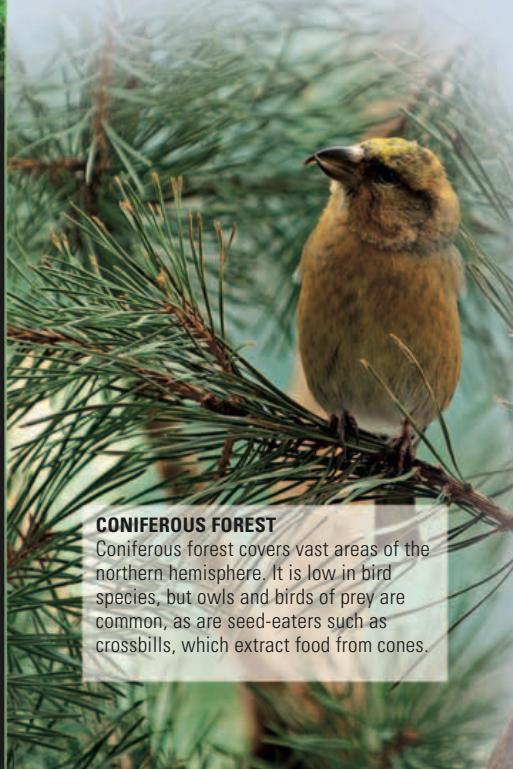
TEMPERATE FOREST

Most temperate trees are deciduous, encouraging an enormous influx of insect-eating birds when buds burst in spring. Most year-round residents, such as this Great Spotted Woodpecker, feed on insect grubs or seeds.



SEAS AND OCEANS

Fewer than 200 species of bird roam the seas and oceans, returning to land only to breed. However, many of these birds have huge populations, and some – such as the Northern Gannet – form enormous colonies when they nest.



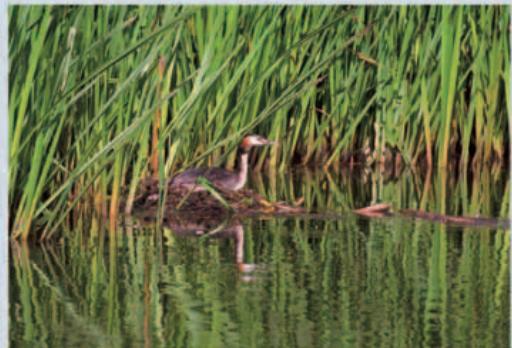
CONIFEROUS FOREST

Coniferous forest covers vast areas of the northern hemisphere. It is low in bird species, but owls and birds of prey are common, as are seed-eaters such as crossbills, which extract food from cones.



TROPICAL FOREST

More bird species live in tropical forests than in all other terrestrial habitats combined. Few species are migratory and the Keel-billed Toucan, with many others, has evolved a specialized lifestyle and thus a restricted distribution.



WETLANDS

A combination of lush vegetation and abundant food makes freshwater habitats prime places for birds. Where winters are cold, many wetland birds migrate to waters nearer coasts. The Great Crested Grebe is familiar on reed-fringed lakes.

MOUNTAINS

Mountains have a huge range of climatic conditions. Peregrine Falcons are found across many mountain ranges, but endemic species can be restricted to individual ranges, or even isolated peaks.





DESERTS

Being able to fly makes it easier to find water, but, even so, most desert birds apart from raptors feed on the ground. They include sandgrouse, pigeons, drought-adapted waders, finches, sparrows, and larks such as this Greater Hoopoe-Lark.

COASTS

The teeming bird life of coasts is dominated by a single bird order, the charadriiformes. This group includes waders like the Eurasian Oystercatcher, as well as gulls, skuas, terns, and auks.



POLAR REGIONS

During the summer months, the Arctic attracts huge numbers of migrant waders and wildfowl. Antarctica is visited by many seabirds, but few, apart from these Emperor Penguins, breed on the ice.



mountains	polar regions
temperate forest	grassland
coniferous forest	scrubland and heath
tropical forest	deserts
seas and oceans	agricultural land
wetland	urban agglomerations



SCRUBLAND AND HEATH

In these two related habitats, a patchwork of trees, shrubs, and open vegetation creates ideal conditions for birds that nest in cover, but which feed in the open. Ground-feeding species such as the Eurasian Hoopoe feed alongside flycatchers and other aerial feeding birds.



FARMLAND AND CITIES

Covering an increasing amount of the planet's surface, farmland and cities offer mixed opportunities for birds. For some species – such as the Common Pigeon – close association with humans has proved to be a passport to success.



GRASSLAND

Ostriches, and most of the world's large flightless birds, live in grassland. This habitat is also rich in seed-eaters such as finches, which typically feed and breed in flocks. When they enter farmland, the same birds can become major agricultural pests.

GRASSLANDS

WITH THEIR SWEEPING LANDSCAPES and open horizons, grasslands are a distinctive habitat. They form where there is enough rain to keep grass alive, but not enough for woodland or forest to grow. Most grasslands are in the interior of large continents, away from rain-bearing winds, but grasslands also exist in areas where mountains block moisture coming from the sea. Bird life in grasslands consists mainly of seed- and insect-eaters, together with birds of prey. But in some types of grassland – particularly in the tropics – grasses and woody plants intermingle, providing a home to a much richer variety of birds.



DEMOISELLE CRANE

Unlike other cranes, which have declined as a result of habitat change, the Demoiselle Crane is faring well. It breeds in marshy ground in central Asia, migrating southwards to southern Asia and Africa to spend the winter in dry grassland.

TEMPERATE GRASSLAND

The temperate world once held vast swathes of natural grassland, including pampas and prairies in the Americas, and the steppes of eastern Europe and central Asia. Today, much of this land is farmed, but remaining areas of grassland still have their own characteristic birds. Some of the commonest are seed-eating songbirds, such as finches, sparrows, and larks, but temperate grassland is also the natural habitat of many gamebirds, such as partridges, quail, and grouse. Grassland birds also include some waders, such as coursers and dotterels; unlike most of their relatives, these species are adapted for survival in dry surroundings. In the northern hemisphere, the largest birds in this habitat are bustards and cranes, while in the southern hemisphere the flightless rheas and Emu take first place in terms of size.

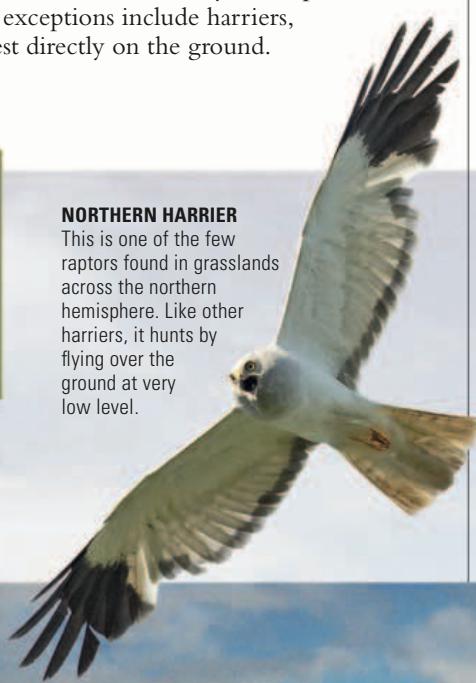
For birds of prey, temperate grasslands make good hunting grounds, but most species are resident only where trees and rocky outcrops provide suitable nest sites. The few exceptions include harriers, which unlike most birds of prey nest directly on the ground.



EURASIAN SKYLARK

Often heard before it is seen, the male sings during its display flight high in the air. Like many grassland songbirds, the species feeds mainly on seeds, but it supplements its diet with insects during the breeding season.

NORTHERN HARRIER
This is one of the few raptors found in grasslands across the northern hemisphere. Like other harriers, it hunts by flying over the ground at very low level.



TROPICAL GRASSLAND

Pure open grassland is rarer in the tropics than in the temperate world. Instead, its place is often taken by savanna – a habitat that mixes areas of grassland with thickets and scattered trees, particularly acacias and baobabs in Africa, eucalypts (gum trees) in Australia, and palms in South America. Trees can make a big difference to birds, because they enable species that nest off the ground to colonize the habitat. These include a host of seed-eating songbirds, including weavers and waxbills, and many birds with broader diets, from starlings to shrikes. Even when trees are dead, they provide vital living quarters for cavity-nesters, such as parrots, hornbills, and owls.

In subtropical grassland, rainfall can be heavy, but it is usually concentrated in a rainy season, while the rest of the year is dry. During the long drought, the grass dies back and often burns off in wild fires.



BUDGERIGAR

The wild Budgerigar is a seed-eating parrot from the grasslands of Australia. It nests in tree-holes – if necessary even in logs lying on the ground – and will breed whenever and wherever there is an adequate supply of grass seeds.

Although the blackened land appears devastated, fires do not do lasting harm to the grassland itself because the grass roots stay alive underground. However, the flames send insects, lizards, and other small animals fleeing for their lives, and this gives birds a welcome feast. They flock to the flame front to grab the refugees, attracted from far afield by the smoke. In Africa's tropical grasslands, these opportunists include hornbills and bee-eaters.

Tropical grasslands are home to a wide variety of birds of prey, from small insect-eating falcons to one of the world's largest eagles – the Martial Eagle of sub-Saharan Africa. A variety of vultures scan the land for dead remains. They are joined at carcasses by storks, including the huge Jabiru in South America and Africa's equally large Marabou Stork. Savanna also supports a handful of unusual ground-based predators, such as the long-legged Secretary Bird – a specialist snake-killer.



SOUTHERN RED BISHOP

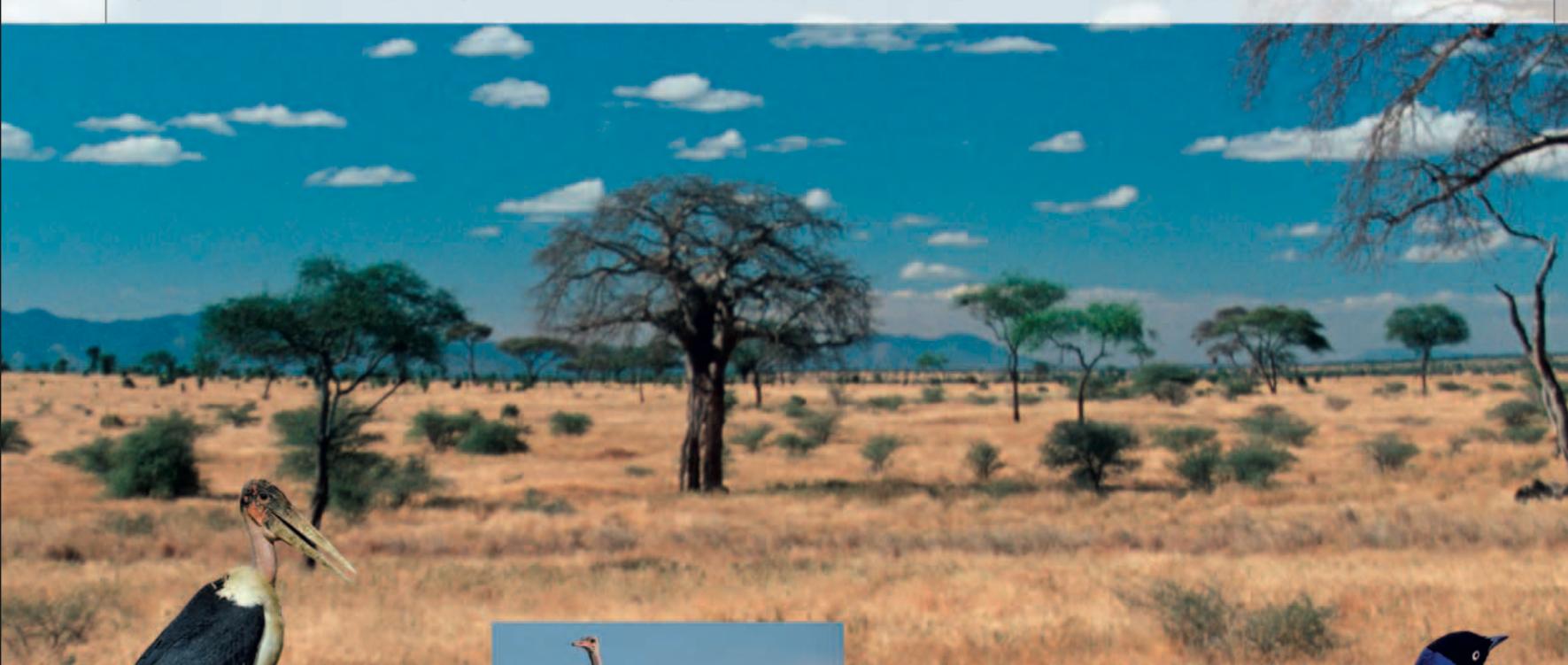
The Southern Red Bishop is found in grasslands across much of Africa. A member of the weaver family, it typically feeds in flocks, and is one of several weaver species that plunder grain from fields. The bird pictured is a male in its bright breeding plumage.

WITHOUT TREES

A variety of birds with tree-nesting ancestors have adapted to treeless conditions. They include owls, pigeons, and a handful of highly unusual woodpeckers. The latter excavate nesting holes in banks of earth – behaviour more typical of kingfishers. In the 19th century, Charles Darwin studied these atypical ground woodpeckers on his travels across the pampas of South America. He later used their behaviour to support his theory of evolution.

GROUND WOODPECKER

This grassland woodpecker from southern Africa digs its nest burrow in exposed banks. The burrow has an upward slant to stop rain flooding it.



MARABOU STORK

The Marabou Stork has a scavenging lifestyle very similar to that of vultures, with which it is often seen. It soars over the African savanna on huge wings, rapidly dropping to the ground when it spots a carcass.



COMMON OSTRICH

With their exceptional height and keen vision, ostriches are quick to spot danger. Most of the world's large flightless birds live in open habitats, using vigilance and speed to evade predators.



SUPERB STARLING

Starlings are some of the most common omnivorous birds of East African grasslands. Naturally inquisitive, the Superb Starling searches the grass for seeds and insects, and also makes a good living by begging for food at campsites.

DESERTS

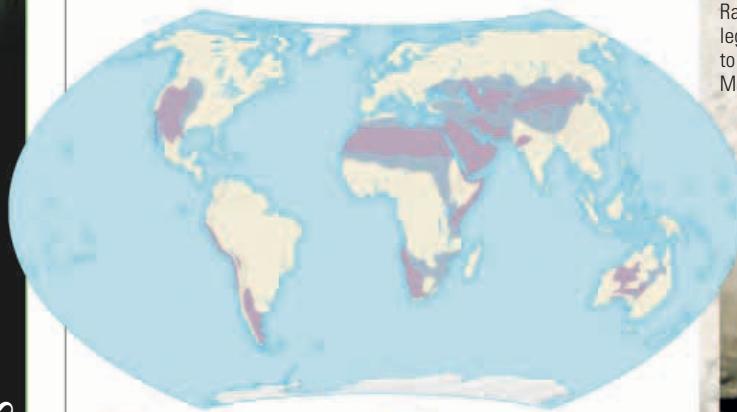
AT LEAST A QUARTER of the planet's land surface consists of desert. For many birds, deserts are dangerous, inhospitable places, or barriers that complicate migratory journeys. But for drought-adapted birds, the huge size of deserts and the shortage of competing species make up for the hostile climate and erratic food supply. Desert bird life varies across the world, but in deserts everywhere its richness depends on one crucial factor – rain.

TRUE DESERT

The driest deserts receive less than 25cm (10in) of rain a year. Not only is rain scarce, it is also highly unpredictable, often falling in sudden downpours separated by months of drought. Vegetation is very sparse, and the wind can be strong and relentless.

Some desert birds, such as seed-eating finches, are able to get all the water they need from their food, but for most, survival depends on a permanent water source. Adult birds can fly great distances to reach water, but their range is limited once they start to breed. As a result, desert birds often nest close to pools and irrigated land, dispersing once their young have fledged. Some sandgrouse have evolved an unusual solution to this problem. At daybreak, the males fly off to waterholes, which can be up to 50km (30 miles) away. Here, they wade in up to their chests, using their breast feathers to soak up water like a sponge. They then deliver this water to their chicks. This daily airlift enables sandgrouse to colonize areas that are inaccessible to many other breeding birds.

In arid regions, the largest birds are often raptors, which cruise on thermals (see Gliding and Soaring, p.34) generated by the sun-baked ground. However, the most abundant birds are usually small songbirds such as larks and chats, gleaners of seeds and small insects. Many are nomadic, breeding after rain and moving on when drought returns.



true desert

semi-desert

DESERT AND SEMI-DESERT DISTRIBUTION

Outside the poles, deserts are found mainly in mid-latitudes, where high pressure systems dominate the climate, blocking the flow of rain-bearing winds. On their margins, where rainfall is higher, are areas of semi-desert that often grade into grassland and shrubland.

**LAPPET-FACED VULTURE**

This powerful scavenger is able to force its way past smaller species, including other vultures, when it lands to feed.

**DESERT WHEATEAR**

Found in arid habitats from Africa to central Asia, this insect-eater migrates in the east of its range, where winter temperatures can fall far below freezing.

**NAMAQUA DOVE**

Africa's small, slender-bodied Namaqua Dove ranges from thorny scrubland to true desert, where its plumage provides excellent camouflage.

**GREATER HOOPOE-LARK**

Rather than flying from danger, this long-legged lark often runs instead, seeming to vanish among the rocks and stones. Males have a distinctive song flight.

**CROWNED SANDGROUSE**

Sandgrouse are found in arid habitats in southern Europe, Africa, and Asia. This species lives across the Sahara, where it collects water at pools and oases.





HARRIS'S HAWK

Often kept in captivity, this raptor lives in the semi-deserts of the Americas. It often hunts by swooping from a tree or cactus.



ELF OWL

This tiny owl, from the southwestern USA and Mexico, is nocturnal. It takes insects in mid-air or on the ground.



CACTUS WREN

Spines are no deterrent for this bird – one of North America's largest wrens. It builds large domed nests in cacti, relying on their spines to keep predators at bay.



ANNA'S HUMMINGBIRD

Hummingbirds are common migrants in arid regions, but this is one of the few species that can be seen in North American semi-deserts all year.



GREATER ROADRUNNER

Famous for its speed and agility, this terrestrial member of the cuckoo family can run at up to 20kph (12mph).

SEMI-DESERT

Compared to true desert, semi-desert is a much richer habitat for both animals and plants. Plants provide birds with cover and, directly or indirectly, such vegetation is also the ultimate source of all their food. In this habitat, many birds have broad-ranging diets, but semi-desert is also home to birds with much more specific needs. Most specialized of all are nectar-feeders, which visit desert flowers. In North America's arid zones, hummingbirds feed on nectar from cacti, and from shrubs such as ocotillos. In Africa, sunbirds have a very similar lifestyle.

Semi-desert is an important habitat for seed-eaters, particularly finches, larks, and ground-feeding doves.

In South America, this habitat is also home to seedsnipes – unusual short-legged waders that have evolved a vegetarian diet. But some of the most conspicuous semi-desert birds feed on insects, either darting out to catch them in mid-air, in the case of flycatchers, or swooping down from a perch – the tactic used by shrikes. In the deserts of the southwest USA, these insect-eaters also include the Gila Woodpecker, which pecks nest holes in the thick stems of large cacti. Once its nests have been abandoned, they are often taken over by Elf Owls – a classic example of one bird creating opportunities for another.

Semi-desert is particularly rich in reptiles, and birds are their most important predators. Gamebirds, such as Africa's guineafowl, often eat small lizards as well as seeds and insects, while in North America roadrunners chase this kind of prey on the ground. But for reptiles generally, the greatest danger is overhead, in the form of birds of prey. Scanning the ground as they soar overhead, they swoop down on snakes and lizards basking in the sun. In Africa and Asia, the snake eagles specialize in this kind of food, but reptile-eating raptors are also common in the Americas.

BREEDING AFTER RAIN

Instead of having a fixed breeding season, some desert birds start to nest after sporadic periods of heavy rain. The Gibberbird, from central Australia, is a typical example. It normally breeds between July and November, but rain outside this period switches on its reproductive behaviour. "Gibber" is the Australian term for desert covered with a broken pavement of wind-scoured stones. This kind of desert has no soil and almost no shade, making it one of the world's most extreme habitats used by birds.

GIBBERBIRD

Clutching an insect in its beak, a Gibberbird prepares to fly back to its nest. In common with some waders, Gibberbirds use a "broken wing" display to distract predators from their eggs and young.



TROPICAL FOREST

MORE BIRD SPECIES OCCUR in tropical forest than any other habitat, despite the ravages of deforestation. Some species are well known for their vivid colours, but there are many less conspicuous birds that also live in this habitat. The bird life is strongly influenced by climate, and there are major differences between the birds of the Old and New World tropics.

AMERICAN RAINFOREST

Central and South America remain unequalled in the richness of their birds. Many bird families are restricted to the Americas, and for the overwhelming majority, rainforests are by far the most important habitat. These families range from toucans and cotingas – some of the most flamboyant and vocal of all forest birds – to antbirds and tapaculos, whose drab colours form highly effective camouflage. Other American rainforest species include tyrant flycatchers, hummingbirds, and American blackbirds and orioles.

Fruit-eating birds, such as toucans and quetzals, play a key role in tropical forests because they help to spread seeds. Many other forest birds actually feed on seeds and nuts. In the Americas, the most conspicuous among them are macaws – the world's largest parrots – which are found only in this region. Generally speaking, tropical forests are difficult habitats for scavengers and birds of prey, since the dense cover makes it hard to find food. However, the American tropics are home to several spectacular examples, including the King Vulture and Harpy Eagle.



tropical forest

TROPICAL FOREST DISTRIBUTION

Rainforest is found worldwide on and near the equator, where intense sunshine produces almost daily downpours of rain. Towards the edges of the tropics, the climate is much more seasonal. Here, evergreen forest gives way to monsoon forest, which is dry for much of the year.



SCARLET MACAW

Like many other forest parrots, the Scarlet Macaw flies over the canopy in noisy flocks to and from its night-time roosts. It is one of the most abundant macaws.



KING VULTURE

This is the largest vulture found in American tropical forests – and by far the most colourful. It locates food by smell and its diet includes dead mammals in the forest itself, as well as dead fish washed up on riverbanks.



KEEL-BILLED TOUCAN

Fruit and a variety of small animals feature on the Keel-billed Toucan's menu. The species is widespread in America's lowland rainforests.



FORK-TAILED WOODNYMPH

In the Americas, hummingbirds are important pollinators of forest flowers. Despite their small size, the males can be pugnacious, attacking each other in mid-air to defend patches of flowers.

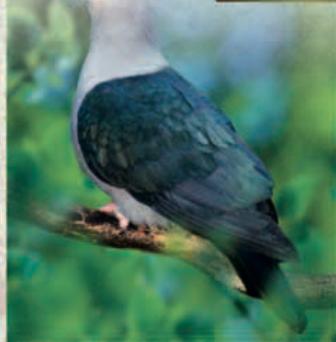


**PHILIPPINE EAGLE**

This enormous eagle hunts up in the forest canopy, where it is a predator of monkeys and colugos (flying lemurs).

LONG-BILLED SPIDERHUNTER

Spiderhunters are named for their habit of plucking spiders from their webs, but also (as here) feed on nectar. They belong to the sunbird family, and like other sunbirds build hanging, pouch-shaped nests.

**GREEN IMPERIAL PIGEON**

This Asian forest pigeon feeds mainly on soft fruit, digesting the flesh but scattering the seeds in its droppings.

GREAT BLUE TURACO

Also known as the Blue Plantain-eater, this large forest bird occurs throughout much of equatorial Africa. Pairs or small family groups can be seen feeding on fruit, flowers, and leaves in the tops of tall trees.

**OLIVE SUNBIRD**

The Olive Sunbird from tropical Africa is a highly active species that flits between forest flowers like a hummingbird.



AFRICA AND ASIA

Thanks to their long geological links (see Bird Geography, p. 70), Africa and Asia's tropical forests share many families of birds. Among the most impressive are the hornbills, which are the Old World counterpart of toucans. Hornbills live in a variety of habitats, but the largest species are found in the forests of southeast Asia. Old World tropical forests are also an important habitat for bulbuls – medium-sized songbirds that often have crests. Dozens of species live in tropical forests, and although many are secretive, some visit gardens near forested land. Flower-visitors include sunbirds, which probe deep into blooms with their long curved bills, and white-eyes. Compared to most nectar-feeders, white-eyes have short bills, and they often reach their food by pecking holes in the base of flowers.

In temperate regions, pigeons are typically drab-looking birds that feed in the open. But in the Old World tropics, dozens of species of sumptuously coloured pigeons and fruit-doves live and feed in forests. Some species are widespread, while others are localized, particularly in the islands of southeast Asia and the western Pacific. Despite their brilliant colours, fruit-doves can be difficult to see. Parrots are different: their bright plumage and noisy habits often make them a conspicuous part of the forest fauna. Some of the most colourful kinds, such as lorikeets, feed mainly at flowers, lapping up pollen and nectar with their brush-tipped tongues. Australasian tropical forests are home to two highly distinctive families found nowhere else: the cassowaries and birds of paradise.

MONSOON FOREST

Unlike tropical rainforest, monsoon forest has a sharply defined wet season, followed by months of drought. Many monsoon forest trees are deciduous, losing their leaves during the dry season, and they sometimes flower while their branches are still bare. The largest area of this habitat is found in southern Asia. Here, forest birds include hornbills, parrots, and many species of babbler. There are also a wide variety of gamebirds, including the Indian Peafowl and the Red Junglefowl – the wild ancestor of the farmyard chicken. Like most gamebirds, they feed on the ground but roost in trees.

MALABAR PIED HORNBILL

Resident in southern Asia from India to Sri Lanka and Borneo, this hornbill prefers open forest, often near human habitation.



TEMPERATE FOREST

FEW HABITATS MATCH the amazing surge in bird life that occurs each spring in temperate woodland. This huge influx occurs mainly in deciduous woods, when trees are coming into leaf, and insect food is abundant. In warm parts of the temperate world, woodland is often evergreen. This habitat usually supports fewer insect-eating birds, but more that feed on reptiles or at flowers.

DECIDUOUS WOODLAND

Across the northern hemisphere – and in places as far south as Chilean Patagonia – deciduous woodland changes dramatically through the seasons, as trees grow and then shed their leaves. Birds echo these changes, reaching peak numbers in spring as migrants flood in, and then declining again in autumn as the leaves start to fall. The earliest arrivals are often warblers, which probe bursting buds for newly hatched caterpillars, followed by larger insect-eaters, such as vireos, and also by flycatchers, which catch insects in mid-air. Spring also sees the arrival of migratory raptors, and in Europe and Asia, the Common Cuckoo. At this time of year, the dawn chorus rivals anything that can be heard in the tropics.

In autumn the pattern is reversed, as the migrants leave, together with their young. Of the songbirds that remain during the winter, most feed on seeds and nuts, or on invertebrates gleaned from cracks in bark or on the ground. They include jays and thrushes, as well as titmice and chickadees, nuthatches, treecreepers, and wrens. All these species are potential food for predators such as hawks and owls.



deciduous woodland

temperate evergreen woodland

TEMPERATE FOREST DISTRIBUTION

Deciduous woodland is found in the northern hemisphere, particularly in eastern North America, western Europe, and the Far East. The main areas of temperate evergreen woodland are in South America, Australia, New Zealand, and the Mediterranean and Caucasus region.



BROAD-WINGED HAWK

A summer visitor to woods and forests in eastern North America, this hawk rarely hunts on the wing. Instead, it watches for prey from a low branch.



TAWNY OWL

Named for its plumage, the Tawny Owl can be very difficult to see, but is in fact one of the most common owls in European woodland.



GREAT SPOTTED WOODPECKER

This widespread Eurasian woodpecker eats mainly insects and seeds. In spring it also pecks into nest-holes to reach the nestlings of other birds. The male (left) drums loudly on a dead tree to establish a territory.



BLACK-AND-WHITE WARBLER

Most warblers feed among the foliage, but this one creeps along branches like a tiny woodpecker.



COMMON CUCKOO

The cuckoo is a brood parasite that lays its eggs in the nests of other birds; open woodland and clearings provide it with many suitable songbird hosts.





GREY GOSHAWK
There are two colour forms of this raptor: pure white (left) and grey-backed. It lives in the forests of northern and eastern Australia.



GREY CURRAWONG
Despite their crow-like appearance, currawongs belong to a distinct family of birds unique to Australasia. They occur in a wide variety of wooded habitats.



NOISY FRIARBIRD
The friarbird is a common visitor to fruiting trees and flowers in dry eucalypt woodland. As its name implies, this member of the honeyeater family is highly vocal.



RAINBOW LORIKEET
All kinds of wooded country suit this vividly coloured nectar- and fruit-eating parrot, which ranges from temperate Tasmania northwards to Indonesia.



LAUGHING KOOKABURRA
The kookaburra is an aggressive and omnivorous predator that swoops to the forest floor to snatch its prey.

OLD AND NEW WORLD WARBLERS

Throughout the northern hemisphere, warblers are the most abundant insect-eaters in broad-leaved woodland. Warblers of the Old and New World often behave in similar ways. Most feed by picking insects from leaves and twigs, they usually have distinctive and complex songs, and the majority are migratory. Despite these similarities, however, these birds belong to two unrelated families: the Old World warblers (family Sylviidae); and the New World or wood warblers (family Parulidae). Their similarities are the result of a process known as parallel evolution.



COMMON CHIFFCHAFF
The Common Chiffchaff is one of the earliest warblers to arrive back in the woodlands of northwest Europe each spring.



NORTHERN PARULA
Measuring only 11cm (4½in) long, this tiny wood warbler is a summer visitor to eastern North America and winters in Central America.

TEMPERATE EVERGREEN WOODLAND

In parts of the world with cold winters, conifers are often the only evergreen trees, but where the climate is warmer, many broad-leaved trees also keep their leaves. In Portugal and Spain, cork oak woodland creates an evergreen habitat for Azure-winged Magpies, and on the opposite side of the Atlantic, California's live oaks provide food for jays and Acorn Woodpeckers. One continent – Australia – follows a different pattern. Here, there are large areas of temperate woodland, but almost all of it consists of evergreen eucalyptus trees.

Unlike deciduous trees, eucalypts or gum trees have slender branches and drooping foliage, and they create a patchwork of dappled shade. This provides ideal conditions for birds such as kookaburras, which perch on low branches and drop down onto animals below the trees. Kookaburras feed on a wide range of small animals, especially lizards, which often bask on the sun-warmed ground. Woodland reptiles are also hunted by birds of prey, such as the Grey Goshawk.

Eucalypt leaves are full of aromatic oils, which makes them difficult for insects to eat. As a result, further up the food chain, relatively few birds survive entirely on insect food in eucalypt woodland. Instead, this habitat abounds in birds such as honeyeaters, which feed at the nectar-rich eucalypt flowers. Honeyeaters are found all over Australia, but dozens of species live south of the Tropic of Capricorn, with a few reaching as far as Tasmania. These birds often share the treetops with lorikeets – distinctive parrots that have slender bodies, graduated tails, and long, brush-tipped tongues. Like honeyeaters, lorikeets move in noisy flocks, and help to pollinate flowers as they move from tree to tree.

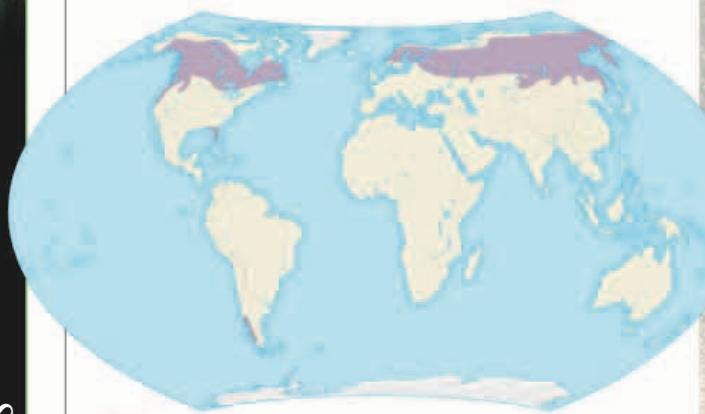
CONIFEROUS FOREST

THIS HABITAT IS HOME TO a narrower range of birds than broad-leaved forest, but what it lacks in variety it more than makes up in scale. The vast coniferous forests that stretch across the far north, called boreal forest, form the largest wooded area left on Earth. Conifers also grow in warm regions and are important for many mountain birds.

BOREAL FOREST

Circling the Arctic across three continents, boreal forest covers about 15 million square km (6 million square miles). It is also known as taiga and is a remarkably even, unbroken habitat, in which immense stretches of forest are dominated by only a handful of different types of tree. Winters are long and severe, with the short winter days of northern latitudes making it even harder for birds to survive. Given these harsh conditions, most of the small insect-eaters – such as kinglets, tits, and warblers – are migrants that spend the winter in forests further south. In the summer, they feed mainly out of sight high up in the canopy, so the forest can seem strangely devoid of birds.

By contrast, the seed-eaters of boreal forest tend to be year-round residents, because their food supply may actually increase during the winter months. The most specialized seed-eaters are the crossbills, which use their cross-tipped beaks to lever open cones, before extracting the seeds. Other common seed-eaters include jays and nutcrackers – birds that have a strong instinct for storing surplus food. In North America, the Grey Jay remains in boreal forest even when the temperature plunges far below zero, while the Eurasian Nutcracker does the same. Energy-rich conifer seeds and an extra-thick, insulating plumage are all that these species need for survival.



coniferous forest

CONIFEROUS FOREST DISTRIBUTION

Conifers grow all over the world, but the largest coniferous forests form a band across the far north of Eurasia and North America, where the climate is too severe for most broad-leaved trees. In the southern hemisphere, the biggest area of coniferous forest is in southern Chile.



RUBY-CROWNED KINGLET

Weighing as little as 5g (1/4oz), this tiny insect-eater breeds in the boreal forest of North America, and in mountains further south. Only males have crests.



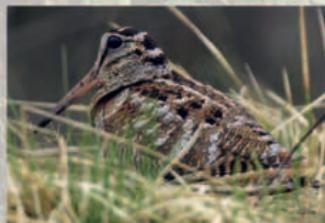
EURASIAN SISKIN

This small, seed-eating finch often feeds in clearings and nests high up in conifers. The male (left) has a smart black crown in the breeding season.



NORTHERN GOSHAWK

Like many boreal forest species, the Northern Goshawk ranges right around the Arctic. It preys on birds and squirrels.



EURASIAN WOODCOCK

High, sideways-facing eyes give this wader an all-round view of danger as it feeds on the forest floor.



WESTERN CAPERCAILLIE

Male capercaillies like this one gather at communal display grounds, or leks, in late winter and early spring.



**NORTHERN HAWK-OWL**

With its long tail and pointed wings, this forest owl has a distinctly hawk-like shape. Like most northern owls, it hunts partly by day during the summer months.

**MAGNOLIA WARBLER**

The Magnolia Warbler winters in the tropics and in spring migrates north to its breeding grounds in the coniferous forests of Canada and the northern USA.

**RED CROSSBILL**

Young crossbills hatch with straight bills, but after they fledge the tips cross over to produce the species' tweezer-shaped bill, as seen in this adult male.

**BLACK WOODPECKER**

Twice the size of most other Eurasian woodpeckers, this impressive bird feeds mainly on insects, but also attacks other birds' nests to steal eggs and chicks.

NATURAL FOREST AND PLANTATIONS

When conifers are planted close together, the ground soon becomes smothered with a thick carpet of fallen needles. For birds, finding food here is difficult, since there are few small animals apart from ants. But where coniferous forest is more open, far more plants and animals can thrive. This richness – a characteristic feature of natural forest, and one that is absent from plantations – creates more opportunities for ground-feeding birds, and for predators such as hawks.

Across the northern hemisphere, several species of grouse live in open coniferous forest, and on its margins. They include the Black Grouse and Western Capercaillie in Europe, and the Spruce Grouse and Ruffed Grouse in North America. During the summer, these birds eat buds, seeds, and many other kinds of plant food, but in winter they often rely on needle-shaped conifer leaves. Few other birds can digest this tough food, but grouse have powerful gizzards that break it down. Damp clearings are also an important habitat for snipe and woodcock – superbly camouflaged waders that probe the ground with their pencil-like bills. During the breeding season, male snipe perform remarkable display flights, using specialized tail feathers to produce drumming or fluttering sounds as they dive headlong.

Woodpeckers are common in coniferous forest, both in the Arctic and warmer climes. The smallest species are not much bigger than a European Starling, but the largest kinds, such as the Black Woodpecker of Europe and Russia, can be nearly 50cm (20in) long. The Black Woodpecker's nest holes are as wide as a clenched fist, and the ground below is often piled with wood flakes the size of clothes pegs. Once abandoned, the holes are ideal homes for owls.

SOUTHERN SEED-EATERS

Conifers grow from the fringes of the Arctic tundra south to Australia and South America. In the southern hemisphere, they include araucarias – eye-catching trees with prickly foliage, large cones, and nutritious seeds, of which the most familiar species is the distinctive Monkey-puzzle Tree. Araucaria seeds are an important food for many birds, and also for native peoples. In Australia, cockatoos feast on the seeds of the Bunya Pine – an araucaria with enormous cones up to 30cm (12in) wide. In southern Brazil, the fast-growing Parana Pine, another araucaria, relies on the beautiful Azure Jay (below) to spread its seeds.

AZURE JAY

This colourful member of the crow family lives in southeast Brazil and northeast Argentina – the natural habitat of the Parana Pine. It is declining as a result of deforestation.



SCRUBLAND AND HEATH

OFTEN DISMISSED AS WASTE GROUND, scrubland can be exactly the opposite for birds. It is found in places where local conditions limit the growth of trees, and its patchy mix of open space and dense cover provides many opportunities for feeding, nesting, and hiding from predators. Heath is similar to scrubland, but instead of being a natural habitat, it is often created by human activity.

SCRUBLAND

Natural scrubland is a feature of regions that have mild, wet winters and long, dry summers. This type of climate is typical of the Mediterranean and parts of southern Africa and Australia. There are also large expanses of scrubland at similar latitudes across the world, including California and the interior of South America and Africa, where it is too dry for woodland and grassland but not dry enough for desert. Many scrubland plants are low-growing and woody, and they can regenerate from ground level if scorched by wild fires during the parched summer months.

For humans, dense scrubland can be inhospitable terrain, because the vegetation often bristles with thorns. But for insects, it is a rich habitat, and this is mirrored in the profusion of insect-eating birds. Apart from songbirds, scrubland birds include rollers and hoopoes – brightly coloured relatives of kingfishers that eat not only insects, but also lizards and snails. Small birds of prey are common in scrubland, and it is also a prime habitat for nightjars and owls. California's scrubland, called chaparral, is favoured by hummingbirds, attracted by flowers, which they help to pollinate. Many are migrants, with just a few species remaining in this habitat all year round. Many scrubland plants in the southern hemisphere depend entirely on birds for pollination.



scrubland

Mediterranean scrubland

SCRUBLAND DISTRIBUTION

Most scrubland occurs in warm temperate regions, dry parts of the tropics, and on the fringes of deserts. Mediterranean scrubland is characteristic of southern Europe, North Africa, and other areas with a similar climate, such as southern Africa and Australia.



EURASIAN HOOPOE

With their bold markings and large crest (folded in this individual), hoopoes are conspicuous summer visitors to southern Europe's scrubland. They feed on the ground.



NEW HOLLAND HONEYEATER

Australia's scrubland is home to many species of honeyeater, including this one from southern and eastern coasts. Like most honeyeaters, it is non-migratory, although it wanders in search of food.



WHITE-FACED SCOPS OWL

Many scops owls live in the heath and scrub of Africa and southern Eurasia, where they hunt the abundant insects and spiders. The strikingly marked species pictured (left) has a large range in Africa south of the Sahara Desert.



CAPE SUGARBIRD

This long-tailed nectar-feeder lives only in fynbos – the low-growing evergreen shrubland unique to the Cape region of South Africa. Sugarbirds often feed at protea flowers, as here, although they also catch passing insects.



**EURASIAN HOBBY**

This falcon is a summer visitor to the heathlands of Europe. It is one of the last migratory birds to breed. Its young hatch in midsummer when the songbirds on which it preys are plentiful.

**WOODLARK**

Like most larks, the Woodlark thrives in open habitats, especially heath. Due to the lack of trees, it sings in mid-air to attract a mate and nests on the ground.

**EUROPEAN BEE-EATER**

Sun-warmed scrub and heath provide this insect-eater with a good supply of bees, wasps, and hornets. It is the only member of its family found in Europe.

**GREAT GREY SHRIKE**

Shrikes often nest in thorny bushes, which also provide spikes for impaling prey. The Great Grey Shrike inhabits Europe's heathland and forest edge.

**EUROPEAN NIGHTJAR**

In the north of its range, this nightjar depends on pine-studded heathland. It is a ground nester, relying on camouflaged plumage to protect itself and its young.

HEATH

Unlike scrubland, heath is more open, with wide expanses of low-growing vegetation studded with isolated shrubs and trees. This kind of habitat develops naturally in places with sandy, nutrient-poor soils, and close to coasts, where salt spray makes it difficult for trees to grow. But in some parts of the world, such as northwestern Europe, heath is often an artificial habitat, produced by deforestation. This may be recent, or it may date from prehistoric times.

For birdwatchers, man-made heath holds lots of interest, because its bird life is distinctive. European heathland is a major habitat for the Eurasian Hobby, a small and remarkably agile falcon that catches other birds on the wing. It usually preys on small songbirds, but it may sometimes be seen chasing swallows in a breathtaking aerial chase. Other heathland birds of prey include kestrels and harriers, which search the ground for rodents and young birds. Like scrubland, heath is rich in insects, particularly where boggy pools allow damselflies and dragonflies to breed. In the heaths of southern Europe, insect-eating birds include the European Bee-eater and various species of shrike, which impale surplus food or half-eaten victims on thorns to create a grisly larder.

After dark, nocturnal insect-eaters take to the air. Nightjars and their relatives are a feature of heath in many parts of the world. During the day, their mottled brown and grey plumage makes them almost invisible as they roost motionless on the ground, but at dusk they can often be seen in silhouette, flying in leisurely circles on sharply pointed wings. Like many insect-eating heathland birds, nightjars are usually migrants in temperate regions, and spend the winter in warmer climates where there is a reliable source of food. As a result, throughout the winter months heathland can seem empty and quiet, with small songbirds in particular being very scarce.

FEEDING AT FLOWERS

Nectar- and pollen-eating birds are common in the tropics, but much rarer in other parts of the world. Australia is a major exception to this rule. Even in the scrubland on its stormy southern coast, honeyeaters and parrots forage among wind-pruned shrubs, searching out banksias and other flowers. Here, birds and shrubs have a very long history of co-evolution, with each adapting to the other. Honeyeaters have long bills for probing deep into tubular flowers, while many of the shrubs have long flowering periods, with different species blooming in a staggered sequence.

As a result, nectar-eating birds can find food all year.

WESTERN SPINEBILL

Confined to the southwest corner of Australia, this species of honeyeater gets most of its food from column-shaped *Banksia* flowers.



MOUNTAINS

MOUNTAINS CAN BE a very tough environment for birds, but are extremely rich in different species because of their wide climatic variation and range of habitats. Individual peaks may have many vegetation zones, each with their own distinctive bird life. Today, the world's uplands provide a last refuge for hundreds of endangered bird species due to habitat destruction in lowlands.

LOWER SLOPES

Many of the birds found in the foothills of mountain ranges also live in neighbouring lowland areas.

However, steep hillsides and narrow valleys or inaccessible gorges often have more undisturbed habitat than the flatter, fertile lowlands, because the terrain is more difficult to clear for farming or settlement. As a result, the lower slopes of mountains frequently support a greater number and variety of birds than lowland plains. Many rare birds, especially tropical forest species, have their last remaining strongholds in mountainous regions.

Montane forests are home to many fruit- and seed-eaters, such as pigeons, pheasants, and parrots, with crossbills, siskins, and nutcrackers specialized for life in coniferous forests (see pp.82–83).

MID-ALTITUDES

Higher up mountainsides, a new selection of habitats and species takes over. Here, typical habitats include scrub, alpine meadows, bamboo thickets, rocky outcrops, cliffs, and scree slopes. The type of forest changes, too, with different trees suited to the normally wetter, cooler climate. Dense cloudforest is found at mid-altitudes in the tropics and is shrouded in mist for much of the day. It is one of the world's



mountain ranges

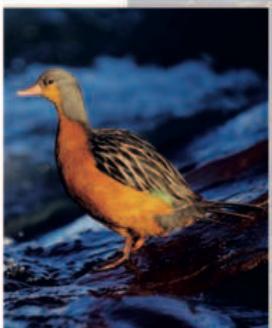
MOUNTAIN DISTRIBUTION

In the temperate zone, the highest, most extensive mountain ranges lie in Eurasia, North America, and southern South America. The Andes are by far the largest mountain chain within the tropics, but there are isolated ranges in Central America, East Africa, and southeast Asia.



ANDEAN CONDOR

Due to its huge size the Andean Condor has difficulty in getting airborne – to get aloft it relies on powerful updraughts from cliffs and steep-sided canyons, which also provide it with inaccessible ledges to roost and nest. The condor soars up to 5,500m (18,000ft) high.



TORRENT DUCK

Unusually for a species of waterfowl, this duck from the Andes is adapted to the rapids of mountain rivers and streams. A female is pictured (left); males are mostly black and white with red bills.



KEA

The Kea's viciously hooked bill is a clue to its diet, which uniquely for a parrot includes sheep carrion and scraps scavenged from car parks and campsites.



RUFOUS-TAILED ROCK THRUSH

This rock thrush breeds on insect-rich, sun-warmed slopes from southern Europe east to China, but winters in the savanna of sub-Saharan Africa to avoid the cool northern winter when such food becomes scarce.





PEREGRINE FALCON

Mountains are a major habitat for birds of prey, such as the fast-flying Peregrine Falcon. Its cliff-side nest sites, called eyries, may be used by the same pair year after year.



SNOW BUNTING

In the south of its circumpolar range the Snow Bunting lives in high mountains. Here, it is threatened by global warming because the higher temperatures destroy the sparse alpine vegetation.



CITRIL FINCH

Many finches and sparrows around the world are mountain specialists, including this native of southern Europe. It often moves downhill in severe weather.

GOLDEN EAGLE

Probably the most numerous raptor of its size in the world, the Golden Eagle takes prey as big as hares or grouse. A pair of eagles often hunt together to help trap and catch their prey.



SEASONAL PLUMAGE

A few mountain birds moult to match the changing appearance of their upland habitat through the seasons. They include several species of grouse, such as the Rock Ptarmigan. This gamebird spends its entire life on the ground, often on open treeless slopes, so it relies on camouflage for protection. In winter (below left), the Rock Ptarmigan is white apart from a narrow black mask, and vanishes against the snow. During the summer (below right), it is greyish-brown with fine black bars and mottling, to blend in with grass, heather, and rocks. In spring and autumn, the ptarmigan has an intermediate plumage.



ROCK PTARMIGAN

Emboldened by its seasonally camouflaged plumage, the Rock Ptarmigan is usually very fearless. It freezes when a predator approaches, only running away or taking flight at the last moment.



richest bird habitats – some cloudforests in Central and South America have an astonishing 400 species of bird, including quetzals and cotingas. Sometimes species are so well adapted to the conditions at a particular altitude that they occur within a vertical band as narrow as 500m (1,650ft); in the tropics, where species diversity is highest, ornithologists carry altitude-calculating GPS devices to help identify similar species found in adjacent altitude zones.

HIGH PEAKS

Alpine slopes and plateaux support the smallest variety of species, but many of these birds do not occur anywhere else. Among the high-altitude residents are seedsnipes, which live on windswept bogs and meadows in the Andes, and snowcocks – large, turkey-like gamebirds of central Asia and the Himalayas. At these altitudes, most small birds, such as snow finches and accentors, feed on seeds and insects, while the Wallcreeper probes crevices for insects on barren scree slopes and sheer rock faces up to the snow line. The Red-billed Chough, a species of crow, has been seen at the summit of Mount Everest – the highest that any animal has ever been recorded.

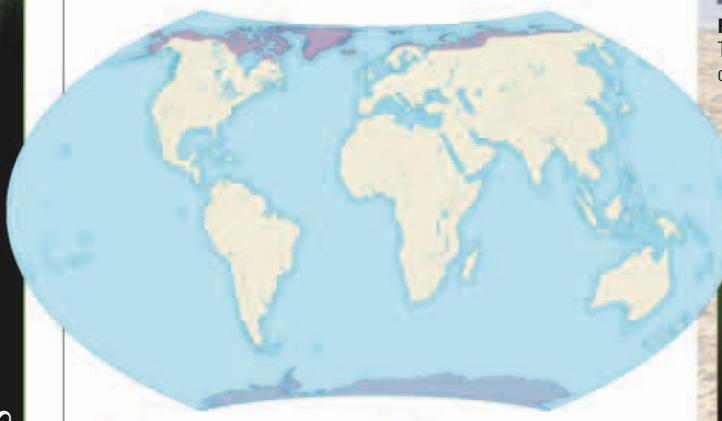
Supplies of food are often scarce or seasonal on mountaintops, so birds here roam larger areas. Birds of prey, in particular, travel huge distances to make a kill or locate carrion. The difficulties of survival at altitude has also driven some birds to develop unusual diets; for example, the Kea of New Zealand is the world's only meat-eating parrot. Another problem facing high-altitude species is the extreme climate, including strong winds and very low temperatures at night. One survival strategy is simply to move lower down the mountains in harsh weather. But in the Andes a few hummingbird species survive the bitterly cold nights by becoming torpid – a form of night-time hibernation that saves precious energy.

POLAR REGIONS

WITH THEIR SUPERB INSULATION, birds are well equipped to cope with the extreme cold near the poles. Some birds remain in the far north or south all year round, but the majority are migrants, often from far afield. Antarctica's visitors are all seabirds, whereas those in the Arctic include vast numbers of waterfowl and waders, which flood northwards in spring to breed in the tundra zone.

ARCTIC TUNDRA

Despite the changes caused by global warming, the Arctic Ocean remains largely frozen for most of the year. Relatively few birds, such as the Ivory Gull, venture far over unbroken ice. Instead, the majority are found either close to the coast, over open water, or in the bleak and treeless tundra. Compared to the tropics, the number of bird species in the Arctic is low, although it is still far higher than in the Antarctic. However, during the breeding season, some Arctic birds congregate in extraordinary numbers. In northwest Greenland, an estimated 30 million Little Auks nest on coastal cliffs and among fallen rocks, and throughout the Arctic millions of terns lay their eggs on shingle banks and shores. Plovers, sandpipers, and many other waders nest on the open tundra, sharing their habitat with geese and swans. Geese graze on vegetation, which grows rapidly during the lengthening days in late spring, but most of the waders eat the invertebrates that thrive in the boggy ground. These large concentrations of birds attract plenty of airborne predators and scavengers. Snowy Owls prey mainly on small mammals, but also take the young of ptarmigans. Skuas specialize in robbing seabirds of their catch, and loiter in nesting colonies to steal any unattended eggs or chicks.



Arctic and tundra

Antarctica

POLAR REGIONS

Geographically, the polar regions lie inside the two polar circles – the areas around the North and South Poles where the Midnight Sun can be seen once a year. However, the biological boundaries of the polar regions depend more on the prevailing ocean currents and climate.

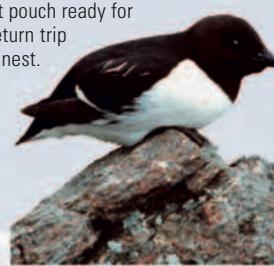


SNOWY OWL

Found throughout the far north, this large ghostly owl hunts in broad daylight during the polar summer. The owl nests on the ground, choosing a raised site to ensure that its chicks stay dry.

LITTLE AUK

The Little Auk is abundant in the Arctic and feeds mainly on animal plankton, storing the food in a throat pouch ready for the return trip to its nest.



LONG-TAILED JAEGER

With its long, pointed wings and tail streamers, this aerial pirate is a more elegant bird than most skuas and uses its flying skills to harass gulls and terns.



RED KNOT

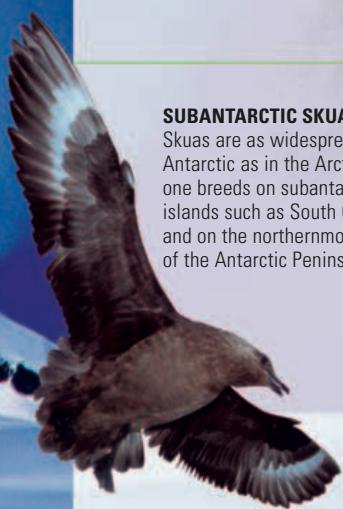
The globetrotting Red Knot is one of the commonest breeding waders in Arctic tundra, but winters as far south as South Africa and New Zealand.



KING EIDER

Vivid facial markings make male King Eiders (above) easy to identify. These coastal seaducks dive for molluscs, and stay in the far north all year round.





SUBANTARCTIC SKUA
Skuas are as widespread in the Antarctic as in the Arctic. This one breeds on subantarctic islands such as South Georgia, and on the northernmost part of the Antarctic Peninsula.



SNOWY SHEATHBILL
Confined to the extreme south, the sheathbill is a dumpy, chicken-like bird that lives mainly on the shore. It eats anything from eggs and chicks to rotting remains washed up by the tide.



SOUTH GEORGIA PIPIT
This is the world's most southerly songbird. It nests in tussac grass – a dense plant that offers shelter from the fierce wind – and manages to survive on the scarce supply of insects and seeds.



EMPEROR PENGUIN
At sea, Emperor Penguins chase fish and squid at depths of up to 250m (820ft). Adults take turns to go fishing, returning with a regurgitated meal for their chick.

ANTARCTIC COAST

In the whole of the far south, only two species of bird are entirely based on land. One is a pipit, and the other is a duck – the Yellow-billed Pintail. Both are found on the island of South Georgia (pp.146–147), which lies north of the Antarctic Circle. On outlying islands such as this, “tubenoses” and cormorants are the most abundant seabirds, and huge numbers can be seen during the summer months. Cormorants rarely travel far when collecting food for their chicks, but albatrosses – the largest tubenoses – can fly thousands of kilometres before returning to their nests. This remarkable breeding strategy is only possible because the adults swallow their catch, then regurgitate a soup-like slurry when at their nests.

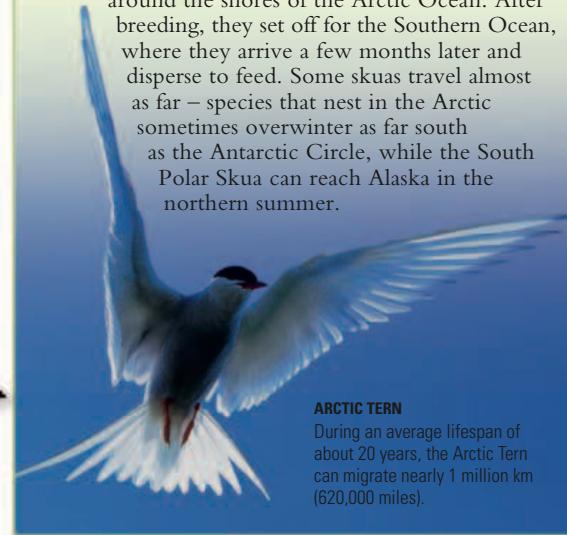
Mainland Antarctica is home to only 11 species of breeding bird, and directly or indirectly, all of them depend on food from the sea. Penguins are famous emblems of the continent’s bird life, but of the 17 species in the penguin family, only five actually set foot on Antarctic shores. Penguins spend the winter far out to sea, but during the polar summer gather at breeding sites on coasts. Most of these colonies are on rocky ground, and some have been in constant use for thousands of years. The Emperor Penguin is exceptional in breeding on Antarctic ice, and in following a breeding cycle that starts in the autumn, rather than in spring. The males, which carry out incubation, experience the lowest temperatures of any bird in the world. Only petrels breed further south than this. One species – the Snow Petrel – has been found nesting over 250km (155 miles) inland, on ice-free cliffs in Antarctica’s mountains.

Throughout Antarctica and its outlying islands, a selection of avian pirates and scavengers eat food that has been brought ashore. Skuas often attack other birds, just as they do in the Arctic, but Southern Giant Petrels and Snowy Sheathbills also tackle more substantial fare, including seal and whale carcasses.

FROM POLE TO POLE

Despite its name, the Arctic Tern is a migrant that travels between both of the polar regions – a round-trip of at least 40,000km (25,000 miles). It is the only bird to do so, and this immense journey requires a large amount of energy. Unlike some migrants, the Arctic Tern is an unhurried traveller, and feeds constantly on the way. Most Arctic Terns travel off westerly coastlines on their way north and south.

Once they reach the far north, they breed around the shores of the Arctic Ocean. After breeding, they set off for the Southern Ocean, where they arrive a few months later and disperse to feed. Some skuas travel almost as far – species that nest in the Arctic sometimes overwinter as far south as the Antarctic Circle, while the South Polar Skua can reach Alaska in the northern summer.



ARCTIC TERN

During an average lifespan of about 20 years, the Arctic Tern can migrate nearly 1 million km (620,000 miles).

WETLANDS

WHEREVER THEY ARE, freshwater wetlands act like magnets for birds. From Arctic lakes to luxuriant tropical marshes, they support a wide range of species, often concentrated in a way that few other habitats can match. The most successful wetland species include some of the most widely distributed birds in the world. In temperate regions, ponds and lakes can freeze over in winter, forcing many of their birds to move to larger bodies of water or to coasts. In the tropics, freezing is not a problem, but lakes and rivers often rise and fall with the seasons, sometimes drying up entirely before rain returns.



WATER RAIL
A narrow, laterally flattened body enables the Water Rail to slip easily between reeds. Normally very shy, it reveals itself by its loud call – a startling series of pig-like grunts and squeals.



EURASIAN BITTERN
Camouflaged by its plumage, this large bittern hunts among reeds. Unlike other members of the heron family, it is rarely glimpsed out in the open as seen in this photograph.



TUFTED DUCK
The Tufted Duck is named for its droopy crest, just visible in this photograph. It is a bird of deep lakes, and dives from the surface to feed. Like most ducks, it takes off explosively at the first sign of danger.



EURASIAN REED WARBLER
A summer visitor across most of Europe, this warbler builds a cup-shaped nest supported by reed stems. Common Cuckoos often use it as a foster parent for their young.



WETLAND DISTRIBUTION

Apart from major rivers, the world's largest freshwater wetlands are found in the tundra zone. Major tropical wetlands include the Amazon flood plain and Pantanal swampland in South America, inland deltas and flood plains in Africa, and parts of northern Australia.



GREAT CRESTED GREBE
Grebes are streamlined fish-eaters that spend their entire lives on water. They build floating nesting platforms, often among reeds.



GREAT NORTHERN DIVER
Also known as loons, divers are clumsy on land but very agile underwater. They nest beside lakes in the far north, usually moving to coasts in winter.

TEMPERATE WETLANDS

Having fallen as rain or snow, fresh water returns to the sea as part of the planet's water cycle, creating many different habitats on the way. In temperate regions, relatively few birds live in the first of these habitats – fast-flowing mountain streams. Dippers are a remarkable exception: the world's only aquatic songbirds, they feed below the surface, using their wings to stay submerged as they walk upstream. Some unusual ducks also live in whitewater, such as the Blue Duck from New Zealand and the Torrent Duck of South America. However, birds become much more numerous where rivers widen and the current slows. Here, waterfowl, moorhens, and coots all use the thick waterside vegetation to conceal their nests, while kingfishers dig nest tunnels in exposed banks of earth.

The bird life of lakes varies according to location, and also with depth. Deep northern lakes are the breeding habitat of divers, while lakes further south are often fished by grebes. Cormorants and herons are also frequent visitors to lakes, particularly ones that are artificially stocked with fish. But reedbeds are the richest freshwater habitat of all. Often found near to the coast, they are home to rails, crakes, bitterns, waterfowl, and waders.

TROPICAL WETLANDS

Due to their combination of water, nutrients, and warmth, tropical wetlands are powerhouses of biological activity. Waterfowl are common, but tropical lakes and rivers have some much more statuesque birds, such as the huge Goliath Heron and the bizarre Shoebill, or Whale-headed Stork, both from Africa, and the Jabiru of Central and South America. Tropical waterways also attract many aerial hunters. More than 90 per cent of the world's kingfishers are found in the tropics – particularly in Southeast Asia – and tropical wetlands are also home to several species of fish eagle, as well as the Snail Kite. After dusk, night herons and small bitterns stalk food at the water's edge, while fish owls snatch prey from the surface. In some parts of the tropics, low rainfall coupled with rapid evaporation creates extensive soda lakes. Their highly saline water is toxic to most freshwater life, apart from some crustaceans and algae. This food is exploited by flamingos, which can form flocks containing hundreds of thousands of birds. High in the Andes and in East Africa's Rift Valley (see p.157), huge flocks of flamingos make some of the most breathtaking bird spectacles anywhere on Earth.

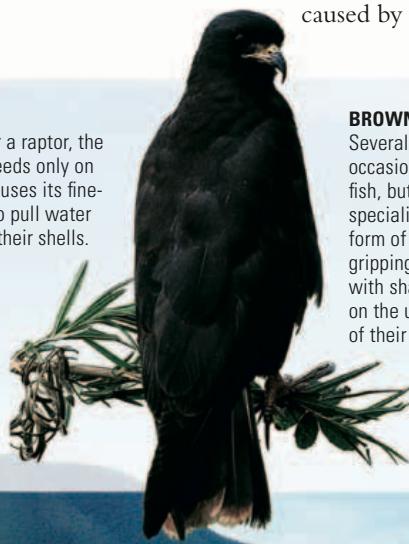


SNAIL KITE

Uniquely for a raptor, the Snail Kite feeds only on molluscs. It uses its fine-tipped bill to pull water snails from their shells.

PIED KINGFISHER

This noisy species is widespread in Africa and Asia, and often hovers above the water's surface before diving in to catch its prey.



BROWN FISH OWL

Several tropical owls occasionally prey on fish, but fish owls are specialized for this form of hunting, gripping their prey with sharp spines on the underside of their feet.



SHOEBILL

This massive-billed stork haunts the swamps of tropical Africa and eats all kinds of animal food, including turtles and young crocodiles.



TEMPORARY WETLANDS

On the equator, torrential downpours ensure that wetlands rarely run dry, but towards the edges of the tropics rain is more seasonal. As a result, wetlands expand and shrink on an annual cycle. In arid regions, these changes are more extreme and wetlands are often temporary features, appearing after sudden storms, then drying out altogether weeks or months later. Wetland birds adapt to this by adopting a nomadic lifestyle. In Africa, for example, Blacksmith Plovers are remarkably successful at tracking down temporary pools. In Australia, pelicans and Black Swans will fly very long distances to visit temporary lakes caused by heavy rain.



AUSTRALIAN PELICAN

Despite being dependent on water, Australia's only native pelican can be encountered in the continent's dry interior. A great wanderer, it seeks out isolated temporary lakes.



BRONZE-WINGED JACANA

Extraordinarily long toes enable jacanas to walk on waterlily leaves. Jacanas are found throughout the tropics – this species lives in south and southeast Asia.

COASTS

ALMOST EVERY COASTLINE is home to birds, even on small remote islands and in polar regions. Coasts provide a vast and varied supply of food and birds tackle virtually all of it, from worms and molluscs hidden in coastal mud to remains washed up by the tide. Some coastal birds, such as turnstones, live only in this habitat, but they are a minority. Gulls and waders often wander far inland, while oceanic birds, such as gannets, petrels, and auks, live at sea and visit coasts only to breed. Ultimately, the bird life of coasts is shaped by geology – whether the shore is rocky, muddy, or sandy, and flat or raised into cliffs.



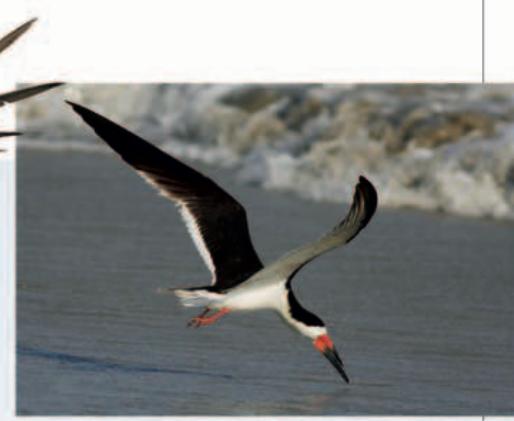
GREAT BLACK-BACKED GULL

This huge North Atlantic gull is a formidable predator. It often preys on other seabirds and their young, and is able to kill mammals up to the size of a rabbit.

ROCKY SHORES

Some birds of rocky shores have no direct connection with the sea. For Red-billed Choughs, Common Pigeons, and Peregrine Falcons, coastal cliffs are simply the seaside equivalent of the habitat they use inland. But for true seabirds, cliffs are vital nesting sites that provide safety from predatory mammals. During the breeding season, cliffs in the northern hemisphere can be crowded with murres, razorbills, puffins, and kittiwakes, creating an impressive chorus of noisy calls – and often a powerful smell (see Breeding p.48). In the North Atlantic, and off southern Africa and Australia, gannets breed on bare rocky islands, with thousands of pairs spaced just pecking distance apart. Rocky turf-covered islands are used by shearwaters, which lay their eggs in burrows. By day, their nesting colonies seem deserted, but the adults return with food as soon as it is dark. Rocky shores are also home to seaducks, such as eiders, and to many birds that feed on animals exposed by the tide, including

10 species of oystercatcher.

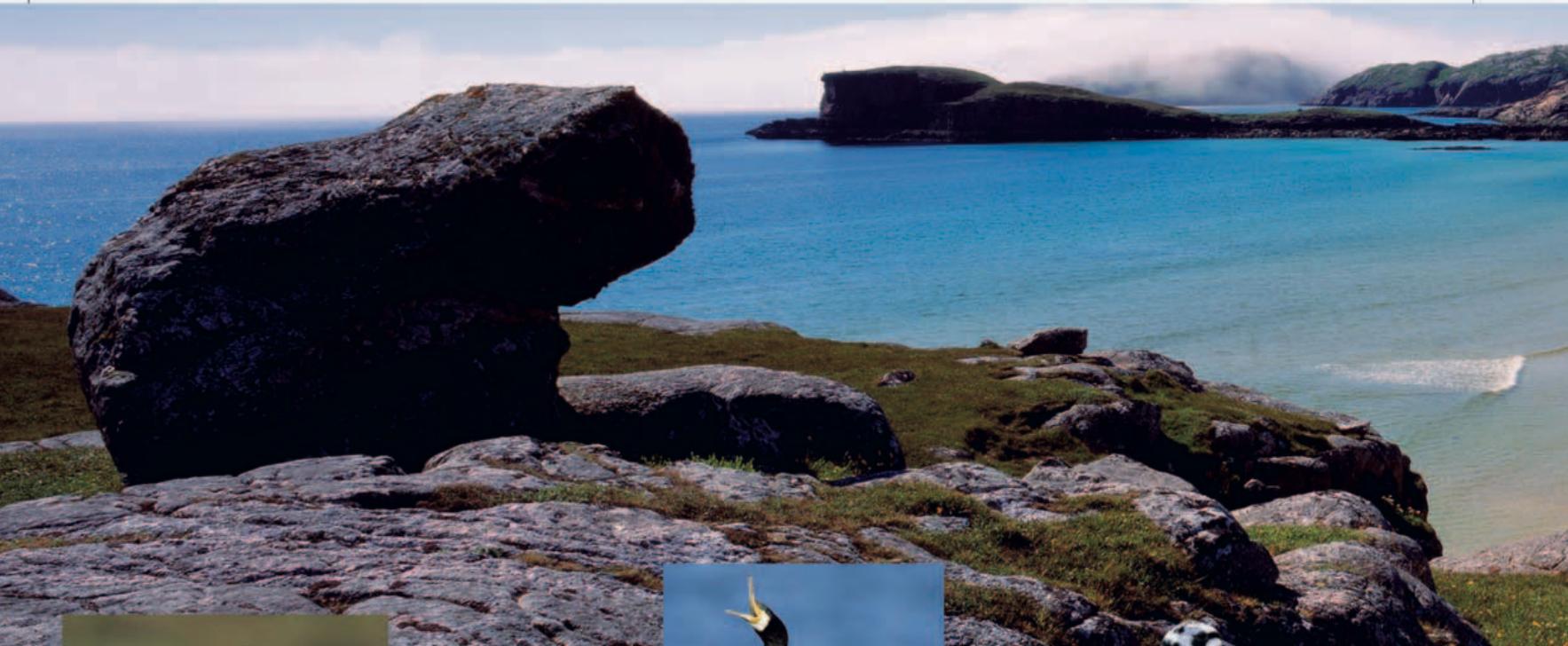


WHITE-TAILED EAGLE

Like the Bald Eagle of North America, this Eurasian bird of prey tackles a wide range of food. Its diet includes fish (caught alive or scavenged) as well as other birds.

BLACK SKIMMER

In calm conditions, skimmers fly low over lagoons and estuaries. They slice through the water's surface with an open bill, and scoop up fish by means of their projecting lower mandible, a unique adaptation.



MAGELLANIC OYSTERCATCHER

Despite differences in plumage, oystercatchers are remarkably alike in their feeding habits. This species lives on the wild coasts of southern Chile and Argentina.



GREAT CORMORANT

The Great Cormorant is equally at home in fresh water and on coasts. Like all cormorants, it swims low in the water, peering under to look for fish.



RUDDY TURNSTONE

This short-billed wader patrols the tideline, flicking seaweed aside to catch sandhoppers and other small animals. One of the most widely distributed coastal birds, it lives on every continent except Antarctica.

MUDFLATS AND ESTUARIES

On low-lying shores, tides play an important part in the life of birds. For many, the busiest time is when the tide recedes, revealing banks of sand or mud. Sand contains relatively little animal life, but mud teems with it, and this food is exploited by huge numbers of waders all around the globe. Low-lying coasts are also home to birds that feed in the brackish water of estuaries and lagoons. Among them are avocets, stilts, spoonbills, and skimmers. Low-lying coasts are major summer nesting habitats for terns. But in temperate regions, the bird life of muddy and sandy shores is richest in winter. At this time of year, big flocks of waders arrive from their distant breeding grounds, and many freshwater birds, such as grebes and waterfowl, fly in to avoid cold weather inland.



GREY HERON

Heron are often seen on coasts. Some species are true shoreline birds, but the Grey Heron, from Eurasia and Africa, usually breeds by fresh water and visits coasts during the winter.



EURASIAN CURLEW

Like many waders, curlews breed on wetlands inland but are more obvious in winter when they move to coasts. The Eurasian Curlew winters as far south as southern Africa and Indonesia.

MANGROVES

In temperate parts of the world, flat muddy coastlines are often backed by a salt-marsh zone. But in the tropics, the same kind of low-lying coast is fringed by mangroves – specialized evergreen trees able to grow in coastal mud, with tangled prop-like roots that can survive being flooded by salty water. Wherever they grow, mangroves are important roosting and nesting sites for birds. These include ibises, spoonbills, and egrets, which sometimes breed in large mixed colonies, and also birds of prey such as the Osprey and Brahminy Kite. Mangrove forests are also a good place to see kingfishers. The Mangrove Kingfisher, from Southeast Asia and Australia, makes its nest holes in rotten mangrove trunks or in abandoned termite nests slung from mangrove branches. Seasonal visitors to mangroves include a few land birds, such as the lorikeets and honeyeaters that visit the mangroves of northern Australia to drink nectar from flowers.

HUMAN IMPACT

MANGROVE DESTRUCTION

In recent decades huge areas of mangroves have been destroyed to make way for building projects or shrimp farming, especially in Central America and Southeast Asia. Many of the surviving trees are dying off due to pollution, including sewage and the waste water from shrimp ponds. As a result, birds unique to mangroves are under increasing pressure.

DEAD MANGROVES, COLOMBIA

The mangrove forests on the Caribbean coast of north Colombia are vanishing due to urban sprawl. They are the only home of the critically endangered Sapphire-bellied Hummingbird.



SANDERLING

Resembling small clockwork toys, Sanderlings scuttle along sandy beaches on fast-moving legs. They stay near the water's edge to snap up small animals exposed by the waves. The bird shown is in summer plumage.



COMMON SHELDUCK

The Common Shelduck inhabits low-lying coasts, estuaries, and salt lakes, where it methodically sifts wet mud for food. Its young often form crèches, supervised by several adults.

COMMON GUILLEMOT

GUILLEMOTS, also called murres, lay a single egg on narrow ledges high on sea cliffs. The egg has a strongly oval shape to help stop it rolling off the ledge.



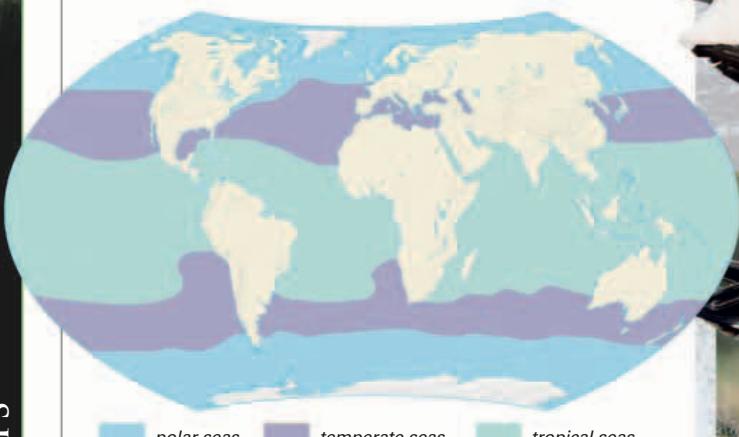
OCEANS AND SEAS

NO BIRD SPENDS its entire life at sea, but several come very close. The Sooty Tern roams tropical oceans for up to eight years before it returns to land to breed, and many other species – such as gannets and boobies – remain at sea until they are four or five years old. Some oceanic birds land on the water to feed, but others stay in the air round the clock, snatching their food from the surface, or from other birds.

TEMPERATE SEAS

On land, warm regions often have the most wildlife, but in oceans the situation is usually reversed. Cold water contains much more dissolved oxygen than warm water, and is often richer in nutrients. As a result, large numbers of pelagic (ocean-going) birds live in temperate seas, or in regions where cold currents flow into the tropics. Some species are astoundingly abundant. For example, Wilson's Storm-petrel – a pelagic bird about the size of a sparrow – is estimated to have a population running into tens of millions, making it one of the world's most numerous birds. Shearwaters and petrels are almost as common, and their larger size makes them easier to see as they speed just above the waves. Many of these birds breed in temperate waters and disperse into the tropics when they leave their nests.

In temperate seas, by far the largest pelagic birds are albatrosses. These depend on strong winds to soar – something that largely excludes them from the tropics, because tropical seas are often calm. Gannets follow albatrosses in size, but they fly strongly whatever the conditions on distinctive, sharply pointed wings. At a distance, gannets may be mistaken for gulls, but no gull can match their skill at dive-bombing fish.



polar seas

temperate seas

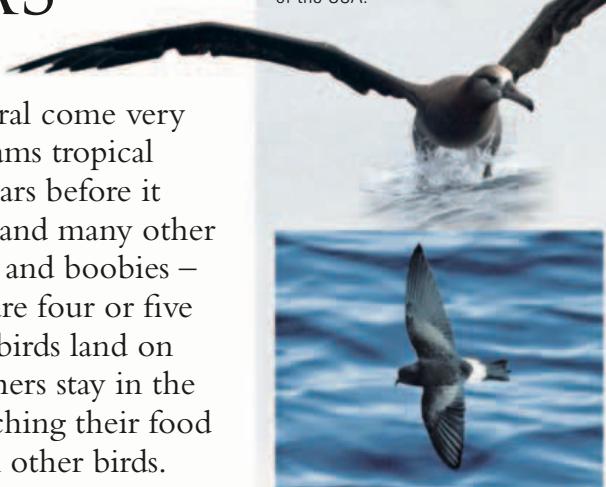
tropical seas

THE OCEANS

Seabirds live in all the world's oceans, but the highest densities occur in temperate and polar seas. Most seabirds live on continental shelves – shallow, gently sloping coastal areas that flank deeper water – or in regions with upwelling currents, such as South America's west coast.

BLACK-FOOTED ALBATROSS

This species is one of three albatross species found in the North Pacific, and it is occasionally seen on migration off the west coast of the USA.



WILSON'S STORM-PETREL

Storm-petrels feed by fluttering close to the water, and often pattering the surface with their feet to help keep their balance as they pick up items of food.



BLACK-LEGGED KITTIWAKE

Kittiwakes are small ocean-going gulls that peck food from the water's surface. After breeding, this species disperses throughout northern oceans and seas.



NORTHERN GANNET

When a gannet dives headlong into the sea for fish, the splash can be seen from afar. Air sacs under the skin of its breast help cushion the impact.



GREAT SKUA

The North Atlantic's largest skua, this predator and scavenger often follows fishing boats out to sea. It is strong enough to rob gannets of their catch.



**GREAT FRIGATEBIRD**

Found only in the tropics, frigatebirds soar far out to sea, using their long tails as rudders. In flight, they have an angular silhouette with rakish wings.

**RED-BILLED TROPICBIRD**

Tropicbirds feed by shallow plunge-diving, a technique also used by many terns. Graceful in flight, they are easily recognized by their long tail streamers.

**ANGEL TERN**

The Angel Tern is a familiar bird to sailors in tropical seas because of its inquisitive nature. It often appears from nowhere to examine passing ships, before flying on.

RED-NECKED PHALAROPE

Seen here in its more colourful breeding plumage, the Red-necked Phalarope migrates to tropical seas for the winter months.

**MASKED BOOBY**

The largest of the world's six species of booby, this powerful plunge-diver fishes in deep water throughout the tropics, except for the eastern Atlantic.

TROPICAL SEAS

In the tropics, ocean-going birds tend to be thinly spread and some fly great distances to search for food. Frigatebirds, for instance, travel by soaring high overhead on massive outstretched wings. They obtain almost all their food from the sea, often by stealing it from other birds, but seldom settle on the surface as they lack waterproof plumage and cannot swim. Unlike true pelagic birds, they head back to islands and coasts at the day's end, spending the night perched in bushes and trees. By contrast, the Fairy Tern is fully oceanic. It is a tireless flier, often being spotted from ships hundreds of kilometres from the nearest land. Tropicbirds are almost as wide-ranging, but Sooty Terns and Brown Noddies have the widest distribution of all: both nest right around the globe, on atolls and other remote islands.

Some tropical seabirds, including Fairy Terns and tropicbirds, are solitary at sea, whereas Sooty Terns can be encountered in huge flocks that look like smoke against the sky. Boobies also feed in flocks, although on a smaller scale. Tropical relatives of gannets, they plunge into the water like a volley of arrows whenever they spot shoals of fish. Most range far over the oceans when they have finished breeding.

Of all the birds found in tropical seas, the ones that perhaps might have been least expected to occur

there are a pair of freshwater waders – the Grey and Red-necked Phalaropes. These elegant species change habitat entirely after breeding.

They nest on bogs and pools in the tundra of the extreme north, but migrate south to spend the winter far from the coast in tropical waters.

OCEANIC ISLANDS

Remote islands are important nesting sites for pelagic birds, particularly if they are free of egg-eating mammals such as rodents or foxes, which can wreak havoc in seabird colonies. Shearwaters dig nesting

burrows, but many other pelagic birds, such as gannets, terns, and albatrosses, nest out in the open, using little or no nesting material. In places with a hot, dry climate, thick deposits of fossilized droppings, called guano, show that some sites have been in continual use for thousands of years. However, dependence on limited sites also makes seabirds vulnerable. If predators are deliberately or accidentally introduced, nesting colonies can be wiped out in a matter of a few years. Several species have been pushed to the brink in this way, including the Bermuda Petrel or Cahow, which almost died out due to predation by introduced rats, cats, and dogs.

**SOOTY TERN
NESTING COLONY**

Sooty Terns breed in very large colonies on islands – the colony shown here, on Midway Atoll, Hawaii, is used by 50,000 pairs. The birds lay their eggs directly on the ground.



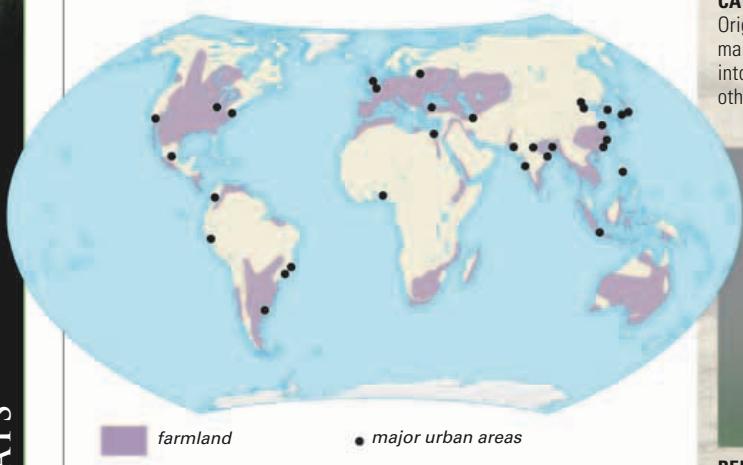
FARMLAND AND CITIES

OVER A THIRD OF the Earth's land surface is currently used for farming, and around 3 per cent is occupied by cities or towns. Together, this adds up to a huge area – one that continues to grow as the human population expands. For birds as a whole, this transformation of the natural world has had all kinds of negative effects, but some species have benefited from the change.

FARMLAND

In farmland, one of the surest signs of success is to be ranked as a pest. Several dozen species of bird can claim this status, and for obvious reasons, most are seed-eaters. In the tropics, they include the Red-billed Quelea – a finch that causes huge crop losses in Africa – and the brightly coloured Java Sparrow, which plunders rice fields in southeast Asia. North American crops are attacked by the Bobolink and Red-winged Blackbird, but in temperate regions, the worst damage is often caused by birds that eat seeds before they have sprouted. These include a wide variety of omnivores such as gulls and crows, which descend on fields when the soil is ploughed and drilled, while pigeons feed on the young plants.

By contrast, insect-eaters are generally welcome visitors, and the expansion of farming originally helped many of them to thrive. Cattle Egrets are a common sight in pasture in many parts of the world, and aerial feeders, such as the Barn Swallow, also benefit from the insect life above meadows. But due to changes in agriculture, intensively farmed land is now bird-free for much of the year. Insecticides and herbicides deplete the birds' food supplies, and heavy machinery destroys the eggs of ground-nesting birds.



FARMLAND AND URBAN AREAS DISTRIBUTION

Humans began farming around 10,000 years ago, and so farmland is a very new addition to the world's list of habitats. Cities are an even more recent habitat in ecological terms. Both habitats are increasing in size – the planet's proportion of urban land is set to double by 2025.



TURKEY VULTURE

This widespread American scavenger is a frequent sight in cattle- and sheep-ranching country. It scans highways for roadkill – a source of food that has soared with the growth in traffic.



BARN SWALLOW

Swallows thrive in regions with damp pasture, because this type of landscape is an ideal breeding ground for insects. The Barn Swallow has a virtually global distribution, but its numbers fluctuate with the changing food supply.



CATTLE EGRET

Originally found alongside wild grazing mammals, the Cattle Egret has moved into farmland. It feeds on insects and other small prey flushed out by cattle.



RED-WINGED BLACKBIRD

When it forms huge flocks, this songbird can devastate entire fields of grain. But the gradual disappearance of suitable nesting habitat means that the species is not as damaging as it was in the past.





COMMON PIGEON

Descended from domesticated birds, these pigeons are so at home in urban areas that they are often considered a pest.



GALAH

A rare success story in the parrot family, the Galah has become an abundant bird throughout Australia's wheat-growing belt, and in some of its cities too, such as Melbourne and Perth.

COMMON STARLING

Buildings make ideal nest sites for this starling. In winter, starlings often gather at mass roosts in towns, performing spectacular aerial manoeuvres before landing.



HOUSE SPARROW

The chirping of male House Sparrows (above) is a familiar sound in urban areas across the world. They nest in holes or among foliage, often in groups.



COMMON NIGHTHAWK

This nocturnal species is now a common urban bird in the USA, where it nests on gravel-covered flat roofs. At night the artificial lighting attracts its insect prey.

CITIES

No accurate figures exist for the world's urban bird population, but it almost certainly exceeds the human one. In most of the world's cities, birds manage to flourish, although the number of species is often low. So what makes a successful urban bird? The answer is several key features. Among them are a wide-ranging diet, a readiness to try new foods, and an ability to feed and breed in busy, built-up surroundings.

Probably the oldest-established urban bird is the House Sparrow. Its natural range includes the Middle East – the region where urbanization first began. Today, House Sparrows are found all over the world, and their ability to get inside buildings is unrivalled. They are often seen in supermarkets and subway systems, and have even been spotted on the 80th floor of the Empire State Building in New York. Although House Sparrows are primarily seed-eaters, they are also ready to feed on all kinds of edible scraps.

House Sparrows moved into towns and cities without any human help, but several top urban birds – including the Common Pigeon and Common Starling – have a more complicated history. The ancestors of the former species nested on cliffs and rocky ground, and were domesticated several millennia ago as a source of food. Over the centuries, many of these birds escaped and began breeding in towns. rooftops and windowsills mimic their natural habitat perfectly, and some cities now have a pigeon population running into millions.

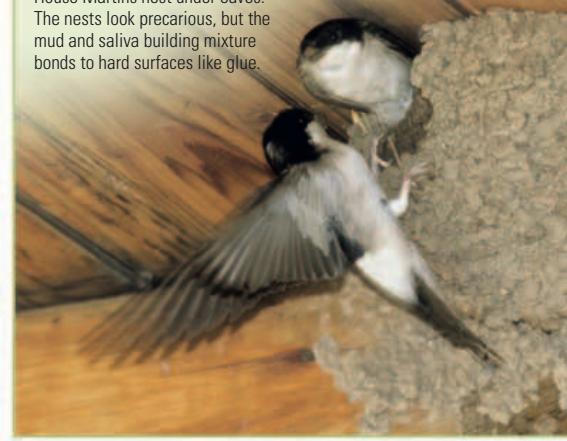
Originally from Europe, the Common Starling was introduced into North America in the 1890s, when about 100 birds were released in New York's Central Park. It spread rapidly and is now a common sight on city streets, and an aggressive competitor to many of the continent's native birds. It has had similar success in eastern Australia and New Zealand, with equally damaging results for the local bird life.

NESTING SPACE

The urbanization of the countryside has generally been good news for swifts, swallows, and martins, because it has created new nesting opportunities. These birds are all aerial insect-eaters and originally nested in crevices or among rocks, but today they often use artificial structures. Barn Swallows and Common House Martins breed in farms or villages, so that they can fetch mud from the surrounding countryside to build their nests, whereas Common Swifts avoid open country, and instead nest in cities. They mould their nests from saliva and feathers.

COMMON HOUSE MARTIN

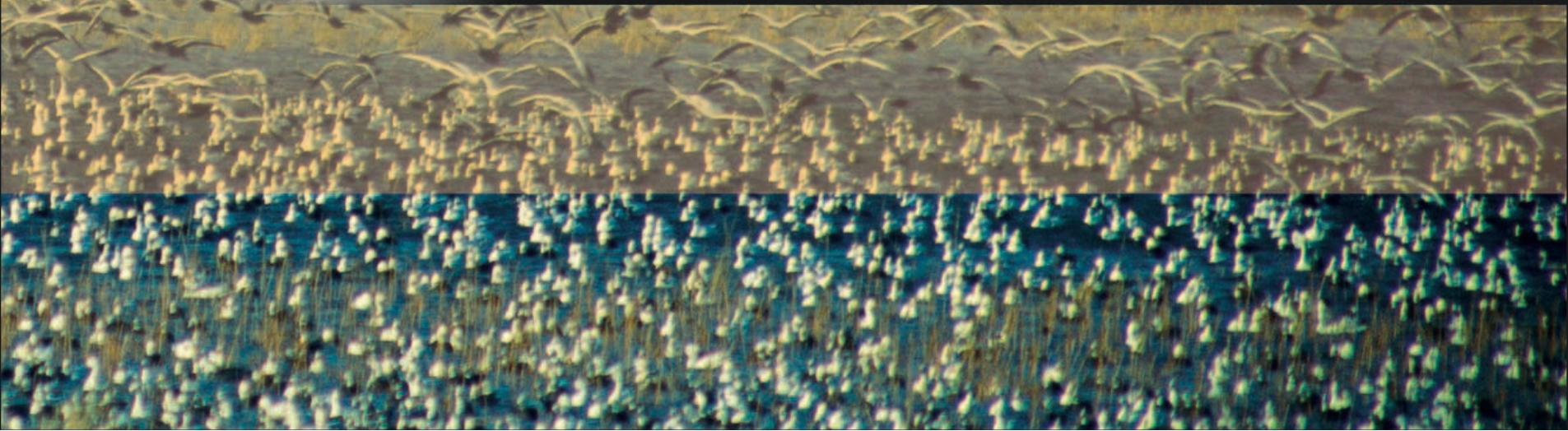
House Martins nest under eaves. The nests look precarious, but the mud and saliva building mixture bonds to hard surfaces like glue.







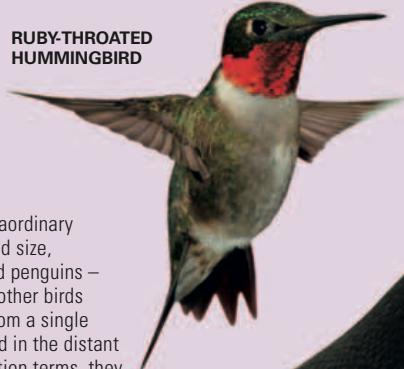
BIRD SPECIES



CLASSIFICATION

CLASSIFICATION IS THE SCIENCE of identifying and categorizing living things and, among ornithologists, few topics generate as much debate. This is because classification involves much more than simply giving birds scientific names. Instead, it delves deep into their evolutionary history, as scientists try to establish how all the world's birds are related. Traditionally, classification is based on physical features, and on other inherited characteristics, such as internal processes or behaviour. But in recent years, the advances in molecular biology have allowed ornithologists to go to the very source of bird evolution, by studying DNA itself.

RUBY-THROATED HUMMINGBIRD



A SHARED PAST

Despite their extraordinary range in shape and size, hummingbirds and penguins – together with all other birds – have evolved from a single ancestor that lived in the distant past. In classification terms, they and their direct forebears make up a clade: a single branch of life's evolutionary tree. Since the branch started growing, it has divided many times, leading to the variety of species that exist today.

HUMBOLDT PENGUIN



CLASSIFICATION GROUPS

In biological classification, the most fundamental unit is the species. This is a group of living things that share the same features, and that breed with each other. To distinguish species from each other, each one is given a unique two-part scientific name. Unlike a common name, this is recognized worldwide. Once classified, each species fits into groups of increasing size, from genera and families, which contain a species' closest living relatives, through orders, classes, and phyla to the Animal kingdom – one of the fundamental divisions of life on Earth.

CLASSIFICATION IN ACTION

The major classification levels are listed here, using the Common Starling as an example. Below species level, distinct variants are classed as subspecies.

KINGDOM Animalia

Includes multicellular organisms that obtain energy by eating food. Most have nerves, which enable them to sense their surroundings. Many are able to move.

PHYLUM Chordata

Animals that have a strengthening rod, or notochord, running the length of their bodies. In some chordates it may be present only during the embryo stage.

CLASS Aves

Contains all the world's birds. Birds are, like mammals, warm-blooded, but they are the only living chordates that have feathers. Most of them can fly.

ORDER Passeriformes

The largest order of birds, containing over 5,200 species. All its members have specialized feet for gripping slender perches. Many have complex songs.

FAMILY Sturnidae

This family contains all the world's starlings – over 100 species. Starlings have straight beaks and an omnivorous diet, and they are often gregarious.

GENUS *Sturnus*

This genus contains a group of 15 species of Asian and European starlings. The most noticeable difference between species is their coloration.

SPECIES *Sturnus vulgaris*

The Common Starling has dark plumage with iridescent spots, which become pronounced in the breeding season. It often roosts in large flocks.

PROBLEM OF VARIATION

Traditional classification suffers from some major problems.

One of the biggest is that some species show marked variations in different parts of their range. The Carrion Crow, for example, has six regional variants, spread across Europe, North Africa, and Asia. The Collared Kingfisher has about 50, many restricted to tiny islands. In cases like these, classification is often a matter of opinion, with experts differing on whether variants are full species or not. As a result, there is no agreed figure for the total number of bird species. Most ornithologists estimate there are between 8,500 and 10,000, but as more subspecies are "promoted" to full species, the total continues to rise.



HOODED CROW

Classified as *Corvus corone cornix*, this Carrion Crow is found in northern and eastern Europe. It may breed with the all-black form.



CARRION CROW

This all-black form of the Carrion Crow is the subspecies found in most of western Europe. It is classified as *Corvus corone corone*.

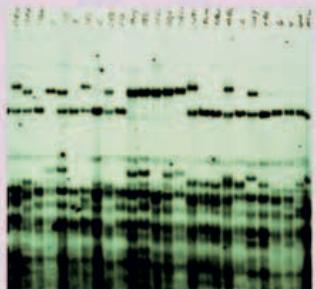
CLASSIFICATION TECHNIQUES

In evolution, some physical features can change much more rapidly than others, so this has to be taken into account when species are compared. "Conservative" features, such as the arrangement of muscles and bones, evolve very slowly, while "derived" features, such as songs, can evolve much more rapidly. Taken together, these can show which birds share distant ancestors, and which ones are more recently related. Anatomical evidence is often clouded by convergent evolution. In this process, unrelated birds can become deceptively similar, by adapting to similar ways of life.

In the 1980s bird classification was revolutionized by the analysis of DNA samples taken from the world's bird species, which showed their relationships. This confirmed many of the groups that had been determined by studying bird anatomy, but it also revealed some previous mistakes in classification.

SUPERB FAIRYWREN

Australian songbirds – such as fairywrens – were originally thought to have evolved from songbirds that arrived from Eurasia. DNA analysis has shown that this is probably not true and that Australia's songbirds form a separate "home-grown" group.

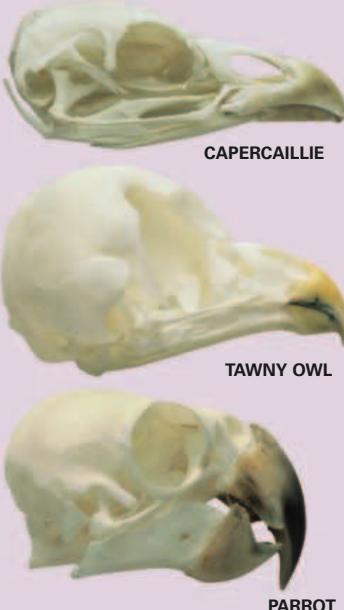


HARD EVIDENCE

Skull anatomy is important for the study of bird evolution. Bill shapes can evolve fairly rapidly, but the arrangement of skull bones is consistent over millions of years.

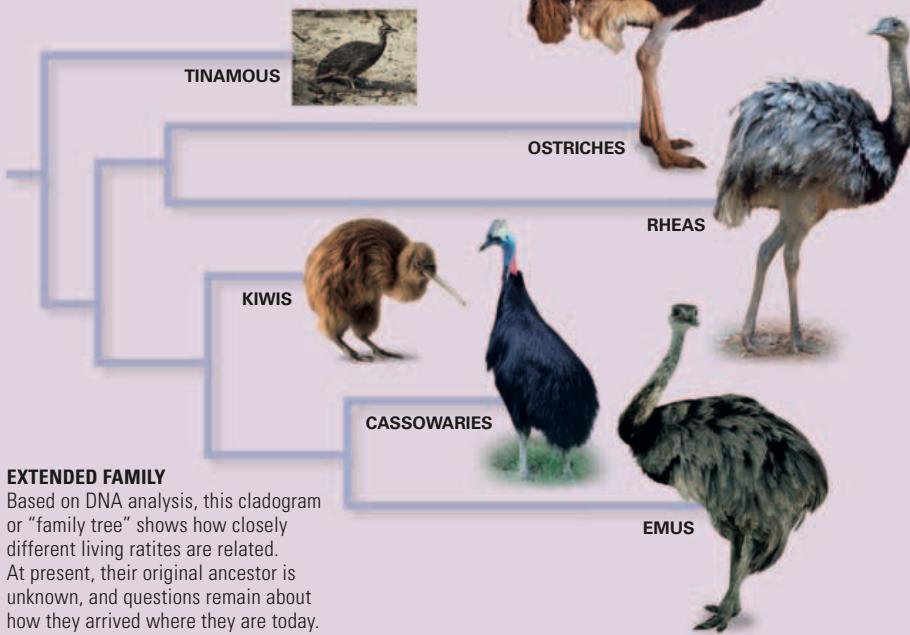
MOLECULAR MATCH

When strands of DNA from different species are compared, the closer the match, the more closely the two species are related. DNA evidence has shown, for example, that flamingos and grebes are each other's closest living relatives.



UNSOLVED QUESTIONS

With some groups it remains hard to trace the path of evolution. One of these problem groups is the ratites – flightless birds such as ostriches and emus, which do not have a keel on their breastbone. This unusual feature, and several others, suggest that the ratites share the same ancestor. They are assumed to have evolved in the ancient continent of Gondwanaland, before it divided. However, DNA evidence suggests that they diverged much more recently, which throws this theory into doubt. Similar puzzles exist with several other groups.



BIRD ORDERS

This section of the book generally follows the names and classification sequence used in *The Howard and Moore Complete Checklist of Birds of the World* (2003) – one of the most comprehensive and authoritative sources in bird classification. In this sequence, a total of 9,721 bird species are recognized, belonging to a total of 204 families. In this book, these families have been grouped into the following 29 orders.

	FAMILIES	SPECIES
TINAMOUS	1	46
OSTRICHES	1	1
RHEAS	1	2
CASSOWARIES AND EMUS	2	4
KIWIS	1	3–6
GAMEBIRDS	5	289
WATERFOWL	3	157
PENGUINS	1	17
DIVERS	1	5
ALBATROSSES AND PETRELS	4	107
GREBES	1	22
FLAMINGOS	1	5
STORKS AND HERONS	3	115
PELICANS AND RELATIVES	8	64
BIRDS OF PREY	3	304
CRANES AND RELATIVES	11	199
WADERS, GULLS, AND AUKS	16	344
SANDGROUSE	1	16
PIGEONS AND DOVES	1	298
PARROTS	1	352
CUCKOOS AND TURACOS	3	161
OWLS	2	194
NIGHTJARS AND FROGMOUTHS	5	115
SWIFTS AND HUMMINGBIRDS	3	429
MOUSEBIRDS	2	6
TROGONS	1	39
KINGFISHERS AND RELATIVES	11	208
WOODPECKERS AND TOUCANS	5	396
PASSERINES	92	5,200

TINAMOUS

ORDER Tinamiformes
FAMILY 1
SPECIES 46

plump bodies, and short legs. However, although they can fly, their skeletons show that they are more closely related to the flightless ratites, which include rheas and ostriches. Tinamous live in woodland and open grassland, including the Andean Altiplano. They feed on the ground, eating seeds and berries, as well as insects, and small animals. They can fly rapidly over short distances on small, fast-beating wings but, if threatened, their first instinct is to run away.

FOUND ONLY IN Central and South America, tinamous superficially resemble gamebirds (see p.107), with small heads,

BREEDING

Tinamous nest on the ground, laying up to a dozen eggs. Their eggs are remarkable, with a bright background colour and glossy sheen. The male is responsible for building the nest and for incubation, which lasts for about three weeks. The chicks are well developed when they hatch, running after their parents within hours.

MALE ON NEST

A male Highland Tinamou incubates a clutch of eggs, with a recently hatched chick by his side.



Tinamus major

Great Tinamou



LENGTH
42cm (16½in)

WEIGHT
1kg (2½lb)

MIGRATION
Non-migrant

HABITAT Primary and secondary rainforest, with an open forest floor



ADULT GREAT TINAMOU

The haunting song of the Great Tinamou, consisting of up to seven tremulous, whistled notes, is one of the most evocative of Neotropical bird sounds, cutting through the forest before dawn and around dusk. It is a large, brown bird that wanders on the forest floor, eating insects, frogs, berries, fruit, and seeds.

Crypturellus soui

Little Tinamou



LENGTH
23cm (9in)

WEIGHT
225g (8oz)

MIGRATION
Non-migrant

HABITAT Tropical and lower subtropical forest, especially in dense undergrowth on forest edges

In common with other members of its genus, the Little Tinamou is found in the forest undergrowth. It has a black crown, nape, and head sides that contrast with its base plumage, which varies from olive-brown to ochre. The female has a brighter plumage than the male.

The call of this species is a series of clear, tremulous whistles, rising in pitch and volume before stopping abruptly. It is a shy bird, usually remaining in dense thickets, which makes it well camouflaged. If surprised in the open, it will either freeze or, more usually, scurry away. The Little Tinamou is omnivorous. While its main diet consists of fruit, berries, tubers, and seeds, it also eats insects and frogs. Like some other tinamous, it swallows small pebbles to aid digestion. It lays two eggs, which are incubated by just the male.

Nothoprocta pentlandii

Andean Tinamou



LENGTH
27cm (10½in)

WEIGHT
275g (10oz)

MIGRATION
Non-migrant

HABITAT Steep slopes at high altitude, including forest edges, steppes, and vegetation along streams



The Andean Tinamou occurs in semi-open habitats, and is most often glimpsed crossing a road. Its most distinctive feature is its slender decurved bill, which is black above and pink below. Its iris is yellow to pale brown. The upperparts are brown with white streaking, grey mottling, and rufous barring. The underparts are pale buff colour. The wings are heavily barred buff, and its legs are pale yellow.

The Andean Tinamou is a shy bird and has a tendency to hide under rocks and vegetation, staying very still. When disturbed, it flies off with strong wingbeats. It feeds on seeds, shoots, buds, fleshy fruit, crops such as potato and barley, and insect larvae.

The call of the Andean Tinamou is a high-pitched, abrupt whistle, usually at long intervals. The male builds the nest in the breeding season and mates with different females, who lay about 14 eggs each. It is the male who incubates the eggs and cares for the brood. The chicks are able to feed themselves a few hours after hatching.

ADULT ANDEAN TINAMOU

Eudromia elegans

Elegant Crested Tinamou



LENGTH
39cm (15½in)

WEIGHT
675–750g (24–27oz)

MIGRATION
Non-migrant

HABITAT Arid and semi-arid grassland, dry savanna, open woodland, steppes, and sandy areas

A large terrestrial inhabitant of arid Patagonia, the most spectacular feature of the Elegant Crested Tinamou is its long, thin, upcurled crest. Its plumage is basically dark brown, with darker markings. There is a prominent white

stripe leading from the eye to the base of the neck and a parallel white stripe starting from the bill. The bill itself is short and decurved and its wings are spotted white. Unlike most tinamous, it has only three toes, lacking a vestigial hind toe.

The Elegant Crested Tinamou is remarkable in its breeding behaviour – either sex may have several mates, and the species is often found in these unusual groupings. The Elegant Crested Tinamou is sedentary, but groups move over large areas in response to food shortages.



SHINY EGGS

Tinamou eggs are among the most beautiful in the world and look as if they are made of porcelain. Such an egg would appear to attract predators. However, this is not the case as most tinamou predators are nocturnal, relying on scent rather than sight.



OSTRICHES

ORDER Struthioniformes
FAMILY 1
SPECIES 1

To escape danger, it runs at high speed on its hoof-like, two-toed feet. The ostrich belongs to the ratite group of birds, which includes rheas, emus, cassowaries, and kiwis. All have a flat breastbone, with no keel.

BEHAVIOUR

Ostriches live in open habitats, and are usually seen in groups of 10–25 birds. They feed on small animals and seeds, often mingling with grazing mammals to catch insects stirred up by their feet. Ostrich social life differs from that of many birds, because the male takes a leading part in raising the young. His partner, known as the major hen, scrapes out a nest on the ground and lays up to 12 eggs. Several other females lay in the same nest, creating a shallow pile of up to 50 eggs, each weighing over 1kg (2½lb). Once the clutch is complete, the major hen incubates by day, with the male taking over at night. The chicks hatch after about 40 days, and immediately follow the male to find food. When two

males meet, their chicks instinctively congregate to form a crèche. One male guards the crèche, until the young are able to fend for themselves. Ostriches have a dangerous kick if cornered, but are docile in captivity. At one time, they were much in demand for their feathers, but today they are farmed as a source of meat.



MOVING OUT

With their commanding height, ostriches are quick to spot danger. Here a group of ostriches run for safety in southern Africa's Kalahari Desert.



FIGHTING RIVALS

During the breeding season, male ostriches fight with their feet as they build up harems of hens. However, once the chicks are hatched, they co-operate.



MALE AND FEMALE

The feathers of the adult male are mostly black, with white wing feathers. It also has a white neck band and tail. The female is greyish brown with no white feathers.

Struthio camelus

Common Ostrich



LENGTH
1.8–2.8m (6–9½ft)

WEIGHT
100kg (220lb)

MIGRATION
Non-migrant

HABITAT Variety of open semi-arid plains (from desert to savanna) and open woodland

The single species of Ostrich is placed in a separate order to all other birds. A creature of superlatives, it is the tallest and heaviest of all birds. The Ostrich is flightless but is better adapted to running than any other bird, aided by its powerful, two-toed feet. It can reach speeds of 70kph (45mph), and has remarkable stamina, "cruising" at 50kph (30mph) for 30 minutes – an important adaptation for fleeing predators and foraging over large, barren areas.

The Common Ostrich's eye measures 5cm (2in) in diameter – the largest of any terrestrial vertebrate. It has 16 primary feathers (an unusual number), which help to create an impressive display. The male is one of

the few birds to have a penis, which it displays during courtship. The male chooses the breeding site and mates with three or more females. The eggs are the largest of any bird, and about 2–11 of them are laid in a communal nest. Incubation takes 42 days, the dominant female sitting on the eggs during the day, while the male takes his turn at night. The resulting offspring form large crèches, tended by one or more adults. The diet of the Common Ostrich is varied, including plant matter, carrion, lizards, and even small tortoises.



DEFENCE OF CHICKS

The adult shelters its chicks under its wings to protect them from sun, rain, and predators. It uses its powerful kicks to drive away predators.

RHEAS

ORDER Rheiformes
FAMILIES 1
SPECIES 2

OFTEN
COMPARED TO
OSTRICHES, rheas
are smaller and
much more lightly

built birds that live in the grasslands of South America, and the foothills of the Andes. They live in flocks of several dozen birds but, even in the open, their grey-brown plumage can make them difficult to see. As with ostriches, male rheas mate with several females, and take charge of raising the young after they have hatched. Several centuries ago, rheas were extremely common birds, but they have been badly affected by hunting and by the spread of farming.



Rhea americana

Greater Rhea

LENGTH	1.2–1.4m (4–4½ft)
WEIGHT	20–40kg (44–88lb)
MIGRATION	Non-migrant

HABITAT Grassland and ranchland, often at edges of lightly wooded areas

Known as the “ostrich of South America”, the Greater Rhea is long-legged and flightless. It is grey to brown and white in colour, which helps to camouflage it. Like other ratites, there is little difference



MALE ON THE MOVE

The Greater Rhea's docile-looking face belies a fierce nature and swift turn of foot when alarmed.

between the male and female Greater Rhea, except that the male has a dark collar in the breeding season and the female is smaller and paler in colour. The juvenile has more grey in its plumage and is marked with dark stripes that disappear about six months after hatching.

The species commences its breeding cycle in very early spring, engaging in elaborate displays, during which rival males may bite one another viciously and utter booming calls reminiscent of a bellowing animal. The male mates with about seven females, each of which may mate with more than one male. Occasionally, two males occupy the same nest, but one is dominant. The young are able to leave the nest within a few hours of hatching, under the supervision of the male. Populations of the bird are declining due to the loss and fragmentation of its native grassland habitats, mainly because of clearance of land for soyabean monocultures.

CLUTCH OF EGGS

A number of females lay their eggs in the same nest. Up to 30 eggs may be laid to be incubated solely by the male.

ANATOMY

Like ostriches and other ratites (large flightless birds), rheas have flat breastbones without a keel. Without this attachment point, their flight muscles are far too weak for them to fly. However, rhea wings are large, with long loose feathers, while the neck and legs are covered with shorter, denser feathers that help to keep them warm. Rhea have three toes on each foot and a single claw on each wing, which they use if cornered by predators. During the breeding season, incubating males can be remarkably aggressive, even to their own kind. They chase away females, and have even been known to attack cars and people on horseback.

Pterocnemia pennata

Darwin's Rhea

LENGTH	90–100cm (35–39in)
WEIGHT	15–20kg (33–44lb)
MIGRATION	Non-migrant

HABITAT Open country in lowland, steppes, deserts, and puna (cold, arid mountain tops)

Smaller than the Greater Rhea (left), Darwin's Rhea has a shorter bill and slightly longer legs. It has uniformly grey plumage, with white tips to the upperpart feathers, white underparts, and three toes, with sharp claws. The head and the back of the neck are covered with dense feathers. The male has a booming call, but the female is not vocal.

Like the Greater Rhea, Darwin's Rhea principally feeds on leaves, fruit, seeds of various grasses, herbs, and insects. The species is sociable, living in groups, usually in flocks of 5–30, which, when disturbed, tend to flee from danger by running in zigzags. Although a fast runner, this rhea uses other tactics to escape from predators – it suddenly squats under a bush and flattens its body against the ground to avoid detection. It does not fly, but is a strong swimmer and can cross large lakes to reach abundant feeding areas.

This species commences breeding in late winter, when the male displays vigorously during courtship to attract several females, all of which lay eggs in the same nest. The male incubates the eggs for about five weeks.

ADULT DARWIN'S RHEA



CASSOWARIES AND EMUS

ORDER Casuariiformes
FAMILY 2
SPECIES 4

linked by dry land. Unlike ostriches and rheas, these birds have finely divided plumage, which often looks like coarse hair. Cassowaries live in forest, but emus are birds of scrub and grassland, often travelling over long distances to find their food.

ANATOMY

Cassowaries and emus look quite different, but they all have tiny wings concealed under their plumage, and feet with three toes. In cassowaries, the inner toe carries a long claw, which can inflict lethal wounds on an enemy. Emus are the tallest birds in this order, but the Southern Cassowary is the heaviest, being more thickset. All four species have areas of bare skin on their necks. A cassowary also has a brightly coloured wattle hanging in a

loose fold from the neck, and a conspicuous casque that projects impressively from the top of the head. The casque is most obvious in adults, and it continues to grow throughout life.

CASSOWARY CASQUES

Cassowaries use their casques to push through vegetation, but the casque may also play a part in asserting dominance when breeding.



CASSOWARY FOOT
Cassowaries have wide-spreading feet, and the inner toe – seen here on the left – carries a sharp claw up to 10cm (4in) long.

Casuarius casuarius

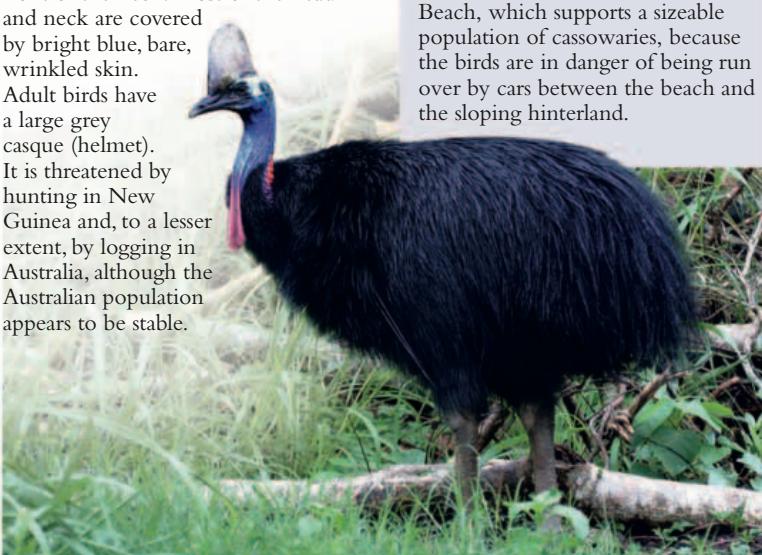
Southern Cassowary



LENGTH	1.3–1.7m (4½–5½ft)
WEIGHT	30–60kg (66–130lb)
MIGRATION	Non-migrant

HABITAT Dense tropical rainforest and, more rarely, eucalyptus and palm forest

Also known as the Double-wattled Cassowary, the powerfully built Southern Cassowary has red wattles that vary in length, hanging from the front of the neck. Most of the head and neck are covered by bright blue, bare, wrinkled skin. Adult birds have a large grey casque (helmet). It is threatened by hunting in New Guinea and, to a lesser extent, by logging in Australia, although the Australian population appears to be stable.



JUVENILE SOUTHERN CASSOWARY

HUMAN IMPACT

ROAD HAZARD



Road signs, such as the one above, are needed in Queensland's Mission Beach, which supports a sizeable population of cassowaries, because the birds are in danger of being run over by cars between the beach and the sloping hinterland.

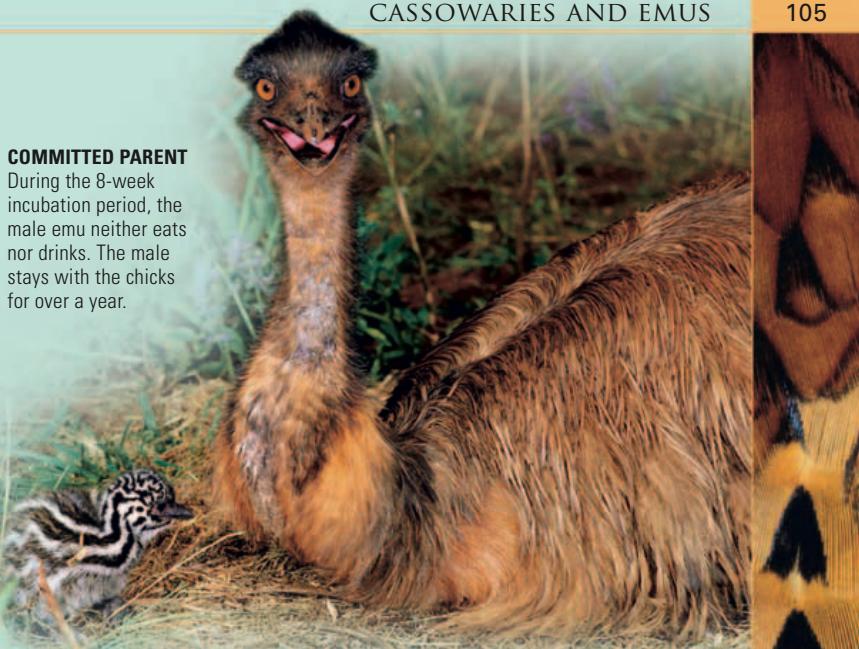
Dwarf Cassowary

LENGTH	1m (3½ft)
WEIGHT	17–26kg (37–57lb)
MIGRATION	Non-migrant

HABITAT Forest and secondary growth, usually in hills and mountains as high as the tree line

The smallest of the cassowaries, the Dwarf Cassowary differs from the Southern Cassowary (left) in that it lacks the dangling neck wattles and has a flattened triangular black casque on top of the head. It has an orange foreneck and its plumage is black. The female is generally larger than the male, usually with brighter red and blue bare skin on the head and neck, and has a longer casque. The Dwarf Cassowary is usually observed alone or in small family groups, feeding on fruit, insects, and small animals. It forms pairs only in the breeding season.

COMMITTED PARENT
During the 8-week incubation period, the male emu neither eats nor drinks. The male stays with the chicks for over a year.



BEHAVIOUR

Emus normally live in small groups, but huge flocks congregate where food supply is abundant. Cassowaries are shy and solitary, vanishing at first signs of intrusion, but attack fiercely if unable to escape. Emus live on seeds and berries; cassowaries feed on fallen fruit, helping to disperse the seeds of forest trees. In the breeding season, the male takes sole charge of the clutch once the female has laid her eggs. Females often mate with several partners in a season, unlike ostriches and rheas. Deforestation threatens cassowaries but, with the spread of agriculture, emus have benefited from easy access to grain.

Dromaius novaehollandiae

Emu

LENGTH	1.4–1.7m (4½–5½ft)
WEIGHT	18–48kg (40–105lb)
MIGRATION	Non-migrant

HABITAT Open country, preferring areas developed as pastoral land and shunning very arid zones

The flightless Emu is the sole representative of a family of birds that is confined to mainland Australia. It has a long neck and legs, but a short bill and tiny wings that are rarely noticeable amid its greyish brown to almost black, shaggy plumage. It can travel great distances at a fast trot and, if necessary, can sprint as well. The male incubates the eggs and tends to the young.

ADULT EMU

KIWIS

ORDER Dicroidiformes
FAMILY 1
SPECIES 3–6

WITH HUMPBACKED BODIES AND LONG, decurved bills, kiwis are unmistakable, and recognized the world over as New Zealand's national bird. There is disagreement about how many species exist, but the differences

between the species are small. All kiwis are flightless, with tiny vestigial wings and brown plumage that looks like coarse fur. They have an excellent sense of smell, with nostrils positioned at the tip of the bill. They live in forests, and are strictly nocturnal, emerging at night to probe damp vegetation for earthworms and other small animals.

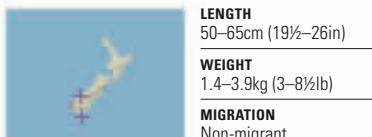


GIANT EGGS

Kiwi eggs are about 12cm (5in) long, and contain unusually large amounts of yolk. Females lay only one or two eggs each time they breed.

Apteryx australis

Brown Kiwi



LENGTH	50–65cm (19½–26in)
WEIGHT	1.4–3.9kg (3–8½lb)
MIGRATION	Non-migrant

HABITAT Subtropical to temperate forests and shrub, plantations, and farmland

RED LIST CATEGORY Endangered

The Brown Kiwi is typical of the kiwis, being a flightless ground-dweller. As its name suggests, it has brown feathers. It has a long, ivory-coloured bill. The shrill whistles of the

ADULT BROWN KIWI



GREAT SITES

STEWART ISLAND

Brown Kiwis are relatively common on New Zealand's Stewart Island. The island is rich in other bird species including the Yellow-eyed Penguin (the world's rarest penguin). Predator-free islands around Stewart are home to some of the world's rarest birds, such as the Kakapo.



HUMAN IMPACT

CONSERVATION

Like many of New Zealand's native birds, kiwis have been decimated by introduced mammals. A nationwide conservation programme is aimed at reversing a decline of up to 5 per cent a year. Conservation measures include setting traps (right) for rats and stoats, which prey on kiwi chicks.



BEHAVIOUR

Kiwis are monogamous and, despite their harmless appearance, will attack rivals with their claws, sometimes inflicting severe wounds. However, confrontations like this are rare, because territory holders advertise their presence with loud calls. During the day, kiwis hide, either in a burrow, or in thick vegetation. They sleep with their heads tucked incongruously under a wing just 5cm (2in) long. The female lays her eggs in a nesting burrow and, in most kiwis, the male incubates the egg, which takes about 70 days to hatch. Initially, the young bird is nourished by the remains of the yolk sac, which is still attached to its body, but by the end of the first week, it ventures out of the burrow to feed. Many kiwis fall victim to predatory mammals at this stage, before they are large enough to defend themselves.

Apteryx owenii

Little Spotted Kiwi



LENGTH	34–45cm (13½–17½in)
WEIGHT	880–1,950g (2–4½lb)
MIGRATION	Non-migrant

HABITAT Evergreen and deciduous forest with dense undergrowth.

RED LIST CATEGORY Vulnerable

The Little Spotted Kiwi is the smallest kiwi, with irregular bands of brown, giving it a mottled appearance. The call of the male is an ascending,

high-pitched whistle. Before European settlement, the Little Spotted Kiwi was found in forested areas throughout New Zealand. It is now extinct on the main islands, and survives only in introduced populations on five offshore islands. The most successful population is on Kapiti Island. Kiwis are long-lived birds. The oldest known wild Little Spotted Kiwi reached 17 years of age. They do not reach breeding maturity until their third year. Little Spotted Kiwis remain faithful to the same territory year after year, and pair bonds are similarly long-lasting.

ADULT LITTLE SPOTTED KIWI



GAMEBIRDS

ORDER Galliformes
FAMILY 5
SPECIES 289

Most gamebirds feed on the ground, but have strong wing muscles, and rely on an explosive take-off to escape danger. Their feet are well developed; many use them to scratch the ground in search of food. Gamebirds are found in a variety of habitats, from tropical forests to Arctic tundra.

ANATOMY

Typical gamebirds have plump bodies, small heads, and short, rounded wings. They range in size from quail weighing as little as 50g (2oz), to wild turkeys weighing up to 10kg (22lb). Gamebirds rarely fly far – the chief exception being migratory species, such as quails – but well developed pectoral muscles allow many to take off almost vertically when threatened with danger.

Their bills are short and slightly curved, a shape that allows them to eat a wide mixture of plant and animal food, most of it small items pecked up one by one.

Gamebirds have strong legs, and in some species – including pheasants – males have sharp spurs on the ankles, which they use when fighting with rivals. At night, many gamebirds roost in trees. Guans and curassows are entirely arboreal, feeding and nesting off the ground.



COMPARE AND CONTRAST

Common Pheasants typify the sexual dimorphism shown by many gamebirds. The female, here on the left, has camouflaged coloration that conceals her on the nest, while the male is highly ornamented. He retains coloured plumage throughout the year.

PLUMAGE

In some gamebirds, the sexes look alike, but this order includes some of the most extreme examples of sexual dimorphism in the bird world. This reaches its height among pheasants and peacocks, whose males have sumptuous and often iridescent plumage, and extraordinarily flamboyant tails. Many of these male birds also have colourful wattles – in some species, they can be inflated to increase their allure during courtship displays. These sex differences also extend to size: in turkeys and grouse, the males can be twice the weight of the females. In the far north, ptarmigans moult their plumage up to three times a year to blend in with the bare tundra in summer, and snow in winter. They are unique among birds in having completely feathered toes.

BREEDING

Except for guans and curassows, gamebirds nest on the ground. They are prolific parents, producing large numbers of eggs. Bobwhite Quails lay up to 28 eggs, while Grey Partridges produce an average of 16. If eggs are removed as they are laid, many gamebirds will keep replacing them – a trait exploited in domestic chickens. Gamebird chicks are well developed when they hatch, and are soon ready to follow their parents. The young of megapodes – such as Mallee Fowl – are the only birds that receive no parental care. Incubated in nests that heat up like compost heaps, they are quickly able to fly.



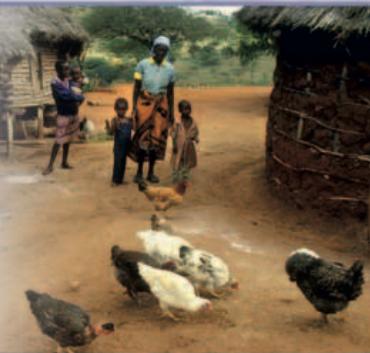
HIDDEN CLUTCH

Grouse lay camouflaged eggs in a hollow lined with grass. Once the young have hatched, they are particularly vulnerable to birds of prey, and only a small proportion survive to reach adulthood.

HUMAN IMPACT

DOMESTICATION

The first bird to be domesticated, probably at least 5,000 years ago, was the Jungle Fowl of southeast Asia – the ancestor of the farmyard hen. Today, there are approximately 16 billion chickens, making them by far the world's most common bird. Domesticated species also include turkeys, originally from Central America, and guineafowl, from Africa. All are flock-forming birds that are easy to keep in captivity.



*Alectura lathami***Australian Brushturkey**

LENGTH	60–70cm (23½–28in)
WEIGHT	2–2.5kg (4½–5½lb)
MIGRATION	Non-migrant

HABITAT Tropical and warm, temperate forest and dry woodland

The Australian Brushturkey is the largest of the megapodes (large-footed birds) of Australia. Both sexes are mainly black in colour, with a red or pink head, yellow throat wattles, and a broad, flat tail. The male tends to be larger and brighter, especially in the

breeding season, when its neck pouch becomes bright yellow. The diet of the Australian Brushturkey consists of plant materials and termites. In the breeding season, this bird constructs mounds of vegetation to incubate the eggs. The female is capable of laying between 15–27 eggs in a season, and the mound, which is kept at a constant temperature by the heat released by decaying vegetation and direct sunlight, is protected by the male. A mound often contains eggs from more than one female, and the male has been known to protect two mounds at the same time. The eggs hatch after 47–52 days, and the young birds develop rapidly.

The population of this species is not globally threatened, but clearance of forests has reduced the range and fragmented the habitat in some areas.

**LEAVING THE NEST**

A juvenile Australian Brushturkey digs its way out of its nest of leaf litter. It is capable of flying within hours of leaving the mound.

MALE AUSTRALIAN BRUSHTURKEY

The male is distinguished by the red head and yellow neck, which becomes brighter in the breeding season.

*Leipoa ocellata***Malleefowl**

LENGTH	60cm (23½in)
WEIGHT	1.5–2kg (3¼–4½lb)
MIGRATION	Non-migrant

HABITAT Woodland and scrub, typically in semi-arid areas

The Malleefowl is one of the most distinctive of the megapode family, with a variegated brown, white, and black back, upper tail, and wings. The head and neck are grey, with broken black markings down the front of the throat. Both the sexes are alike, although the females tend to be slightly smaller. It is thought to be omnivorous, with the most important elements of its diet being various seeds. Two distinct populations are found in south Australia and western Australia.

ADULT MALLEEFOWL**INCUBATION MOUND**

Malleefowl lay their eggs in a giant heap of leaves, sticks, and bark, which rises to about 0.6m (2ft) above ground level. As this organic litter decomposes, it gives off heat, which helps incubate the eggs. The entire process takes about 11 weeks.

*Macrocephalon maleo***Maleo**

	LENGTH 55cm (21½in)
WEIGHT	1.5kg (3½lb)
MIGRATION	Non-migrant

HABITAT Lowland and hill forest up to 1,200m (3,900ft)

RED LIST CATEGORY Endangered

Confined to the Indonesian island of Sulawesi, the Maleo can be identified by its prominent bony casque. The sexes are similar, with bare yellow facial skin, the black head, back, wings, and tail, and a pink wash on the breast and belly. Little information is available about its diet, although the bird is known to feed on fallen fruit. It is usually a silent bird, but its calls include a loud, braying sound and quacking, rather like a duck.

The Maleo lays its eggs in burrows, which are often communal, although it is known to be monogamous. The species is classified as endangered and is declining over much of its range as a result of egg-collecting and illegal encroachment into protected areas.

ADULT MALEO**MALEO EGG**

The Maleo egg is large, about five times the size of a domestic chicken's egg. Each egg is laid in a separate hole, up to 1m (3½ft) deep, and left to incubate by heat from the sun or volcanic activity. The eggs hatch after 60–80 days and the young make their own way back to the forest.



elongated shape

Ortalis vetula

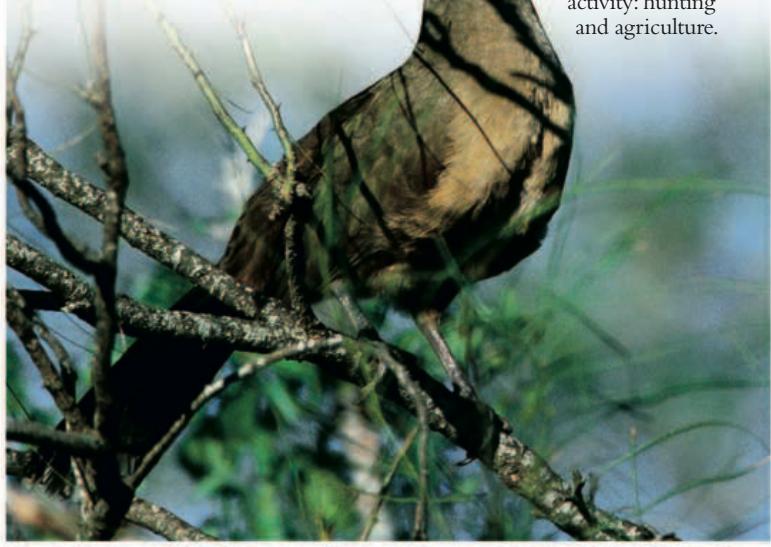
Plain Chachalaca



LENGTH	48–58cm (19–23in)
WEIGHT	425–800g (15–29oz)
MIGRATION	Non-migrant

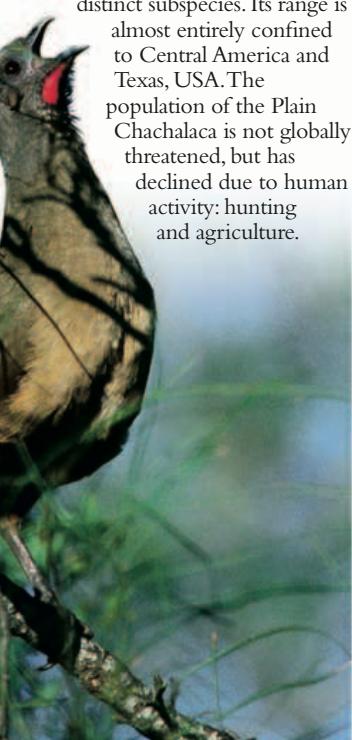
HABITAT Dense scrub and secondary growth

The Plain Chachalaca has a dark brown back, paler brown underparts, a long green-tinged tail, and a red throat patch. The male and female are similar. Its diet consists mostly of fruit, which is

ADULT PLAIN CHACHALACA

collected from the ground by groups of up to 15 birds. It also eats leaves, seeds, buds, and insects. The nest is a fragile platform of sticks, grass, and leaves, lined with a few green leaves. The average clutch size is three and the incubation period lasts for 22–27 days. The Plain Chachalaca is known to breed at one year of age, although most birds mature at two years. The species has two

distinct subspecies. Its range is almost entirely confined to Central America and Texas, USA. The population of the Plain Chachalaca is not globally threatened, but has declined due to human activity: hunting and agriculture.

*Oreophasis derbianus*

Horned Guan



LENGTH	75–85cm (30–33in)
WEIGHT	Not recorded
MIGRATION	Non-migrant

HABITAT Humid montane forest**RED LIST CATEGORY** Vulnerable

Named for the unusual red horn on its head, this bird has black plumage with a blue-green sheen and white foreneck and breast. It mostly feeds on vegetable matter, with fruit being an important part of its diet. It nests high up in trees and generally in areas where there is running water. The Horned Guan is classified as vulnerable due to the serious decline in its numbers owing to the high level of hunting as well as trapping for the illegal bird trade.

**ADULT HORNED GUAN***Crax daubentoni*

Yellow-knobbed Curassow



LENGTH	84–92cm (33–36in)
WEIGHT	2.5–3kg (5½–6½lb)
MIGRATION	Non-migrant

HABITAT Gallery forest at low altitude between 100–500m (330–1,600ft)

The male Yellow-knobbed Curassow has a yellow bill, with a knobbed structure on it that gives the species its name. It has a crest with curling feathers. Both sexes are entirely black, except for a white belly and tip to the tail. It eats fruit, seeds, and small animals.

MALE YELLOW-KNOBBED CURASSOW*Penelope obscura*

Dusky-legged Guan



LENGTH	68–75cm (27–30in)
WEIGHT	950–1,200g (34–43oz)
MIGRATION	Non-migrant

HABITAT Mature and secondary forest up to an altitude of 2,200m (7,200ft)**ADULT CRESTED GUAN***Penelope purpurascens*

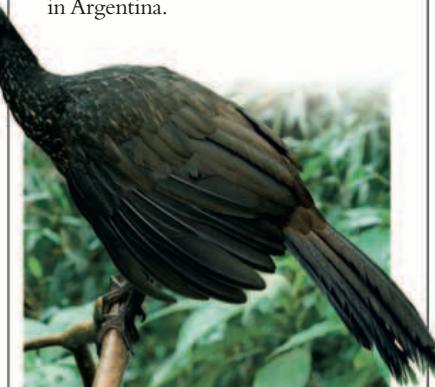
Crested Guan



LENGTH	72–91cm (28–36in)
WEIGHT	1.5–2.5kg (3¼–5½lb)
MIGRATION	Non-migrant

HABITAT Humid forest or forest edges, up to an altitude of 2,300m (7,500ft)

The largest of the guans, the Crested Guan is a dark bird with a white crest and a prominent red throat pouch. It has a black face and chestnut-brown underparts. Its diet mostly consists of fruit and sometimes insects, for which it forages singly or in pairs or small groups. Breeding takes place in the rainy season, when a bulky nest is built from twigs and branches. There are normally two eggs in each clutch, although three eggs have been recorded in some nests. Although not migratory, this species makes seasonal movements in mountainous parts of its range. It is common over much of the range, despite being heavily hunted.

**ADULT DUSKY-LEGGED GUAN**

Numida meleagris

Helmeted Guineafowl



LENGTH	53–63cm (21–25in)
WEIGHT	1.3kg (3 1/4lb)
MIGRATION	Non-migrant

HABITAT Bush, savanna, and grassland, often near cultivation

Like other guineafowl, the Helmeted Guineafowl is a highly sociable bird, which walks rather than flies. It has a large body and relatively tiny head, made to look larger by its “helmet” (also known as a casque). Its plumage is dark and spotted in white. The Helmeted Guineafowl is now classified as a single species, but at least four separate species were formerly recognized across the huge sub-Saharan range. Individuals vary in size, the shape of their helmets, and the form and colour of their wattles.

During the breeding season, Helmeted Guineafowl separate into pairs or small groups, but in winter and the dry season, flocks of 20 to 25 are common, and hundreds or even thousands, have been reported at water holes. They wander widely on foot over their home territory and roost in trees. An unfussy feeder on roots, seeds, insects, and snails, the Helmeted Guineafowl is easily domesticated. The species has been introduced with varying success elsewhere in Africa and the rest of the world. Flocks seen outside the normal range may be farmed or feral birds.



ADULT HELMETED GUINEAFOWL

HELMET AND WATTLES



Crowned with a golden orange bony casque (helmet) covered with horny cartilage, the Helmeted Guineafowl also has bright blue facial skin. These features, along with the red-tipped blue wattles on each side of its red, upper bill, make for its extravagantly colourful appearance.

Acryllium vulturinum

Vulturine Guineafowl



LENGTH	61–71cm (24–28in)
WEIGHT	1.3kg (3 1/4lb)
MIGRATION	Non-migrant

HABITAT Savanna and semi-arid grassland with scrub; also riverside thickets

The largest and most spectacular guineafowl, the Vulturine Guineafowl sports an elegant cape of silver and blue, the word “vulturine” referring to its bald head and scrawny neck. The cape is made up of iridescent, elongated feathers, which combines with the bird’s red eyes, blue-tinted head, and brown side-whiskers to make this guineafowl easily recognizable. Unlike other types of guineafowl, it has a long, drooping tail.

Vulturine Guineafowl walk or run rather than fly, even from predators. They move in flocks of up to 30 birds, but in the breeding season the adults form pairs. The female lays 4–6 eggs in a scrape on the ground and incubates them for 30 days.

MALE VULTURINE GUINEAFOWL

GREAT SITES

TSAVO NATIONAL PARK

More than 400 species of birds have been recorded in Tsavo National Park, Kenya’s largest national park, where the Vulturine Guineafowl thrives. The park offers a range of ecosystems, from semi-desert, savanna, and open plains, to acacia woodland, palm thickets, mountain forest, riverine vegetation, and swamps.

*Callipepla californica*

California Quail



LENGTH	23–27cm (9–10 1/2in)
WEIGHT	150–175g (5–6oz)
MIGRATION	Non-migrant

HABITAT Grassland and scrub, farmland, open woodland, and chaparral



ADULT CALIFORNIA QUAIL

Its forward-drooping, teardrop-shaped crest immediately distinguishes the California Quail, although it resembles the closely related Gambel’s Quail (*C. gambeli*), which also has a black face with a white bridle pattern. The California Quail tends to be loyal to its small home ranges, rarely moving far, even outside the breeding season.

Colinus virginianus

Northern Bobwhite



LENGTH	24–28cm (9½–11in)
WEIGHT	175g (6oz)
MIGRATION	Non-migrant

HABITAT Grassland, scrub, and open woodland; avoids dense forest

Named after its whistling call, often rendered “bob-white” or “bob-bob-white”, the Northern Bobwhite is a shy bird, more often heard than seen. Like many other gamebirds, this bird tends to sit quietly when approached, before bursting up and scattering almost from under the intruder’s feet. The Northern Bobwhite varies



ADULT NORTHERN BOBWHITE

greatly in size and colour, with many subspecies recognized, 16 of which are found in Mexico alone. The Northern Bobwhite feeds on seeds, insects, worms, and spiders.

Cyrtonyx montezumae

Montezuma Quail



LENGTH	21–23cm (8½–9in)
WEIGHT	175–200g (6–7oz)
MIGRATION	Non-migrant

HABITAT Oak and pine-oak woodland; grassland with bushes and trees

Also known as the Harlequin Quail for the clown-like black and white face pattern of the male, the Montezuma Quail has a relatively large head, which appears even larger and rounder because of its crest. The female has a smaller crest and a fainter version of the male’s face pattern. This quail is found in coveys of up to 20 birds. When roosting on the ground, coveys form a circle facing outwards. The Montezuma Quail feeds on bulbs and tubers, seeds, and fruit.

Falcipennis canadensis

Spruce Grouse



LENGTH	38–43cm (15–17in)
WEIGHT	450–500g (16–18oz)
MIGRATION	Non-migrant

HABITAT Young coniferous forest with dense undergrowth



DISPLAYING MALE SPRUCE GROUSE

The displaying male Spruce Grouse is easy to identify when it fluffs its feathers and fans its tail. Unlike the Ruffed Grouse (above), it is a very quiet bird, and when it does drum or call, the sound does not carry far. It is most often seen at the edge of forest clearings or beside forest roads. It is easy to hunt because of its trusting nature, but habitat damage is a bigger threat to it than hunting.

Tetrao urogallus

Western Capercaillie



LENGTH	60–87cm (23½–34in)
WEIGHT	1.8–4.1kg (4½–8¾lb)
MIGRATION	Non-migrant

HABITAT Mostly coniferous forest, sometimes mixed forest with conifers or other evergreens

A dark grouse the size of a turkey, the Western Capercaillie is easily recognized. Despite its huge size, it is light on its feet and flies easily – and powerfully –

LEKKING

The male Western Capercaillie shows off its beard-like throat tufts and fans its tail as it performs a courtship dance.

*Meleagris gallopavo*

Wild Turkey



LENGTH	1–1.5m (3½–5ft)
WEIGHT	4.3–8kg (10–18lb)
MIGRATION	Non-migrant

HABITAT Open woodland, forest with clearings, scrub, and farmland

The male Wild Turkey is readily identified by the familiar gobbling call that is shared by the farmyard turkey, which is descended from it. The male of the wild species also has a bald blue head and naked red wattle (or snood), which hangs down from between its eyes to one side of its beak. The female is duller in colour, but both sexes have a long body and athletic legs.

FEMALE WILD TURKEY



MALE RUFFED GROUSE

Bonasa umbellus

Ruffed Grouse

LENGTH	43–48cm (17–19in)
WEIGHT	500–575g (18–21oz)
MIGRATION	Non-migrant

HABITAT Dense forest, always including deciduous trees, especially aspen

In spring, the forests of Canada and northern USA resound to the drumming of the male Ruffed Grouse. However, drumming can occur at any time of year. When drumming, the bird leans back against its tail and beats its wings strongly, with gathering speed. The Ruffed Grouse has a small crest on its head, brown or grey upperparts with heavy white spotting, and brown or grey barred underparts.



NESTING IN SPRING

The Western Capercaillie breeds from March to July; the female (above) makes a scrape in undergrowth or at the foot of a tree and lays 5–8 eggs.

Centrocercus urophasianus

Sage Grouse



LENGTH	48–76cm (19–30in)
WEIGHT	1.5–3kg (3½–6½lb)
MIGRATION	Non-migrant

HABITAT Arid grassland containing sagebrush

With its contrasting black, mottled grey-brown and white plumage, the male Sage Grouse is a spectacular bird. When courting, it displays at a lek by raising the feathers of its white collar and arching its spiky tail above its back. The female is smaller and plainer and lacks the male's eyecombs and black bib. Males that are successful at the lek may breed with several females. The nest is a



DISPLAYING MALE

shallow depression, lined with grass and sagebrush leaves. The common name of the Sage Grouse comes from its diet of sagebrush, which makes up most of its food intake.

Lagopus lagopus

Willow Ptarmigan



LENGTH	36–43cm (14–17in)
WEIGHT	525–700g (19–25oz)
MIGRATION	Partial migrant

HABITAT Arctic tundra and open areas of woodland

Widespread across Arctic and subarctic regions, except for Greenland, the Willow Ptarmigan is a hardy gamebird, well adapted to the cold. It has reddish brown plumage, which turns white in winter (see panel, below). The male is slightly larger than the female and has a chestnut

ADULT WILLOW PTARMIGAN



As its common name suggests, the Willow Ptarmigan mainly feeds on willow twigs and buds. It is monogamous, with the male guarding a single incubating female throughout the nesting period. There are about 20 subspecies, most of which are sedentary, although there is some migratory movement in the northern parts of its range.

WINTER PLUMAGE

In winter, the plumage of the Willow Ptarmigan changes to white, helping to camouflage it as it nestles in snow and keeping it safe from predators. White feathers also grow to cover its feet in winter. When the birds moult in summer, they appear brown and white. However, some subspecies do not have a complete plumage change, with only patchy areas turning white.

*Lagopus muta*

Rock Ptarmigan



LENGTH	33–38cm (13–15in)
WEIGHT	425–750g (15–27oz)
MIGRATION	Non-migrant

HABITAT Rocky tundra with sparse vegetation, also on high peaks above 2,000m (6,500ft)

The Rock Ptarmigan is similar to the Willow Ptarmigan (below left) but is more slender and has a longer tail. However, the females of the two species can be difficult to distinguish at a distance. The male has small red combs over the eyes, mottled brown plumage, and a black tail. In the breeding season, it displays its swollen red combs. The plumage in winter is white. The diet of the Rock Ptarmigan varies throughout the year, but it mainly feeds on low-growing plants such as dwarf birch and in winter finds food such as twigs and buds.



MALE ROCK PTARMIGAN



ADULT HIMALAYAN SNOWCOCK

Tetraogallus himalayensis

Himalayan Snowcock



LENGTH	54–72cm (21½–28in)
WEIGHT	2–3.5kg (4½–7¾lb)
MIGRATION	Non-migrant

HABITAT Open mountain slopes to the snow line

Mainly grey and white in colour, which helps to camouflage it, the Himalayan Snowcock is a large bird, although the female is slightly smaller than the male. Its diet consists of roots and tubers, with the birds moving uphill during the day while feeding. They are not migratory, but are often found at a higher altitude when the snow line retreats in summer.



Tympanuchus cupido

Greater Prairie Chicken



LENGTH	41–47cm (16–18½in)
WEIGHT	775–1,000g (28–36oz)
MIGRATION	Non-migrant

HABITAT Open prairies or prairies enclosed by farmland and scrub oak**RED LIST CATEGORY** Vulnerable

Both the male and female Greater Prairie Chicken have elongated black neck feathers and brown upperparts with brown, buff, and white barring.

MALE GREATER PRAIRIE CHICKEN

The male's display, in a territory called the "booming ground", is dramatic. It raises its neck feathers and lowers its head to display its ornamental fleshy yellow-orange eyecombs as it inflates its golden neck sacs, creating the characteristic booming sound. The tail is upright during the display. The male reaches sexual maturity at one year of age, but does not usually breed successfully until the second year of life, when it mates with several females. The nest of the Greater Prairie Chicken is a shallow bowl lined with feathers, leaves, and grass and is built by the female, who also incubates the eggs. The diet of this species includes insects, rosehips, leaves, shoots, and a range of cultivated grains.

Alectoris chukar

Chukar Partridge



LENGTH	32–39cm (12½–15½in)
WEIGHT	450–800g (16–29oz)
MIGRATION	Non-migrant

HABITAT Bare areas from low arid plains to 3,000m (10,000ft)



ADULT CHUKAR PARTRIDGE

The Chukar Partridge has a grey back, upper breast, wings, and tail, with alternate black and white stripes on its flanks and a black stripe framing the lower face and white throat. It also has a prominent red bill and eye-ring. The male and female are alike, but there is much variation in the geographical subspecies. Although native to Asia, it has been released in North America as a gamebird and is established in arid, rocky areas of the West. The main food is vegetable matter, especially seeds, roots, and cheatgrass. The juvenile takes some invertebrates, although this makes up less than half of its total diet. The birds are resident breeders and are mostly monogamous, with pairs forming in mid-March.

Perdix perdix

Grey Partridge



LENGTH	29–31cm (11½–12in)
WEIGHT	300–450g (11–16oz)
MIGRATION	Non-migrant

HABITAT Grassland, steppes, and open arable land

The Grey Partridge can have a dull appearance in the field although the birds are colourful in good light. The predominant colour is grey, but both sexes have a red facial pattern, and the male (and rarely, the female) has a chestnut-coloured patch on the belly. Much of the diet of this species consists of seeds, cereals, and weeds. Changes in the diet have been noted at various times of the year, with grass becoming more important in autumn.

*Pternistis capensis*

Cape Spurfowl

LENGTH	40–43cm (15½–17in)
WEIGHT	450–900g (16–32oz)
MIGRATION	Non-migrant

HABITAT Scrub of various types; rarely, in gardens

The Cape Spurfowl, also known as the Cape Francolin, is uniformly dark in colour, with a distinct pattern of white streaks. The sexes are alike although the female is usually smaller. The male has leg spurs that it uses during fights with other males.

This species feeds on a wide range of plant material, especially roots and shoots, and also takes molluscs,

CAPE SPURFOWL DRINKING

termites, and various other insects. The breeding period varies according to local climate and can be any time between July and February. Although its breeding behaviour has not been described in detail, it is thought to be monogamous. Its nest is a hollow lined with grass and the clutch generally consists of 6–8 eggs. These birds rarely fly, and run when escaping from danger. The range of the species is limited to the area around the Cape peninsula of South Africa, with no overlap of related species. The Cape Spurfowl has been placed in different groups; it was formerly placed in the genus *Francolinus*. The Cape Spurfowl is not globally threatened and can be locally common, but its limited range is a potential concern.

The juvenile also relies on insects for the first two weeks after hatching. The species was introduced in North America and has become established in the prairies.

The Grey Partridge does not defend a breeding territory, despite the fact it is monogamous. A bond between a male and female is often formed well ahead of breeding, but there is often a change of partners before the pair is finally established.

The species is sometimes seen in small groups outside the mating season. It is not currently under threat, but declines have been noted over its range as a result of intense farming and hunting.

GREY PARTRIDGES IN SNOW



*Perdicula asiatica***Jungle Bush-Quail**

LENGTH	15–18cm (6–7in)
WEIGHT	55–80g (2–3oz)
MIGRATION	Non-migrant

HABITAT Dry scrub and brush up to 1,200m (4,000ft)

Very different from the female, the male Jungle Bush-Quail has a white moustache, heavily barred white underparts, and variegated wings. The female has a uniform, rich chestnut breast and belly. However, both the male and the female have red and white streaks on the head.

The diet of the Jungle Bush-Quail consists mainly of seeds, particularly of grasses, although it also takes insects. Breeding takes place after the rains and lasts until the onset of colder weather, with the precise period varying across the range; 5 or 6 eggs are produced and incubation takes between 16 and 18 days. The species is not globally threatened as it has an extensive range and tends to avoid agricultural areas. The population in Sri Lanka has contracted since the 1950s, but is thought to be widespread and common elsewhere in the range. The Jungle Bush-Quail is largely sedentary, although the birds in Nepal are thought to migrate in winter.

ADULT FEMALE JUNGLE BUSH-QUAIL*Coturnix coturnix***Common Quail**

LENGTH	16–18cm (6½–7in)
WEIGHT	70–150g (2½–5oz)
MIGRATION	Migrant

HABITAT Open areas, including agricultural land

A small gamebird, the Common Quail has a pale belly and black and buff streaks on its flanks. The sexes are similar, although the female tends to be duller, with darker markings on the

ADULT COMMON QUAIL

head than the male. The diet of this bird is varied, ranging from seeds of over 100 plant species to invertebrates taken from the ground. Its call is a repeated “whit wit-wit”, the male and female establishing contact by calling during the breeding season.

A widespread species, this quail is found through much of Europe and central Asia as a breeding bird. Resident populations also exist in north Africa, east southern Africa, southern Europe, and northern India, while wintering birds migrate long distances to India and Africa.

*Arborophila torqueola***Hill Partridge**

LENGTH	29cm (11½in)
WEIGHT	225–425g (8–15oz)
MIGRATION	Non-migrant

HABITAT Evergreen forest or scrub up to 1,500–2,700m (5,000–8,850ft)

With its combination of an orange crown and face set against a black head and streaked throat, the Hill Partridge is an attractive species. The female lacks the head markings but shares the variegated wings and grey streaked underparts of the male. Four subspecies have been identified on the basis of differences in the head markings of the male. The food of this species comprises seeds and various invertebrates, which it collects by scratching in leaf litter. The birds are mostly seen in pairs or small coveys of up to 10 individuals that may be made up of family groups. The Hill Partridge has a hen-like contact call that is constantly uttered when it is feeding. Indian populations breed between April and June, although

**ADULT HILL PARTRIDGE**

earlier breeding has been recorded at lower altitudes. The average clutch size is 3–5 eggs but up to nine eggs have also been observed. Incubation time is not recorded in wild birds but is reported to be 24 days in captive birds. The nest is shaped like a bowl, with a dome of grass when it is placed in a bank. The range spans over a narrow band from the western Himalayas to north Vietnam. The species is not globally threatened and is common in most parts of its range.

*Rollulus roulroul***Crested Partridge**

LENGTH	26cm (10in)
WEIGHT	200–225g (7–8oz)
MIGRATION	Non-migrant

HABITAT Evergreen forest mostly on plains, but also up to 1,200m (4,000ft)**RED LIST CATEGORY** Vulnerable

Named for its spectacular orange or red crest, the male Crested Partridge is a stunning bird. It has a bright red eye-stripe and its plumage is dark green, with

**ADULT MALE CRESTED PARTRIDGE**

Tragopan blythii

Blyth's Tragopan



LENGTH	58–70cm (23–28in)
WEIGHT	2kg (4½lb)
MIGRATION	Non-migrant

HABITAT Wooded valleys and hills up to 3,300m (11,500ft) in summer; moves lower down in winter

A colourful gamebird, Blyth's Tragopan has a bright yellow facial skin with a deep orange-red head, neck, and upper breast. The male has a black crown and cheeks, a red neck and breast, a pale

grey belly, black and white upperparts with brown spots, and white-spotted flanks. The female has brown spots on its plumage. Little information exists on the diet of this species, but it is thought to include shoots, invertebrates, and even frogs. It feeds in small groups, moving in undergrowth on steep slopes. The calls of this gamebird include a loud "ouwaa" and "goek goek". Two subspecies are known, with the total range confined to northeast India and Bhutan – the population in India is classified as endangered due to habitat loss and hunting. Its population may never have been high but fragmentation of remaining areas of its range is adding to the dangers facing the species.

Tragopan temminckii

Temminck's Tragopan



LENGTH	58–64cm (23–25in)
WEIGHT	1–1.5kg (2¼–3¼lb)
MIGRATION	Non-migrant

HABITAT Dense evergreen or mixed forest over 2,500m (8,000ft) in Burma

The male Temminck's Tragopan is a striking bird with orange plumage around the neck. It has blue facial skin which can be expanded into an enormous lappet with red markings during courtship. The back and wings are darker, with white spots. It has an orange breast and belly, with large white spots outlined in black. The female is smaller and plainer, with a variegated brown plumage. It feeds on plant stems, ferns, berries, seeds, and insects.

Tragopan satyra

Satyr Tragopan



LENGTH	60–70cm (23½–28in)
WEIGHT	1–2.1kg (2¼–4½lb)
MIGRATION	Non-migrant

HABITAT Bamboo and rhododendron growth in valleys up to 2,400–4,250m (8,000–14,000ft)

The male Satyr Tragopan is distinguished by its bright blue facial skin, black head, and deep red neck and breast. The plumage resembles Blyth's Tragopan (left) whose head is distinctively paler, even when viewed from a distance. It has brown upperparts with black and white spots, white-spotted red underparts, and a dark brown rump and tail. Its grey and red wings are spotted with white. The female has brown and rufous plumage with paler spots and bars.

The Satyr Tragopan feeds on the ground, its main diet consists of leaves and buds. However, it is known to have a wider and more omnivorous diet that includes various insects,



MALE SATYR TRAGOPAN

such as cockroaches. Unlike many similar species, it seems to forage selectively rather than randomly. Details of its nesting behaviour have only been observed in captive birds and have not been widely described. However, the breeding season is thought to occur during May and June. The nest may be in a tree or on the ground and contains 2 or 3 eggs, which are incubated for about 28 days.

The species is not migratory, but seasonal movements have been recorded, sometimes at distances as great as 1,000–2,000m (3,300–6,600ft). Its daily movement is usually 100–200m (330–660ft), depending on the topography.

MALE HIMALAYAN MONAL

With its long wiry crest and metallic blue, purple, yellow, and red plumage, the male Himalayan Monal is a spectacular bird.



FEMALE HIMALAYAN MONAL

The female, with its white throat and mottled brown plumage, is plainer than the male.

Lophophorus impejanus

Himalayan Monal

LENGTH	63–72cm (25–28in)
WEIGHT	1.5–2.5kg (3¼–5½lb)
MIGRATION	Non-migrant

HABITAT Open coniferous or mixed forest up to 2,100–4,500m (6,500–14,500ft)

A colourful bird, the male Himalayan Monal has a crested head, black breast and underparts, and a chestnut-brown tail. The female is smaller, with a short crest, and has black, buff, and white streaks on its plumage. Both the male and the female have a turquoise-blue patch around the eye. The diet of this species varies with its location, but mainly consists of berries, seeds, and insect larvae that are dug from the ground, sometimes to a depth of 25cm (10in). In April to June, 3–5 eggs are laid in a scrape in the ground, usually under a bush or other cover. Incubation lasts for about 27 days and is undertaken by the female.



ADULT BLOOD PHEASANT

Ithaginis cruentus

Blood Pheasant



LENGTH	40–48cm (15½–19in)
WEIGHT	400–650g (14–23oz)
MIGRATION	Non-migrant

HABITAT Rhododendron and other scrub up to 2,700–4,500m (8,850–14,500ft)

Named for the red plumage on the male's head, the Blood Pheasant is relatively plain compared to other pheasants. The male is slightly larger than the female and has a generally greyer appearance, the female being largely brown. The diet of this gamebird consists mainly of vegetable matter and some invertebrates. It collects most of its food by scratching on the ground, but has also been known to feed in trees. It lays its eggs between April and June in a simple depression on the ground, lined with grass. It is not a migratory bird, but some altitudinal movement is known to occur in response to changing levels of the snow line.





MALE GREAT ARGUS

Argusianus argus

Great Argus

	LENGTH 0.7–2m (2½–6½ft)
	WEIGHT 1.5–2.5kg (3¼–5½lb)
	MIGRATION Non-migrant

HABITAT Tall, dry lowland; primary and logged forest up to 1,300m (4,300ft)

A large pheasant, the male Great Argus has a conspicuous naked blue head and neck and a short black crest. The upperparts are warm brown above with fine white spotting, but its most striking features are the elongated inner flight feathers and very long tail. The female is similar, but lacks the male's ornamentation and long tail and is, therefore, shorter.

Syrmaticus ellioti

Elliot's Pheasant

	LENGTH 45–80cm (17½–31in)
	WEIGHT 875–1150g (31–41oz)
	MIGRATION Non-migrant

HABITAT Sub-tropical forest and scrub**RED LIST CATEGORY** Vulnerable

Elliot's Pheasant is restricted to the forests of southeastern China. The male is a stunning, boldly patterned, mainly brown bird with a white head and nape, white shoulder and wing bars, and an elongated brown and a white, evenly barred, tail. The black throat and breast contrast strongly with the white belly. The female is a more greyish brown, lacks the white wing and shoulder bars, and has a shorter tail with indistinct bars. Elliot's Pheasant is considered to be vulnerable because of the decline in the extent of its habitat.



MALE ELLIOT'S PHEASANT

*Gallus gallus*

Red Junglefowl

	LENGTH 41–78cm (16–31in)
	WEIGHT 450–850g (16–30oz)
	MIGRATION Non-migrant

HABITAT Forest edges, open woodland, scrub, and grassland

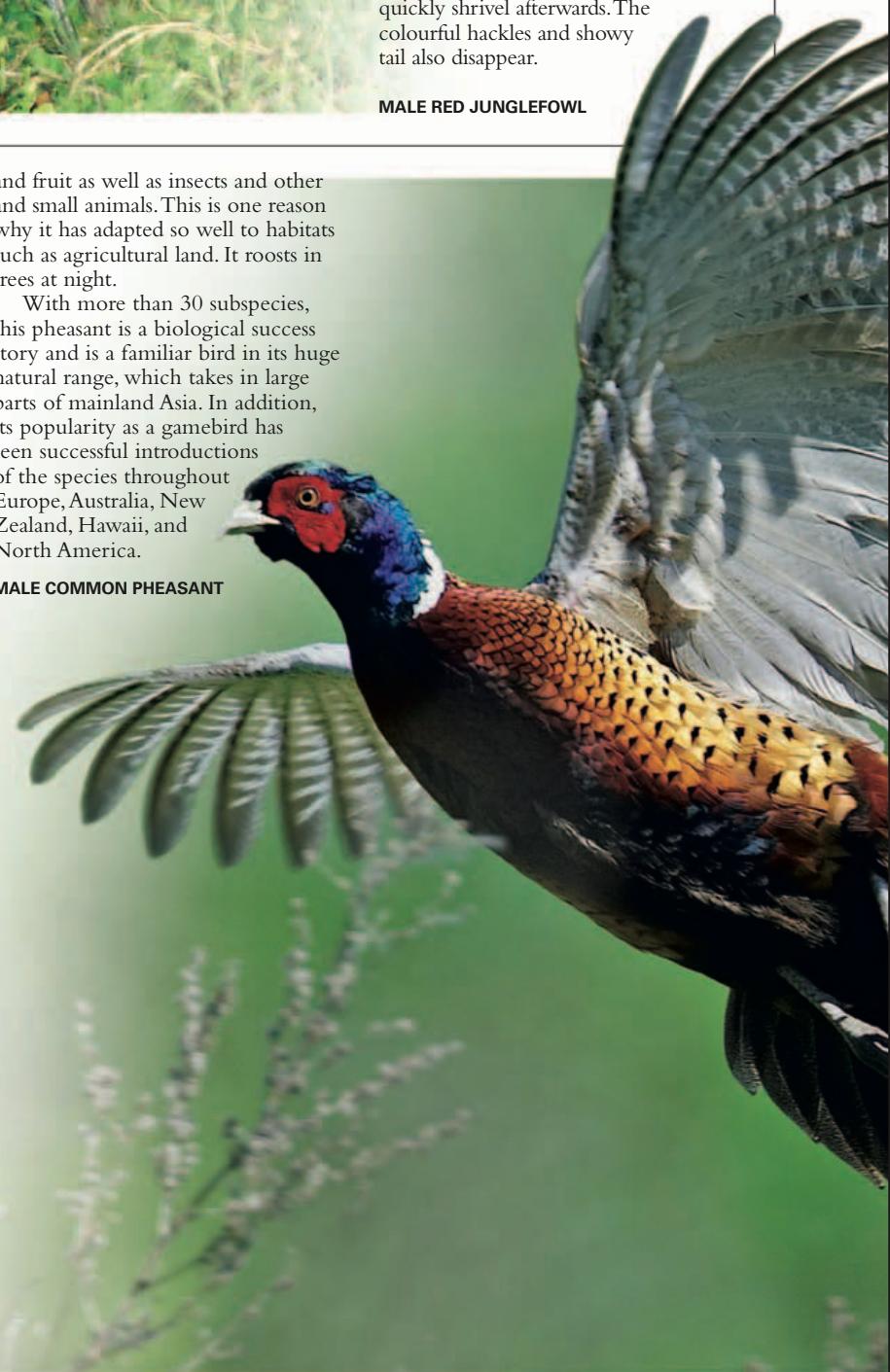
The Red Junglefowl is the wild ancestor of the domestic chicken. When breeding, the male is very colourful, with red and gold hackles or neck feathers, drooping crimson shoulder feathers and sides, a white rump patch, and glossy dark green wing feathers and tail. During the breeding season, the bright red comb, facial skin, and hanging wattles are engorged with blood, but quickly shrivel afterwards. The colourful hackles and showy tail also disappear.

MALE RED JUNGLEFOWL

and fruit as well as insects and other small animals. This is one reason why it has adapted so well to habitats such as agricultural land. It roosts in trees at night.

With more than 30 subspecies, this pheasant is a biological success story and is a familiar bird in its huge natural range, which takes in large parts of mainland Asia. In addition, its popularity as a gamebird has seen successful introductions of the species throughout Europe, Australia, New Zealand, Hawaii, and North America.

MALE COMMON PHEASANT

*Phasianus colchicus*

Common Pheasant

	LENGTH 53–89cm (21–35in)
	WEIGHT 0.7–1.5kg (1½–3½lb)
	MIGRATION Non-migrant

HABITAT Open woodland, scrub, low vegetation, and agricultural areas

Much larger and with a longer tail than the female, the male Common Pheasant is a colourful and beautifully marked bird with iridescent plumage. Predominantly brown above, its underparts are more chestnut in colour. Its dark head has a purple and green gloss, and its facial wattles are red. Many males also have a white neck ring and a maroon breast. The female is drab, with pale brown plumage and dark mottling, especially on the back and wings.

The inconspicuous plumage of the female Common Pheasant makes it hard to spot and provides excellent camouflage when it is incubating eggs, since the nest is usually a scrape on the ground. During the breeding season, the male's presence can always be detected because of its repeated, far-carrying, sudden, and explosive crowing. It also whirs its wings very loudly, a sound that can be heard up to 1.5km (1 mile) away in suitable conditions. The male is

polygamous, gathering a harem of females on its display territory and defending the females against rival males.

In autumn, the species is gregarious, but in winter the sexes tend to segregate. The Common Pheasant is an opportunistic feeder, usually foraging on the ground, feeding on a variety of seeds, grain,



MALE GOLDEN PHEASANTS

Chrysolophus pictus

Golden Pheasant



HABITAT Dense upland scrub

LENGTH

60–110cm (23½–43in)

WEIGHT

550–700g (20–25oz)

MIGRATION

Non-migrant

A spectacular bird, the Golden Pheasant is a resident of the mountains of central China, where it is very hard to locate in its dense scrub habitat. The male has a golden domed crown created by the elongated head and nape feathers and it has a resplendent long tail. The barred cape on its neck is used during the breeding display, when it is flicked forward like an inverted fan, producing a pattern of orange and black concentric rings.

*Pavo cristatus*

Indian Peafowl



HABITAT Deciduous forest, farmland, and cultivation

Although native to the Indian subcontinent, the Indian or Blue Peafowl has been domesticated around the globe as an ornamental bird. The male is stunningly beautiful with a blue neck and breast and a very long, glossy green train of elongated uppertail feathers. These feathers are adorned with iridescent blue-centred, green and copper eyespots, or ocelli. A single displaying adult male fanning its tail at a female creates a dramatic effect. In India, where the bulk of the wild population can be found, the Indian Peafowl is held in high

LENGTH
0.9–2.2m (3–7½ft)WEIGHT
3.5–5kg (7¾–11lb)MIGRATION
Non-migrant

MALE INDIAN PEAFOWL

esteem and goes about undisturbed, so much so that it has become very tame. It is not unusual to see it in villages and even nesting on buildings, but truly wild birds are shy.



ADULT MALE

Polyplectron napoleonis

Palawan Peacock-Pheasant



HABITAT Forest and secondary woodland

RED LIST CATEGORY Vulnerable

LENGTH
45–51cm (17½–20in)WEIGHT
325–450g (12–16oz)MIGRATION
Non-migrant*Afropavo congensis*

Congo Peafowl



HABITAT Primary rainforest

RED LIST CATEGORY Vulnerable



FEMALE CONGO PEAFOWL

This shy inhabitant of the forest understorey is a striking bird. The male Congo Peafowl has a bare, red throat, a black and white crest, dark bronze-green upperparts, and black underparts. The female (shown here) is a smaller brown bird with glossy green upperparts.

This threatened gamebird is a poorly known species that is only found in the dense forest of the Democratic Republic of Congo. Due to the turbulent recent history of the country, it is very hard to be certain of its exact current range and population levels. The Congo Peafowl is listed as vulnerable because it has a small and fragmented population that is inevitably declining in the face of habitat loss and hunting. Fortunately, important populations exist in several protected areas.

The superb Palawan Peacock-Pheasant is endemic to the island of Palawan in the Philippines. Like other members of this Asian genus, the male has a uniformly grey plumage that is relieved by occasional bursts of iridescence in the velvety black upperparts. Its white face is split by a black eye-stripe and red eye-ring and it has a green crest. The most prominent features are the violet blue-green "blind" ocelli, or eyespots, in the metallic blue-green tail feathers and modified uppertail coverts. They are considered "blind" because, unlike those of the Indian Peafowl (above), the ocelli lack a central "eye". This ostentatious ornamentation plays a vital role in display and a male's breeding success depends on its finery.

The Palawan Peacock-Pheasant can be very hard to observe in the wild as it is shy and often slips quietly away when it sees an intruder. It is best located by its call, a loud and persistent "angk".





INDIAN PEAFOWL

The male Indian Peafowl has a long train of tail feathers. To create its familiar display fan, the bird lifts its tail, pushing the feathers upwards and forwards.

WATERFOWL

ORDER Anseriformes
FAMILY 3
SPECIES 157

Waterfowl have a long history of domestication, and of being hunted in the wild. Found on every continent except Antarctica, they include ducks, geese, swans, and screamers in South America. All are swimming birds with waterproof feathers, webbed feet, and typically a broad, flattened bill. Most waterfowl are found on freshwater wetlands, rivers, and ponds, but a number live on coasts or farther out to sea. Ducks and swans usually feed afloat, but some species – particularly geese – graze on land. Waterfowl are powerful fliers, and many migrate long distances to breed.

ANATOMY

Waterfowl typically have plump bodies, powerful wings, and short legs ending in webbed feet. Most also have the classic “duck bill”, although in fish-eating species, such as mergansers, the bill is narrow, and has toothed edges like a saw. In general, ducks have short necks, while the necks of swans and geese are longer, and also more muscular. If they are alarmed, many ducks have an almost vertical take-off, but swans and geese often have to run over the surface of the water to become airborne. Once they are on the wing, their flight is fast and direct. Compared to many other aquatic birds, waterfowl are also good at moving about on land. Geese will often spend all day grazing on their feet, while female Mallards sometimes escort their ducklings a kilometre (1/2 mile) or more to find a suitable stretch of water. Screamers walk over mats of floating vegetation, and rarely swim.

PLUMAGE AND MOULTING

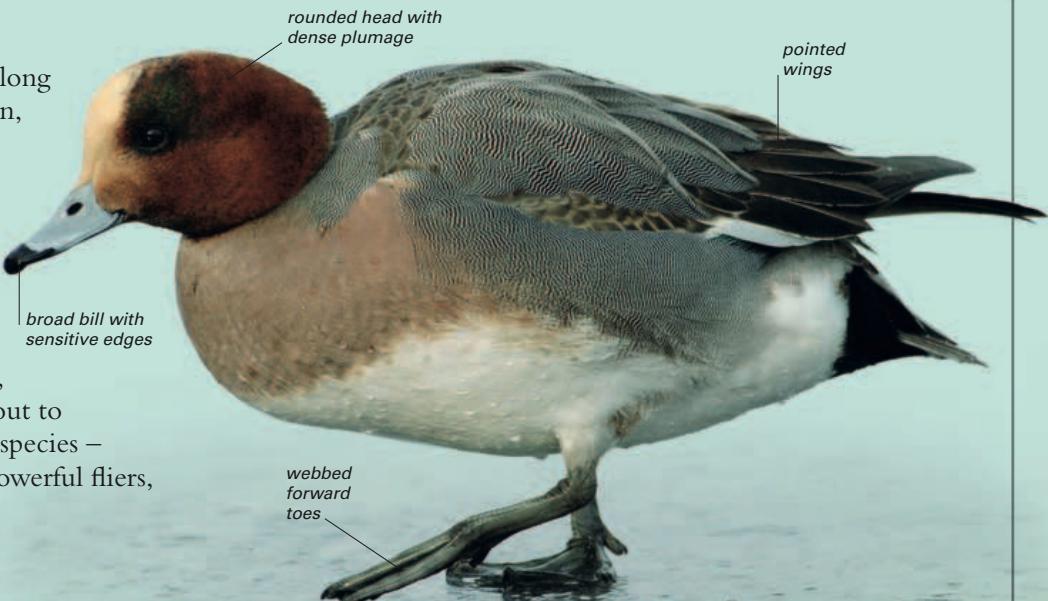
Waterfowl keep their plumage waterproof by covering it with oil from a preen gland positioned near the tail. This oil is so effective that water literally rolls off a duck's back; even when ducks dive, their insulating down feathers do not get wet. In geese and swans, the males and females often look identical, but most ducks show striking differences between the sexes. During the breeding season, many male ducks, or drakes, have eyecatching colours – the reason why they are often kept as ornamental birds. By contrast, the females tend to be drab, helping to conceal them while they incubate their eggs. Immediately after breeding, ducks, geese, and swans moult all their flight feathers, which leaves them unable to fly for up to four weeks.

MALE BREEDING PLUMAGE

During the breeding season, the male Red-breasted Merganser moults into a more colourful plumage, which contrasts with the female's subdued feather tones.



MALE ECLIPSE PLUMAGE
In early summer, male Red-breasted Mergansers lose their breeding plumage, and acquire an “eclipse” plumage much more like the female's.



BUOYANT BUILD

The Eurasian Wigeon is a typical freshwater duck, with dense waterproof plumage, webbed feet, and a broad bill. The male – shown here – is brightly coloured during the breeding season, but less showy during the rest of the year.



FEMALE PLUMAGE
The female Red-breasted Merganser shows much less seasonal variation. Although it moults, it has a similar pattern and colour scheme all year round. During the breeding season, this helps to hide it while it is on the nest.

FEEDING

Most waterfowl feed on aquatic plants and animals. Geese are an exception: most are vegetarian, grazing on land near fresh water and coasts, or gleaning leftover seeds in fields. A goose grazes by gripping plants in its bill, then tugging with its powerful neck. A large goose – such as a Greylag – can eat over 1kg (2.2lb) grass a day. Swans also graze, but spend more time feeding in water, where they eat small animals as well as plants. By up-ending, the largest swans can reach the bottom in water nearly 1.5m (5ft) deep. Ducks have a variety of feeding methods, which they use in water and on land. Shelducks walk over mudflats and through shallow water, sweeping the sediment with their bills and sifting out small animals. On the water itself, dabbling ducks, such as Mallard, feed by sweeping up floating weed from the surface, and by up-ending to collect food farther down. The South American Torrent Duck plunges into mountain streams, gripping boulders with its sharp claws. True diving ducks, such as the Canvasback and Tufted Duck, dive under water to collect small animals and waterplants. Sawbill ducks, such as the Goosander, are even better at diving. They chase fish, gripping them in serrated bills. At sea, most marine ducks dive for food.



SIFTING THE SHALLOWS

Shelducks use side-to-side movements of their bills to collect small molluscs from water or tidal mud. On exposed mud, this leaves a characteristic zig-zag trail.



EXTENDED REACH

Up-ending allows swans to reach food buried in sediment. Like dabbling ducks, swans feel for food with sensitive bills, rather than using eyesight.



UNDERWATER PURSUIT

Propelling itself with its feet, a Goosander successfully catches a fish. Sawbill ducks, including the Goosander, are similar to cormorants in the way that they feed.



NESTING AND PARENTAL CARE

Swans and geese pair up for life, but in ducks the pair bond usually lasts for a single breeding season only. With some notable exceptions – such as Wood Ducks – waterfowl nest on the ground, making their nests from waterside plants, such as grass and reeds. Many species line their nests with their own down, creating a warm lining. On average, swans lay about five eggs, but ducks can lay over a dozen, with the female taking sole charge of incubation. Waterfowl are well developed when they hatch, and soon leave the nest to follow their parents to water. Young Magpie Geese are fed by their parents, but the young of all other waterfowl are able to feed themselves.



TRAVELLING SOUTH

Greater White-fronted Geese migrate from the far north, and overwinter in temperate regions from Mexico to the Nile Delta and southern Japan. There are a number of different subspecies, and each one has its own breeding and wintering grounds.

MIGRATION

Many species of waterfowl undertake long seasonal migrations.

Geese and swans typically fly in V formation, travelling between breeding grounds at high latitudes and wintering grounds in milder regions, often close to coasts. The farthest travellers, such as the Brent Goose, can make round trips of over 12,000km (7,500 miles), with several rest and feeding stops en route. In their wintering grounds, flocks of wildfowl can be spectacular. Snow Geese, for example, gather in tens of thousands in some parts of southern USA. Waterfowl have been hunted for millennia, and migrating birds often find themselves in the firing line. However, for many migrants, habitat change in their wintering grounds is now an equally important threat. Many geese also overwinter in areas that are farmed, creating difficulties when they eat seeds and germinating crops.

Chauna torquata

Southern Screamer

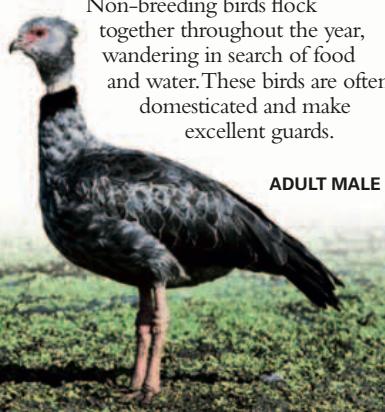


LENGTH	80–95cm (31–37in)
WEIGHT	4.4kg (10lb)
MIGRATION	Non-migrant

HABITAT Wetlands and wet grassland, usually with scattered trees

The calls of pairs of the Southern (or Crested) Screamer – from tree perches or while flying – carry for up to 3km (1.8 miles). This crested, long-legged bird, with a short, decurved bill, frequently soars across the landscape as it moves between wetland areas.

Non-breeding birds flock together throughout the year, wandering in search of food and water. These birds are often domesticated and make excellent guards.



ADULT MALE

Anhima cornuta

Horned Screamer



LENGTH	80–94cm (31–37in)
WEIGHT	3.1kg (6½lb)
MIGRATION	Non-migrant

HABITAT Moist tropical forest, swampy wetlands, and lowland

The Horned Screamer gets its name from the “horn” on its forehead, which is actually a feather shaft. This horn resembles an antenna and may be straight or curved back or forward. Probably used for display purposes, it can almost reach the bill tip and may touch the ground when the bird is feeding. Black and white in colour, the Horned Screamer has a bulky body. Its other distinctive features include a narrow bill and long legs ending in partially webbed feet.

Certain anatomical differences, such as lightweight, hollow bones, and air sacs under the skin, make screamers distinct from the turkey family. They tend to mate for life, with pairs forming long-lasting bonds, and may breed at any time of the year. The female nests on the ground, laying 4–6 olive-brown eggs, which take six weeks to hatch. This species feeds on land rather than in water.

Anseranas semipalmata

Magpie Goose



LENGTH	75–85cm (30–33in)
WEIGHT	2–2.7kg (4½–5½lb)
MIGRATION	Partial migrant

HABITAT Tropical floodplains, swamps, and damp grassland, within 80km (50 miles) of the coast

A primitive, aberrant (atypical) goose that provides the evolutionary link between wildfowl and screamers, the Magpie Goose has unusual features such as partially webbed feet and a long hind toe. Both the male and female are highly vocal. Some males mate with two females, which lay eggs in the same nest. The pair or trio usually bond for life.



ADULT MALE

Anser cygnoides

Swan Goose



LENGTH	81–94cm (32–37in)
WEIGHT	3.5kg (7¾lb)
MIGRATION	Migrant

HABITAT Lowland lakeside marshes, rice fields, and estuaries

RED LIST CATEGORY Endangered

Despite having been domesticated 3,000 years ago, the Swan Goose, also called the Chinese Goose, is one of the northern hemisphere's most poorly known wildfowl. Its population is declining rapidly as a result of habitat loss and hunting. With its long bill, small head, and slim neck, this distinctive goose has a slightly top-heavy appearance. It has a brown cap and orange legs. The species breeds on steppe marshes and lakesides, usually in ground nests.

*Dendrocygna viduata*

White-faced Whistling Duck



LENGTH	44cm (17½in)
WEIGHT	700g (25oz)
MIGRATION	Partial migrant

HABITAT Bodies of fresh water, often with some emergent vegetation

Named after its striking call, a three-syllable whistle, the White-faced Whistling Duck has dark plumage and a white head, which makes the adult easy to identify. The juvenile is trickier to spot, being hard to distinguish from the juvenile Fulvous Whistling Duck (*D. bicolor*), with which it overlaps in range. This species is unusual in that it is widespread over two continents: Africa and South America. Surprisingly, there are no plumage differences between the two populations.

GREGARIOUS SPECIES

The White-faced Whistling Duck is both aquatic and land-based and lives in large flocks on bodies of open water. Unlike some other whistling ducks, which are also known as Tree-Ducks, it rarely perches. Most feeding occurs at night, and takes the form of both dabbling and up-ending. The species may undertake extensive seasonal movements – up to 500km (310 miles) – in response to the availability of water and food.

Anser albifrons

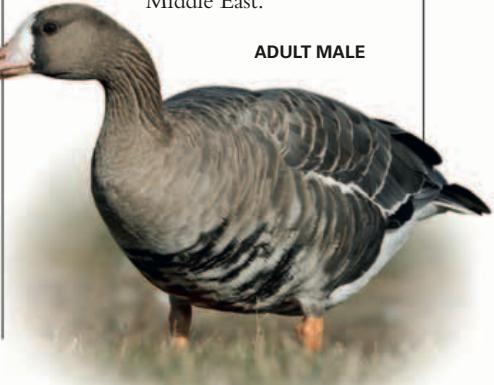
Greater White-fronted Goose



LENGTH	64–78cm (25–31in)
WEIGHT	2–3kg (4½–6½lb)
MIGRATION	Migrant

HABITAT Breeds on lowland tundra, often by lakes and rivers; winters on open steppes and grassland

The distinctive white face of the Greater White-fronted Goose is most apparent when viewed head on and, like the broad, black bars across the belly, varies in extent between individuals. This species has orange-yellow legs and feet. In flight, the brown plumage and U-shaped rump patch are clearly visible. Four subspecies breed in the northern tundra from Russia to Greenland, and large flocks winter in specific areas of the USA, Mexico, Europe, and the Middle East.



ADULT MALE

Anser anser

Greylag Goose



LENGTH	74–84cm (29–33in)
WEIGHT	3.1–3.5kg (6½–7¾lb)
MIGRATION	Partial migrant

HABITAT Mainly in open country, often wintering in lowland farmland

ADULT GREYLAG GOOSE



The Greylag Goose is the wild ancestor of many breeds of domestic geese. It breeds further south than all the other grey geese (such as the Greater White-fronted Goose, opposite), and its European and Asian ranges have been fragmented by hunting. The largest and bulkiest of the grey geese, it has a large head, thick neck, and a heavy bill adapted to probing in marshy lands and pulling out roots. Most breeding populations are migratory. This is the only European grey goose to be seen in large numbers during the summer.

*Anser indicus*

Bar-headed Goose



LENGTH	71–76cm (28–30in)
WEIGHT	1.9–2.4kg (4½–5½lb)
MIGRATION	Migrant

HABITAT Breeds by high-altitude lakes in boggy open country; winters by marshes, lakes, and rivers

HIGH-ALTITUDE MIGRANT

Distinguished by the double dark brown crown-bands on its white head, the Bar-headed Goose is pale grey in colour. It breeds in colonies on the high plateaus of central Asia. The world's highest-altitude migrant, this sociable bird undertakes remarkable migrations in spring, crossing the Himalayas – to winter in large flocks in the marshy lowlands of north India.

Anser caerulescens

Snow Goose



LENGTH	65–75cm (26–30in)
WEIGHT	2.4–3.4kg (5¼–7¾lb)
MIGRATION	Migrant

HABITAT Breeds in low tundra, winters on cultivated land

The Snow Goose has two colour forms (see panel, right). The white form is brilliant white, with a thick red bill, a grey patch adjacent to bold black wing-tips, and deep pink legs. Two subspecies are also recognized. The Lesser Snow Goose (*A. c. caerulescens*) is the more widespread and common; its blue form predominates. The Greater Snow Goose (*A. c. atlanticus*) has a limited breeding range and winters along the Atlantic seaboard; its blue form is rare. As their names suggest, the subspecies differ mainly in size. Highly gregarious throughout the year, this goose breeds in closely packed colonies across Arctic North America and winters in flocks of tens of thousands.

ON THE WING

Flying in flocks that make broad V-formations, Snow Geese have a strong, direct flight with moderate wingbeats; in winter they fly south to the Gulf of Mexico.

**SOCIAL BIRDS**

Family groups stay together throughout the year; a mixed family of blue and white forms is pictured here.

COLOUR FORMS

The Snow Goose occurs in two colour types: one white (see left) and the other dark (called the "Blue Goose" because of its grey-blue wings). Breeding adults tend to mate with their own colour form – mixed pairings usually produce dark juveniles (pictured above).

GREAT SITES

KAKADU NATIONAL PARK



LOCATION On the northernmost coast of Australia's Northern Territory, around 250km (150 miles) east of Darwin.

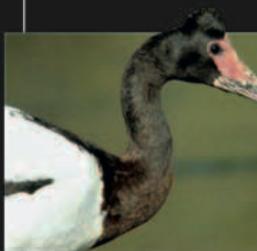


Australia is the driest inhabited continent on Earth, but for a brief period the tropical belt that stretches across the northern third of the country is awash with fresh water – and spectacular concentrations of birds. In December, midsummer storms begin to sweep inland from the Indian Ocean, and over the next few months rivers burst their banks, flooding the low-lying land and creating enormous wetlands. Kakadu National Park lies on the coast in the extreme north of this tropical wet-dry zone. It is among the best places to watch birds in Australia, with more than 280 species being listed. Although the rainforests of the northeast support a more varied bird life, few other areas offer such good bird-viewing opportunities.

WHAT TO SPOT



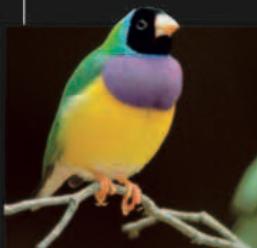
COMB-CRESTED JACANA
Irediparra gallinacea



MAGPIE GOOSE
Anseranas semipalmata
(see p.122)



RED GOSHAWK
Erythrotriorchis radiatus



GOULDIAN FINCH
Erythrura gouldiae
(see p.461)

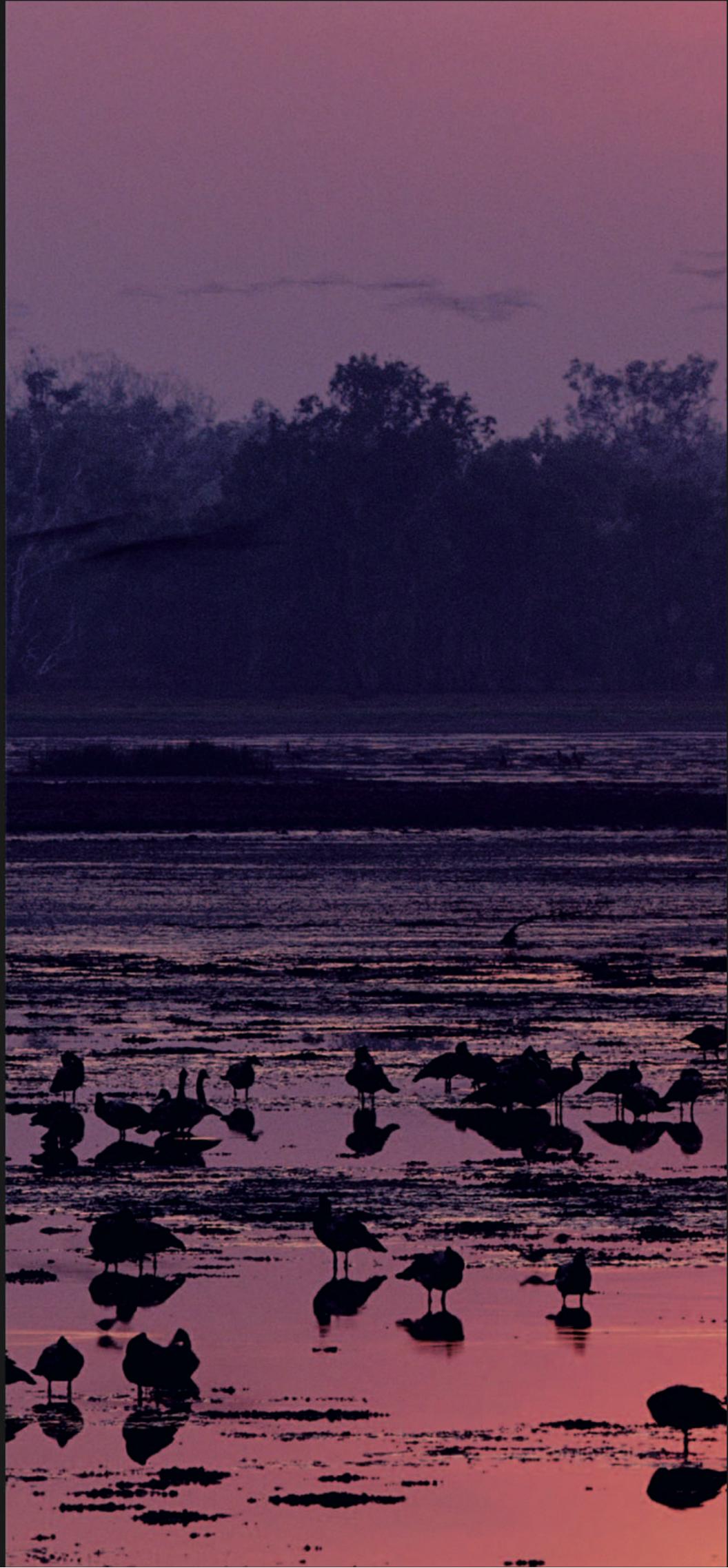
TRANSIENT WETLAND

The wet season in Kakadu usually lasts until April, by which time much of the park is under water and its extensive stands of Paperbark trees have turned into a flooded woodland accessible only by boat. Huge numbers of water birds flock to the area, sometimes travelling great distances across Australia's arid interior to feed or breed in this temporary swampland. They include whistling ducks, shelducks, and vast numbers of Magpie Geese, which graze on the green carpet of sprouting wild rice plants. Endemic to Australia and New Guinea, these noisy waterfowl are polygamous breeders – each male mates with two or three females, which share the same nest. Egrets, herons, and storks wade through the shallows to hunt fish, while flotillas of Australian Pelicans patrol the more open areas. In May and June Kakadu's wetlands slowly start to shrink, and both fish and the birds that eat them become concentrated in isolated pools, or billabongs. By August–September, these waterholes offer impressive birdwatching.

Best known for its waterbirds, Kakadu is also home to a rich selection of land-based species, including birds of prey, pittas, honeyeaters, pigeons, and parrots. The rare Gouldian Finch and Red Goshawk are among its residents. In 1981, Kakadu was listed as a World Heritage Site.

GATHERING OF GEES

During the wet season, floodwaters pour into the flat lowlands of Kakadu National Park. For a few months these lush wetlands attract a wealth of water birds, including flocks of Magpie Geese.





Branta sandvicensis

Nene

LENGTH	56–71cm (22–28in)
WEIGHT	2kg (4½lb)
MIGRATION	Non-migrant

HABITAT Barren volcanic slopes with sparse vegetation on some Hawaiian islands and pastures

RED LIST CATEGORY Vulnerable

A small, brown goose with a black head and bill, distinct feather grooves on its neck, and partially webbed black feet – the Nene is one of conservation's success stories. A reintroduction programme contributed to its recovery from just 30 birds in the early 1900s to 1,000 today. Hawaii's only goose, it is also known as the Hawaiian Goose. The name "Néné" is derived from its low, moaning call.

ADULT NENE

CANADA GEESE IN FLIGHT

Branta canadensis

Canada Goose

LENGTH	0.6–1.1m (2–3½ft)
WEIGHT	1.2–4.8kg (2½–11lb)
MIGRATION	Partial migrant

HABITAT Various lowland habitats, from tundra and wetlands to reservoirs and farmland

The size variation between the different subspecies of the Canada Goose is more extreme than for any other bird: the largest subspecies is seven times heavier than the smallest. In fact, some scientists have grouped several of the subspecies into a separate species, named the Cackling Goose (*B. hutchinsi*). The plumage of all

Canada Geese, however, is basically similar and the combination of a black head and neck, with a white chinstrap and brown body, is easy to spot. The call of the smaller subspecies is a rapid cackle, while larger subspecies make deep honking sounds. The Canada Goose is a dabbler and a grazer; it walks well on land, and feeds on a variety of aquatic and terrestrial plants.

The natural range of this gregarious species is North America south to Mexico, but populations introduced into Europe and New Zealand since the 17th century are now abundant. The total population is estimated to be around three million. Some populations are migratory, while others are sedentary. A dispersal of flocks to traditional moulting grounds often takes place after breeding, some geese flying distances of up to 1,500km (900 miles) to moult.

Branta ruficollis

Red-breasted Goose

LENGTH	53–55cm (21–21½in)
WEIGHT	1.1–1.4kg (2¼–3¼lb)
MIGRATION	Migrant

HABITAT Breeds by tundra close to rivers; winters in open steppes among pasture and crops

RED LIST CATEGORY Vulnerable

PATTERNEDE GOOSE

While strikingly patterned, the chestnut head and neck of this unmistakable goose are inconspicuous at long range, when the species appears simply black and white. The Red-breasted Goose breeds in northern Russia and winters almost entirely at five sites in Bulgaria and Romania. Its range continues to decline due to climate and land-use change.

Cygnus atratus

Black Swan

LENGTH	1.1–1.4m (3½–4½ft)
WEIGHT	5–6kg (11–13lb)
MIGRATION	Partial migrant

HABITAT Large, shallow lakes, flooded agricultural land, coastal lagoons, and sheltered coastal bays

Unique to Australasia, the adult of this species is sooty-black, with white flight feathers that are hidden at rest, and a bill that is bright red. The juvenile is greyer than the adult. The Black Swan is highly gregarious, with flocks of tens of thousands on some lakes. Breeding colonies are densely packed, and the breeding season varies with the climate across Australia.

ADULT BLACK SWAN

Cygnus olor

Mute Swan

LENGTH	1.2–1.6m (4–5½ft)
WEIGHT	9.5–12kg (21–26lb)
MIGRATION	Partial migrant

HABITAT Lowland bodies of fresh water, especially manmade; sheltered coastal areas

The Mute Swan is most familiar as an inhabitant of lakes in urban areas of Europe as well as northeastern North America, but it is actually a bird from the Central Asian steppes. This is due to its long history of domestication in Europe. In its indigenous Asian range, it is wary and unapproachable and is possibly still threatened by habitat

destruction. The adult is distinguished by its orange bill with a black basal knob, pure white plumage, long pointed tail, and its habit of swimming with arched wings and neck held in a gentle S-shape. While most cygnets are brownish grey, some are all white, in a colour form called the Polish Swan (*C. immutabilis*). The Mute Swan's

common name is a partial misnomer – although it is certainly the least vocal of the swans, it is by no means silent. It has a variety of distinctive calls, notably a snake-like hiss when threatened. In flight, the wings make a loud "singing" sound.

ADULT MUTE SWANS

BIRD SPECIES



Cygnus cygnus

Whooper Swan



LENGTH	1.4–1.7m (4½–5½ft)
WEIGHT	9.5kg (21lb)
MIGRATION	Migrant

HABITAT Breeds by open water, often in taiga forest; winters in lowland farmland and floodplains

The Whooper Swan is best known for its loud, clear trumpet-like call, which is responsible for the species' common name. This sound is produced by well-developed structures in the throat that resonate strongly. The second largest swan in the world, the Whooper Swan is superficially similar to the Tundra Swan (below), differing in its larger size, more angular head shape, and wedge-shaped bill. The yellow on the bill is also more extensive than that of the Tundra Swan.

The Whooper Swan is a Eurasian species, breeding across the north of the continental mass and wintering in coastal lowlands, particularly around the North, Black, and Caspian Seas (European birds); and Japan, Korea, and coastal China (Asian breeders). On breeding grounds, pairs of these swans are territorial and nesting sites are well spaced. In wintering grounds, Whooper Swans are gregarious, with congregations numbering up to 3,000 birds. Migrating parties fly in lines or in V-shaped formations, arriving on the grounds in October or November, and departing between March and May.

ADULT WHOOPER SWAN



Cygnus columbianus

Tundra Swan



LENGTH	1.1–1.5m (3½–5ft)
WEIGHT	6.5–7kg (14–15lb)
MIGRATION	Migrant

HABITAT Breeds in tundra near bodies of fresh water; winters in lowland marshes, wet pastures, cropland

The Tundra Swan comprises two distinct subspecies: the Whistling Swan (*C. c. columbianus*) of North America and Bewick's Swan (*C. c. bewickii*) of Europe and Asia. They differ in the colour of

FLOCK ON WATER

their bills: the Whistling Swan is entirely black, whereas the Bewick's swan has varying amounts of yellow. The exact pattern of yellow is unique to an individual, making it possible to track specific birds when flocks arrive on wintering grounds on the Atlantic and Pacific coasts. The Tundra Swan feeds on aquatic vegetation and roots of submerged plants, which it digs up by dipping its long neck and head under water. Known to be a solitary nester, it is a monogamous bird that finds a mate and then pairs for life. It departs from its breeding grounds in September or early October. These birds migrate in family flocks along well-established routes, sometimes pausing at the usual stopover sites until forced to move onwards by colder weather.



ADULT BLUE DUCK

Hymenolaimus malacorhynchos

Blue Duck

	LENGTH 50–57cm (19½–22½in)
	WEIGHT 775–900g (28–32oz)
	MIGRATION Non-migrant

HABITAT Clear, fast-flowing mountain rivers and streams in wooded regions

RED LIST CATEGORY Endangered

As its name suggests, the Blue Duck is mainly blue-grey in colour, and has a dark-rimmed pale pink bill with flaps at the sides. It feeds by swimming and diving in the rapids of fast-flowing mountain rivers. When it is not feeding, it likes to rest on boulders in the mid-stream and only rarely flies. The highly territorial male will drive away any intruder along its stretch of river. Unfortunately, this New Zealand duck is declining in numbers and faces threats from introduced species as well as the construction of dams.

Tachyeres pteneres

Fuegian Steamer Duck

	LENGTH 74–84cm (29–33in)
	WEIGHT 4.2–5.5kg (8½–12lb)
	MIGRATION Non-migrant

HABITAT Rocky coasts with sheltered bays and kelp beds

The flightless Fuegian Steamer Duck is the largest of a group of coastal southern South American ducks, all but one of which are incapable of flying. The sexes of this sturdy duck are similar, with predominantly grey plumage and a bright orange-yellow bill and legs. It finds its food by diving among beds of kelp and spends its time loafing around on rocks. It is not flock-forming and lives in pairs or family groups.

Plectropterus gambensis

Spur-winged Goose

	LENGTH 75–100cm (30–39in)
	WEIGHT 3.9kg (8½lb)
	MIGRATION Non-migrant

HABITAT Freshwater lakes, pools, and rivers in open grassy lowland areas; swamps and river deltas

Named for the spur on the bend of its wing, which is used by this goose to defend its territory during the breeding season, the large Spur-winged Goose has a long neck, white face, red skin around the eyes, and long legs. It lives in flocks around tropical African wetlands and grazes on waterside vegetation and aquatic plants. It often takes over abandoned nests of other large birds or places its nest in cavities in trees and rocks.



ADULT MALE

*Alopochen aegyptiaca*

Egyptian Goose

	LENGTH 63–73cm (25–29in)
	WEIGHT 1.9kg (4½lb)
	MIGRATION Non-migrant

HABITAT Inland wetlands in tropical Africa; parkland, meadows, and pastures where introduced in Europe

The Egyptian Goose is mainly a bird of tropical Africa, but is widely kept in captivity and now occurs in a feral state in parts of western Europe, particularly the UK. It has two colour forms: one with grey-brown on the upperparts, the other with red-brown. The species is found in pairs, but flocks together when not breeding. Although it can swim well and dive, it feeds mainly on land, where it grazes on grass or leaves and also raids certain crops. It has a noisy display in the breeding season when its wings are opened out and its neck is stretched

forwards. Egyptian Geese nest in a variety of places, from tree-cavities and cliff-ledges to abandoned nests of other birds. The female Egyptian Goose lays 5–8 eggs, which hatch after four weeks. The downy chicks are fed and cared for by both parents.

ADULT FEMALE WITH CHICKS

Neochen jubata

Orinoco Goose

	LENGTH 61–76cm (24–30in)
	WEIGHT 1.3kg (3lb)
	MIGRATION Non-migrant

HABITAT Banks of rivers in lowland tropical forest; various wetlands in more open forest and savanna

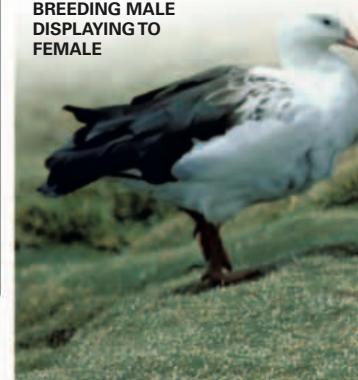
A pale head and neck, dark bill, chestnut flanks, dark upperparts, and black wings with a white patch distinguish this goose. The male and female are similar in appearance. Although it spends most of its time on the ground, it readily perches in trees. It mainly grazes on grass, but will also eat molluscs, worms, larvae, and aquatic insects. It usually nests in tree-hollows. The male has a high-pitched whistling call, and the female cackles like the related Egyptian Goose (above right).

Chloephaga melanoptera

Andean Goose

	LENGTH 70–80cm (28–31in)
	WEIGHT 2kg (4½lb)
	MIGRATION Non-migrant

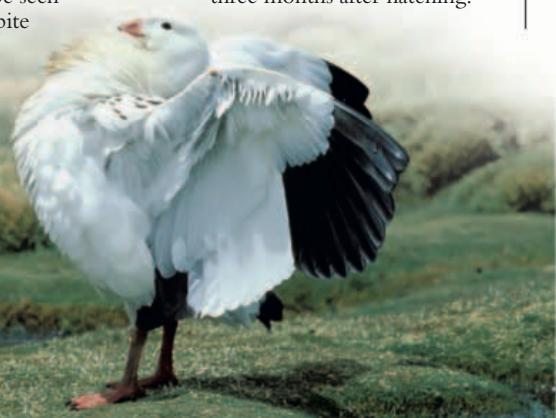
HABITAT Lakes and marshes in high-altitude Andean grassland, moving to lower levels during winter

BREEDING MALE
DISPLAYING TO
FEMALE

A hardy species that lives at very high altitudes – usually well above 3,000m (10,000ft) – in the Andes of South America, the Andean Goose is a striking black and white bird, with a black-tipped pink bill and pinkish orange legs. The female is similar to the male, but is smaller.

This species feeds almost entirely by grazing in short grassland. Although usually found in pairs or small family groups, larger gatherings can be seen after the breeding season. Despite

being classified as a waterbird, it avoids water and will swim only in an emergency. The male can be very aggressive when defending its territory in the breeding season. Pairs apparently stay together for life and breed from November to January, making a simple, feather-lined nest on bare ground, usually on slopes overlooking a lake or pool. The female lays 6–10 eggs and the young become independent about three months after hatching.



Nettapus auritus

African Pygmy Goose



LENGTH	28–33cm (11–13in)
WEIGHT	275g (10oz)
MIGRATION	Non-migrant

HABITAT Freshwater lakes and pools, particularly those that are deep and well-vegetated

This very striking small waterbird is the smallest species of waterfowl in Africa, and is usually found swimming and feeding in groups among floating wetland vegetation.

The male African Pygmy Goose has a conspicuous head-pattern, with black, white, and green markings, as well as a bright orange-yellow, black-tipped bill. The female has a duller, mostly white face with a broken dark eye-stripe. Like other Pygmy Geese, the African Pygmy Goose prefers to nest in tree-holes above the ground. When the young birds hatch, they have to leap down to get to the water or the ground. Sexually mature at two years, these birds have been known to live for up to 15 years in captivity. Large gatherings of non-breeding birds are found in the Okavango delta in Botswana.



MALE AFRICAN PYGMY GOOSE

*Tadorna tadorna*

Common Shelduck



LENGTH	58–67cm (23–26in)
WEIGHT	1kg (2½lb)
MIGRATION	Migrant

HABITAT Sea coasts, estuaries, and larger inland lakes (particularly saline ones); gravel- and sand-pits

The Common Shelduck is one of the most distinctive ducks of western European coasts. The sexes are similar, but the female is somewhat smaller and duller than the male, with white facial markings and a broken chest-band. The red bulge on the bill of the male is absent in the female. Juveniles are browner, with a white face, foreneck, and chest. During late winter and spring, pairs become quite vocal. The male utters low whistling calls, but the female's call is quite different, being a rapid chattering "gag-ag-ag-ag-ag".

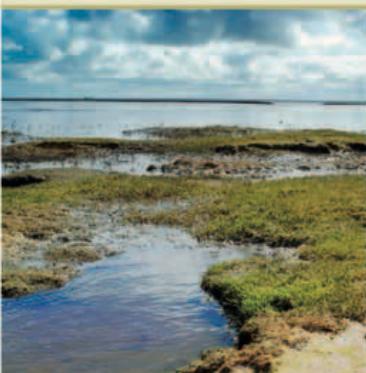
Common Shelducks often nest in rabbit burrows in sandy places, as well as tree-hollows and even haystacks. The female typically lays 8–10 eggs and incubates them for about four weeks. Soon after the young have left the nest, the adults leave for their annual moult (see panel, below). Broods of juveniles are then

PAIR OF COMMON SHELDUCKS

left in the care of one or more adult "attendants", thought to be failed breeders or non-breeders. If approached, these adults take to the wing, uttering warning quacks to the juveniles, who dive with skill to avoid danger.

GREAT SITES

WADDEN SEA



The adult Common Shelducks that breed along the coasts of northwestern Europe move to the Wadden Sea (Waddenzee) on the north coast of Germany in late summer and early autumn for their annual post-breeding moult, forming large congregations.

WILDLIFE-RICH SALT MARSH

The Wadden Sea is an extensive area of tidal mud flats and salt marshes. It is home to a wide variety of animal life.

Malacorhynchus membranaceus

Pink-eared Duck



LENGTH	36–45cm (14–17½in)
WEIGHT	350–400g (13–14oz)
MIGRATION	Partial migrant

HABITAT Shallow inland wetlands, temporary pools; occasionally coastal inlets and mangrove swamps

This Australian duck is most closely related to shelducks, despite the difference in their appearance. The black head-pattern, with a pink spot behind the eye patch, and barred body make this bird unmistakable. It has a large, square-tipped bill designed to help it feed on the plankton (including algae), crustaceans, molluscs, and insects it is dependent on, the pliable flaps of the bill acting as a sieve to filter algae and plankton from the water.



PAIR OF ADULT PINK-EARED DUCKS

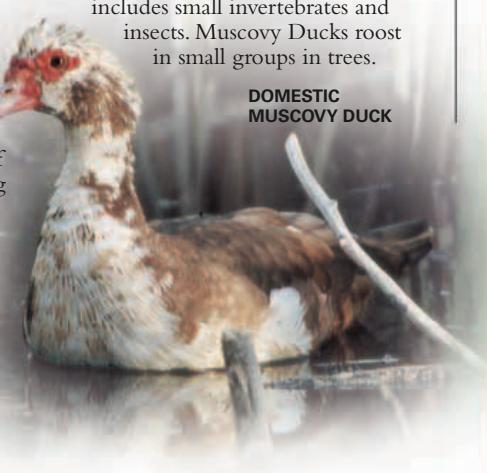
Cairina moschata

Muscovy Duck

LENGTH	66–84cm (26–33in)
WEIGHT	2–3kg (4½–6½lb)
MIGRATION	Non-migrant

HABITAT Lowland lakes, lagoons, marshes, and rivers in forested areas; brackish coastal wetland

This large duck had probably been domesticated for centuries by indigenous South American people before the arrival of European colonists. Selective breeding in captivity has produced larger domestic Muscovy Ducks with unusual and highly individual colour markings. Wild birds are black all over, apart from their white wing-coverts. The naked skin on their faces is mostly dark, with only a small amount of red, and they have a domed crest on top of the head.



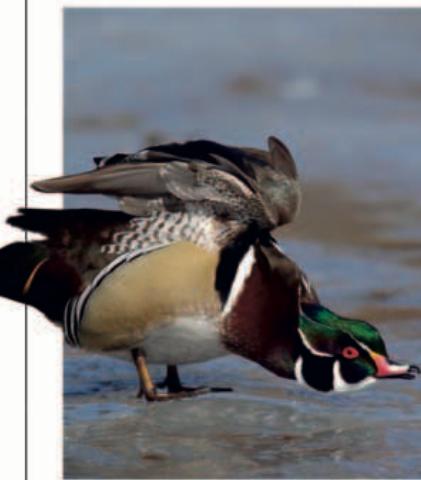
DOMESTIC MUSCOVY DUCK

Aix sponsa

Wood Duck



HABITAT Freshwater ponds, lakes, and slow-flowing rivers in well-wooded places; open areas in winter



DRAKE WOOD DUCK PREENING

A close relative of the Mandarin Duck (right), the North American Wood Duck is often kept in captivity. A black and white patterned head, crowned by a shiny green, floppy crest, distinguishes the male, while the female resembles the Mandarin Duck but has darker cheeks, a more contrasting white throat, and much more white around the eye.

When swimming, Wood Ducks bob their heads backwards and forwards in a jerking motion. The male's call is a rising whistle, while the female gives a whistled "whoo-eek" if startled. Like the Mandarin Duck, this species usually nests in a tree-cavity, and will also take advantage of specially made nest-boxes in suitable habitats. If nest-boxes are placed too close together, the female may lay eggs in the nest of a neighbour, resulting in clutches of as many as 40 eggs and unsuccessful incubation. The Wood Duck prefers nesting over water so that the ducklings can swim and find their food as soon as they leave the nest.

LENGTH	43–51cm (17–20in)
WEIGHT	625–675g (22–24oz)
MIGRATION	Partial migrant

HABITAT Freshwater lakes and marshes in lowland areas; also coastal wetlands

The Gadwall is one of the more widespread dabbling ducks. The male is mostly grey with black tail coverts, but shows a prominent white wing patch in flight. The female resembles a female Mallard (opposite) but shares the white wing patch of the male Gadwall and has an orange-sided bill.

Aix galericulata

Mandarin Duck



HABITAT Lakes, pools, and rivers in well-wooded places; also more open areas in winter

The beautifully ornate plumage of the male Mandarin Duck has made it one of the world's most familiar ducks in captivity. The male's coloration is very showy, with a red bill, broad white eyebrow, an orange fan of neck hackles, orange wing sails, and two white bands on the black breast. The female is more subtly coloured, with a grey head, white "spectacles" and throat, and dark greenish brown upperparts. It has a white belly centre and dark brown breast and flanks covered with heavy white mottling.

PAIR OF MANDARIN DUCKS



TREE-HOLE NESTS

Mandarin Ducks choose to nest in tree-cavities 6–7m (20–23ft) above the ground, where they are safe from most predators, and often several hundred metres from the nearest body of water. They line the nest with rotten wood and bits of vegetation. Soon after hatching, the ducklings make their way to the edge of the nest-hole, before leaping down to the water or ground below.



widespread in eastern Asia, but it is now threatened due to the destruction of its forest habitat.

The populations in eastern Russia and in China are both probably well below 1,000 pairs, although Japan may have about 5,000 pairs.

Anas strepera

Gadwall



HABITAT Freshwater lakes and marshes in lowland areas; also coastal wetlands

The Gadwall is one of the more widespread dabbling ducks. The male is mostly grey with black tail coverts, but shows a prominent white wing patch in flight. The female resembles a female Mallard (opposite) but shares the white wing patch of the male Gadwall and has an orange-sided bill.

This species is less gregarious than many other dabbling ducks and forms relatively small flocks outside the breeding season. It nests on the ground, often some distance from the water, and the ducklings start life on a diet of insects.



MALE GADWALL

Anas americana

American Wigeon



HABITAT Lakes and marshes in open wooded areas; winters mainly in coastal marshes and estuaries

With a grey hood, dark eye patch, and brown to chestnut breast and flanks, the female American Wigeon is plainer than the male, which has a conspicuous white forehead and crown. The male utters a clear, three-note whistle "whoe-whee-whoe", while the female's call is a low, growling "qua-ack".



MALE IN BREEDING PLUMAGE

These dabbling ducks are highly gregarious and gather in large flocks during the winter months to graze on coastal marshlands. They are strongly migratory, and a few individuals fly across the Atlantic Ocean each year to western Europe.



MALE IN FLIGHT

The male Mallard's white collar and white-bordered blue speculum on its wings are clearly visible in flight.

Anas platyrhynchos

Mallard



LENGTH
50–65cm (19½–26in)

WEIGHT
1.2kg (2½lb)

MIGRATION
Migrant

HABITAT All kinds of freshwater wetland, as well as coastal habitats

The familiar Mallard is the ancestor of most domestic ducks, apart from those that have descended from the Muscovy Duck (see p.129). The

breeding male has a glossy green head, white collar, grey-brown back, and rufous breast. However, the non-breeding male is similar to the female, which is mottled brown, buff, and white. The male's call is a low "kwek-kwek-kwek", while the female's is a loud series of quacks.

The Mallard is a strongly migratory and gregarious species outside the breeding season and is found in the wild right across the northern hemisphere. It is classified as a dabbling duck because it feeds on the surface and does not dive. It mostly eats aquatic vegetation, but

also grazes on grasses and takes some invertebrates. It nests on the ground, usually in dense vegetation near water. The male Mallard only forms a pair until the female lays eggs, and then goes its separate way. The clutch of 8–13 eggs is incubated for about 28 days. The ducklings can swim and feed themselves on insects as soon as they hatch, although they stay with the female for 7–8 weeks until they fledge.



SHELTERED FROM THE SUN

On clear summer days, the female Mallard may stand over the ducklings to protect them from the bright sunlight.



Anas clypeata

Northern Shoveler



LENGTH
44–52cm (17½–20½in)

WEIGHT
600–650g (21–23oz)

MIGRATION
Migrant

HABITAT Various kinds of wetland, particularly shallow freshwater lakes and pools, and marshes

ADULT MALE

Spoon-shaped and long, the large bill of the Northern Shoveler sets it apart from other ducks. The male has a black head with a green sheen and rich chestnut sides, while the female resembles the female Mallard. It feeds by dabbling for plant food, often swinging its bill from side to side; it also eats molluscs and insects in the nesting season. The nest, a shallow depression on the ground, is filled with grasses and lined with down.

Anas aucklandica

Brown Teal



LENGTH
36–46cm (14–18in)

WEIGHT
400–500g (14–18oz)

MIGRATION
Non-migrant

HABITAT Swampy pools and streams with some cover of bushes and trees; coastal bays and estuaries

RED LIST CATEGORY Vulnerable

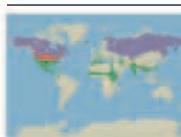


This small brown duck, with a chestnut breast and white-ringed eyes, is only found in New Zealand. However, it has not been able to cope with the changes brought about by human settlement and is now one of the rarest waterbirds in the world. It has evolved over the centuries into three subspecies: *A. a. chlorotis* on the mainland and offshore islands, and the flightless *A. a. nesiotis* and *A. a. aucklandica* (which have virtually been exterminated by cats, rats, and stoats) on subantarctic islands in the Campbell and Auckland groups.

ADULT MALE



MALE IN BREEDING PLUMAGE

*Anas acuta***Northern Pintail**

LENGTH
51–66cm (20–26in)

WEIGHT
750–850g (27–30oz)

MIGRATION
Migrant

HABITAT Open, marshy wetlands in breeding season; also found in coastal habitats in winter

The male Northern Pintail has a long, slender neck and an elegant, pointed tail that is 10cm (4in) longer than the female's. The breeding male has a pale grey body, white breast and lateral neck stripe, and dark brown head. This species is one of the dabbling ducks, a group that feeds by sieving food from the water's surface with its bill or by upending in shallow water. Like many wildfowl, this bird mostly feeds during the evening and at night.



ADULT MALE

*Aythya ferina***Common Pochard**

LENGTH
42–49cm (16½–19½in)

WEIGHT
850–950g (30–34oz)

MIGRATION
Migrant

HABITAT Shallow to relatively deep, open bodies of fresh water; occasional in coastal habitats

A typical diving duck, the compact Common Pochard is boldly marked, with a big head. Diving ducks, as the name suggests, feed by diving and taking food from the bottom. The Common Pochard prefers to feed in water about 1–2.5m (3¼–8¾ft) deep. This species has benefited from forest clearance for agriculture in Europe, and as a result its range has expanded into western Europe.

*Anas crecca***Common Teal**

LENGTH
34–38cm (13½–15in)

WEIGHT
350g (13oz)

MIGRATION
Migrant

HABITAT Marshy freshwater pools and lakes in breeding season; wider range of wetlands in winter

The diminutive Common Teal is found throughout the northern hemisphere. The male in breeding plumage, with its chestnut head and metallic green eye-patches outlined with cream stripes, is easy to identify. As with many ducks, the female is much drabber. Two distinct forms of the species occur in Eurasia and North America that differ slightly in their plumage. The North American subspecies is sometimes considered a separate species, *A. carolinensis*.



MALE COMMON TEAL



PAIR OF MARBLED DUCKS

Marbled Duck

LENGTH
39–42cm (15½–16½in)

WEIGHT
450–600g (16–21oz)

MIGRATION
Migrant

HABITAT Temporary or permanent shallow freshwater and brackish wetlands with emergent vegetation

RED LIST CATEGORY Vulnerable

Identifiable by its mottled grey-brown plumage and distinctive dark mask, the Marbled Duck has a small tuft at its nape and pale spots on its flanks. It has a dark bill, but the back and tail are pale. In flight, the darker tips of the wings can be seen. The male and female Marbled Ducks are similar, while the juvenile has more spots than the adult.



ADULT MALE

*Aythya marila***Greater Scaup**

LENGTH
42–51cm (16½–20in)

WEIGHT
0.7–1.3kg (1½–3¼lb)

MIGRATION
Migrant

HABITAT Breeds in tundra wetlands; winters in food-rich marine habitats

*Aythya fuligula***Tufted Duck**

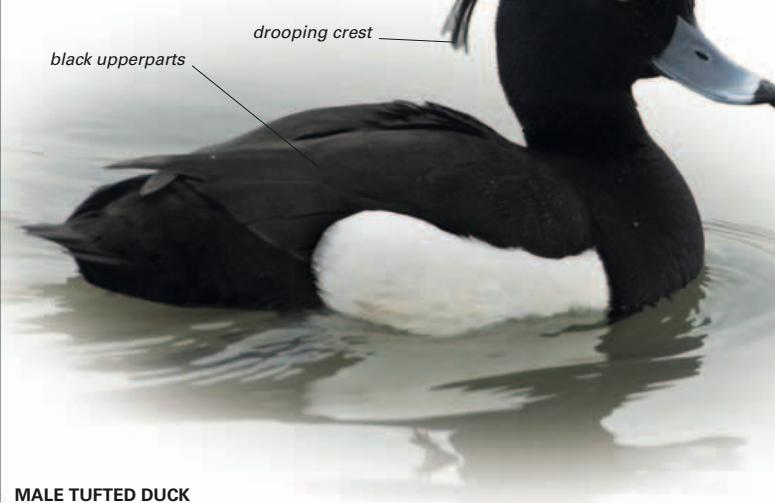
LENGTH
40–47cm (15½–18½in)

WEIGHT
0.5–1kg (1–2½lb)

MIGRATION
Migrant

HABITAT Temperate, lowland bodies of fresh water; occasional in sheltered marine habitats in winter

The male Tufted Duck has a neat appearance, with an attractive plumage in contrasting black and white, a long, drooping crest, and a black-tipped, blue-grey bill. The female is largely brown, with a short crest on the nape,



MALE TUFTED DUCK

Although similar to the Tufted Duck (left), the Greater Scaup lacks an obvious crest and the upperparts are grey, not black. The Greater Scaup breeds in the northern hemisphere at very high latitudes in a variety of tundra wetlands. During the winter, the species further demonstrates its hardiness by feeding almost exclusively at sea, often gathering in huge flocks in food-rich areas, such as mussel beds and sewage outflows.



Somateria spectabilis

King Eider



LENGTH	47–63cm (18½–25in)
WEIGHT	1.5–2kg (3¼–4½lb)
MIGRATION	Partial migrant

HABITAT Breeds on coastal and inland tundra wetlands; winters at sea, mostly north of Arctic Circle

Pastel shades of grey, green, and salmon-pink on the head and neck of the male King Eider contrast with its bright red bill, enormous yellow-orange frontal shield outlined in black, and the starker black and white plumage of its body. The body is further ornamented by unusual raised inner feathers on the back that form two "sails". The female is drab and brown (as is usual for ducks), differing only in minor plumage and anatomical details from the females of other eider species.

The King Eider often flies in big flocks, abreast, not behind each other.

It dives to depths of 55m (180ft) to feed on molluscs and crustaceans. A true Arctic species, it breeds in the tundra at high latitudes and most winter at sea north of the Arctic Circle. The species is common throughout its range and may be the most abundant eider species in the world, with a total population possibly exceeding three million birds.

SPECTACULAR PLUMAGE

Named "king" for its large blue-grey crown, the male King Eider displays vivid plumage in the breeding season.

GREGARIOUS WATERFOWL

Large flocks of King Eiders gather to feed in the coastal waters of the Arctic Ocean, migrating in even larger flocks during spring.



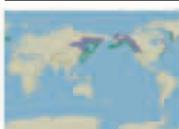
SOLITARY NESTER

Forming individual pairs, King Eiders arrive at their nesting ponds in June. The female scrapes a shallow depression on raised, dry ground near the water and lines it with plant material and large amounts of down. It lays 4 or 5 eggs, after which the male returns to sea, leaving the female alone to incubate the eggs for the next 27–30 days. The female King Eider tends to the young until they leave their nest to find their own food.



Histrionicus histrionicus

Harlequin Duck



LENGTH	38–45cm (15–17½in)
WEIGHT	525–675g (19–24oz)
MIGRATION	Migrant

HABITAT Breeds in fast-flowing upland watercourses; winters along rocky shorelines

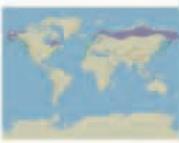
No other wildfowl species sports the striking combination of dark blue-grey and rich chestnut that is a distinctive feature of the Harlequin Duck. Another noticeable feature is the unique head pattern of the male, with its white facial crescent, cheek spot, neck stripes, and stunning chestnut eye-stripe. It has a small, blue-black bill, several white lines on the body, and a long, pointed black tail. However, the female is a drab brown, with two spots in front of the eye and a white cheek patch.

This is a tough species, quite at home in icy cold, rough water, both at sea and on the fast-flowing rocky

rivers where it breeds. Though usually silent, it is a noisy breeder, its calls characterized by high-pitched squeals and whistles – a common vocal adaptation among birds breeding in turbulent water. Wintering birds always select coastal areas with rugged shorelines, such as exposed headlands and cliffs. Harlequin Ducks feed almost exclusively on animal matter, diving to remove food items from rocks with their small bills.

MALE HARLEQUIN DUCK



*Melanitta nigra***Black Scoter**

LENGTH
44–54cm (17½–21½in)

WEIGHT
1kg (2½lb)

MIGRATION
Migrant

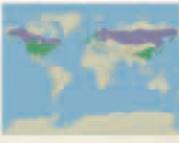
HABITAT Breeds in freshwater wetlands; winters mainly in shallow coastal waters

Otherwise uniformly plumaged, the Black Scoter shows a silvery grey sheen in flight. The species is divided into two subspecies, each of which are considered by many authorities to represent distinct species on their own.

MALE BLACK SCOTER

The Black Scoter (*M.n. nigra*, shown above) belongs to the subspecies that occurs in Europe and western Asia and can be identified by the distinct knob on its bill and the restricted area of yellow below it. The subspecies (*M.n. americana*), found in eastern Asia and North America, has a yellower bill.

The species is most often seen in dense wintering flocks in shallow coastal areas, where it feeds by diving for molluscs and crustaceans. Although considered a sea duck, this species actually breeds across the subarctic region in a variety of freshwater habitats.

*Bucephala clangula***Common Goldeneye**

LENGTH
42–50cm (16½–19½in)

WEIGHT
0.8–1.1kg (1¾–2¼lb)

MIGRATION
Migrant

HABITAT Breeds on forest lakes and rivers; winters on large lakes and shallow coastal habitats

A chunky, muscular diving duck, the Common Goldeneye has a curious large, triangular head and striking black and white plumage. Energetic and restless, it rises easily from the water. In flight, the wings make a distinctive whistling noise, which is especially pronounced in the male.

The Common Goldeneye breeds throughout the Arctic-Alpine forest zone and is heavily dependent on the availability of tree-holes for nesting.

*Clangula hyemalis***Long-tailed Duck**

LENGTH
36–60cm (14–23½in)

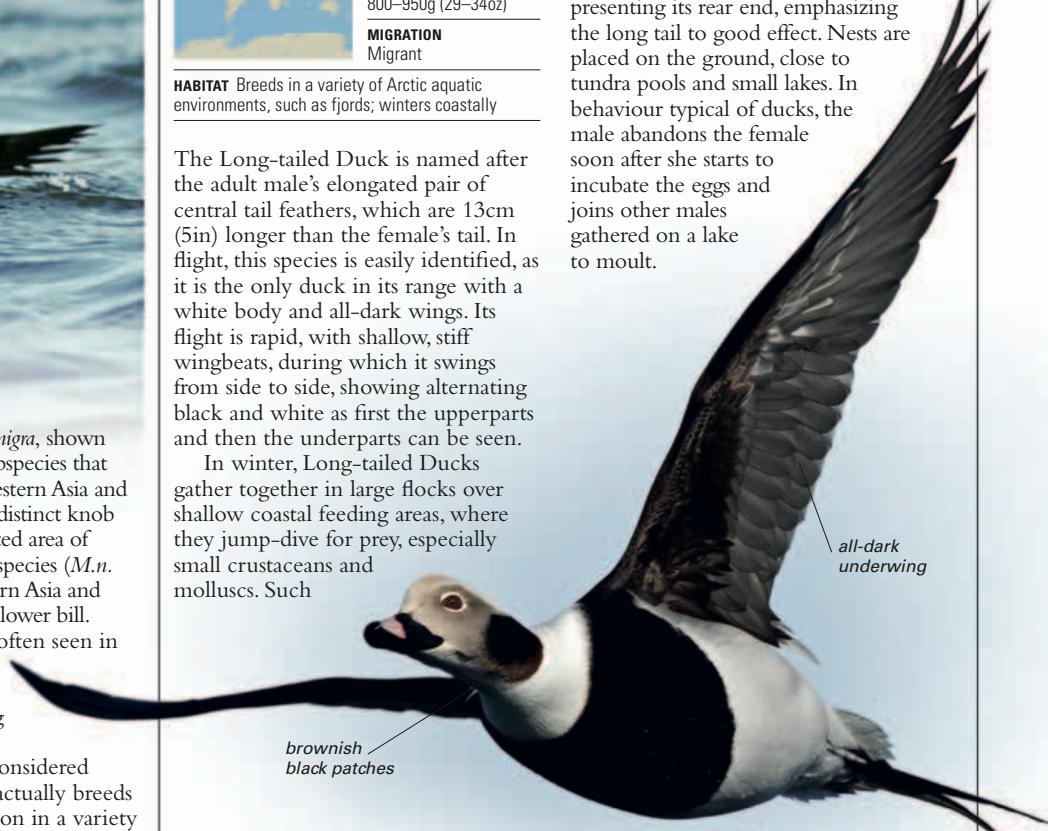
WEIGHT
800–950g (29–34oz)

MIGRATION
Migrant

HABITAT Breeds in a variety of Arctic aquatic environments, such as fjords; winters coastally

The Long-tailed Duck is named after the adult male's elongated pair of central tail feathers, which are 13cm (5in) longer than the female's tail. In flight, this species is easily identified, as it is the only duck in its range with a white body and all-dark wings. Its flight is rapid, with shallow, stiff wingbeats, during which it swings from side to side, showing alternating black and white as first the upperparts and then the underparts can be seen.

In winter, Long-tailed Ducks gather together in large flocks over shallow coastal feeding areas, where they jump-dive for prey, especially small crustaceans and molluscs. Such

**MALE LONG-TAILED DUCK**

all-dark underwing

brownish black patches

**MALE SMEW***Mergus albellus***Smew**

LENGTH
38–44cm (15–17½in)

WEIGHT
550–650g (20–23oz)

MIGRATION
Migrant

HABITAT Breeds near forested freshwater wetlands, especially rivers; winters on lakes and estuaries

The male Smew has a striking pied plumage, which is largely white with decorative black markings and includes goggle-like eye patches. The female has a rufous head, conspicuous white cheeks, and brownish plumage. The juvenile also has a rufous head. This small diving duck has a breeding habitat similar to that of the Common Goldeneye (left), but prefers well-forested, lowland river basins.

Mergus merganser

Common Goosander

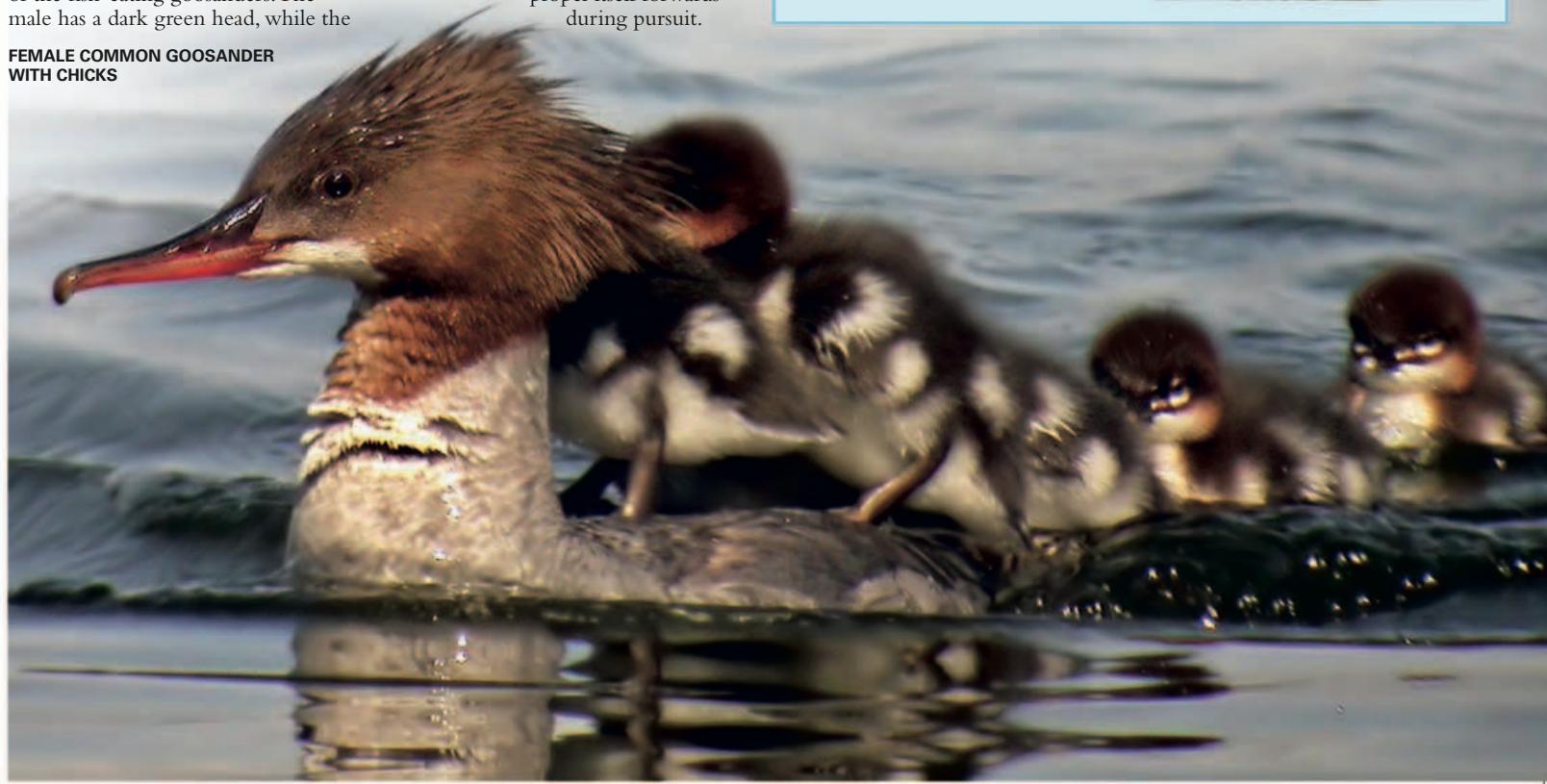


LENGTH	58–66cm (23–26in)
WEIGHT	1.2–1.7kg (2½–3½lb)
MIGRATION	Migrant

HABITAT Breeds on upland rivers and lakes; winters on large bodies of water, mostly fresh water

A heavily-built duck, the Common Goosander, or Merganser, is the largest of the fish-eating goosanders. The male has a dark green head, while the

FEMALE COMMON GOOSANDER WITH CHICKS



female's head is reddish brown in colour. The male Common Goosander's mostly white body, dark head, and red bill sets it apart from other goosanders, making it easy to spot at a distance or in flight.

The diet of this species consists almost entirely of fish, as reflected in the structure of its long, thin beak, which is very different from the typical duck's bill. It submerges its head while searching for food and captures fish by diving. An expert diver, it uses only its webbed feet (which are towards its rear end) to propel itself forwards during pursuit.

A DUCK WITH TEETH

Goosanders are sometimes referred to as "sawbills" because of a unique adaptation that allows them to control slippery fish when hunting. The cutting edges of both the upper and lower mandibles are lined with backward-projecting spines or "teeth". This design helps give it a firm grip on its catch, ensuring that the captured fish is unable to escape on its route to the bird's stomach.

*Heteronetta atricapilla*

Black-headed Duck



LENGTH	35–38cm (14–15in)
WEIGHT	500–575g (18–21oz)
MIGRATION	Partial migrant

HABITAT Swampy freshwater habitats

Rather peculiar in appearance, with its long body coupled with short wings and tail, the small Black-headed Duck is drably coloured. The male has a black head and mantle, and paler flanks and belly, while the female is pale brown all over.

This species practises a parasitic way of rearing its young that is unique among wildfowl. Rather like a cuckoo, it lays its eggs in the nests of other wetland birds such as ducks, coots, gulls, and even birds of prey. Unlike the cuckoos (see p.274–75), however, this breeding practice does no damage to the host species. Once the chick has freed itself from the confines of the egg, it is independent and leaves the nest to fend for itself.

Oxyura jamaicensis

Ruddy Duck



LENGTH	35–43cm (14–17in)
WEIGHT	575–625g (21–22oz)
MIGRATION	Partial migrant

HABITAT Freshwater lakes with abundant marginal emergent vegetation

With its often upright tail, the Ruddy Duck is an excellent example of a small group of ducks called "stiff-tails". The male breeding display is extraordinary, being accompanied by an array of sounds that do not come from its vocal chords. These include a rattling noise produced by the open bill, "ticks" or croaks (that can be heard when the duck taps its inflated throat with its bill), and a rapid series of notes produced when it beats its wings on the water.



MALE RUDDY DUCK

Biziura lobata

Musk Duck



LENGTH	55–66cm (21½–26in)
WEIGHT	1.5–2.4kg (3½–5½lb)
MIGRATION	Partial migrant

HABITAT Freshwater wetlands, estuaries, and sheltered coastal areas

The Musk Duck of Australia is a heavy and unusual-looking member of the "stiff-tail" duck group. Its large, webbed feet are situated well back on

its body and the fanned tail is distinctive. The most striking feature is the huge lobe hanging beneath the bill of the mature male. Another oddity is that during the breeding season, the plumage of the male is usually oily and exudes a pungent musky odour –

hence its common name. This oil can even be observed on the surface of the water during the strenuous and noisy displays as the male tries to attract a coterie of females.

MALE MUSK DUCK



PENGUINS

ORDER Sphenisciformes
FAMILY 1
SPECIES 17

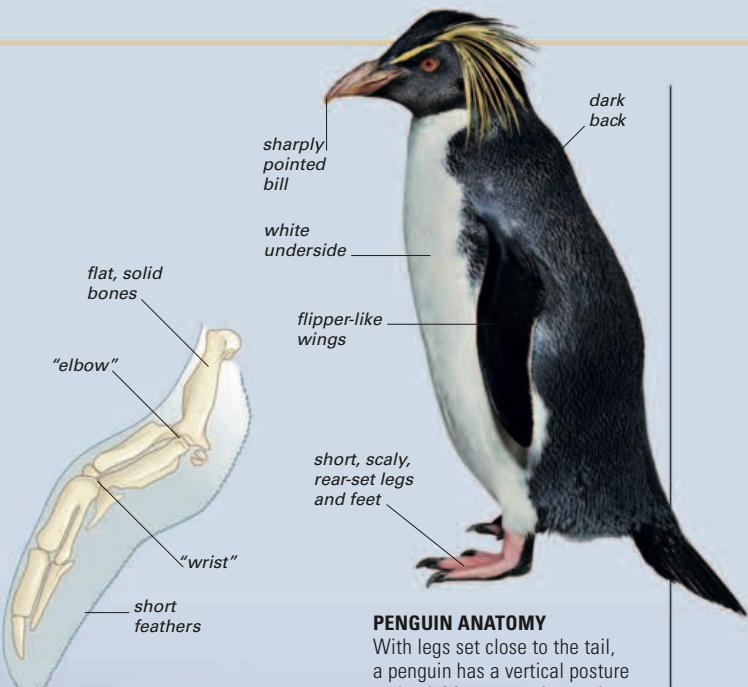
bodies, and unusually dense bones, they are the fastest birds underwater, and the deepest divers. Their legs are short and set far back, giving them an upright stance and characteristic “penguin waddle” when they move on land.

ANATOMY

Penguins are the most marine of all birds, typically spending much more time at sea than they do on land. All have thickset but highly streamlined bodies, with sharp bills, short tails, and large, webbed feet with well-developed claws. The classic penguin colour scheme, with a white front and a dark back, helps to camouflage them at sea, both from above and from below. Penguin wings are narrow and stiff, and move only at the shoulder joint – something that distinguishes them from the wings of all other birds. Unusually for non-flying birds, they have powerful wing muscles attached to a well developed keel. In adults, penguin plumage is short and dense, with a texture like a hard-wearing carpet. Beneath the skin, a layer of insulating fat, or blubber, helps to retain body heat, even in temperatures far below freezing.

HABITAT

Although often photographed on land or ice, penguins spend much of their lives at sea. When they do come ashore, it is in order to breed or to moult. Five species breed in Antarctica, while the remainder nest on subantarctic islands, or on cold-water coasts in South America, South Africa, Australia, and New Zealand. The northernmost species is the Galapagos Penguin, which lives on the equator, at the northern limit of the cold Humboldt current. Seawater is never colder than about -2°C (28°F) because below this temperature it freezes. However, on land or on ice, penguins experience a huge range of temperatures, from -60°C (-76°F) during the winter in Antarctica, to +30°C (86°F) or more in breeding colonies on the coast of Argentina.



PENGUIN WING

With its stiff elbow and wrist joints, and narrow elliptical shape, a penguin's wing makes a highly effective paddle.

PENGUIN ANATOMY

With legs set close to the tail, a penguin has a vertical posture on land. Many penguin species, including this Rockhopper, have characteristic head markings or crests, with the feet the only naked parts of their bodies.

HUMAN IMPACT

MARINE POLLUTION

At one time, penguins were heavily exploited for their meat, skins, and oil. Today, they are protected, but still face many threats, including marine pollution and climate change. Oil spills are a problem for the Jackass Penguin, which lives close to a major shipping lane off southwest Africa.

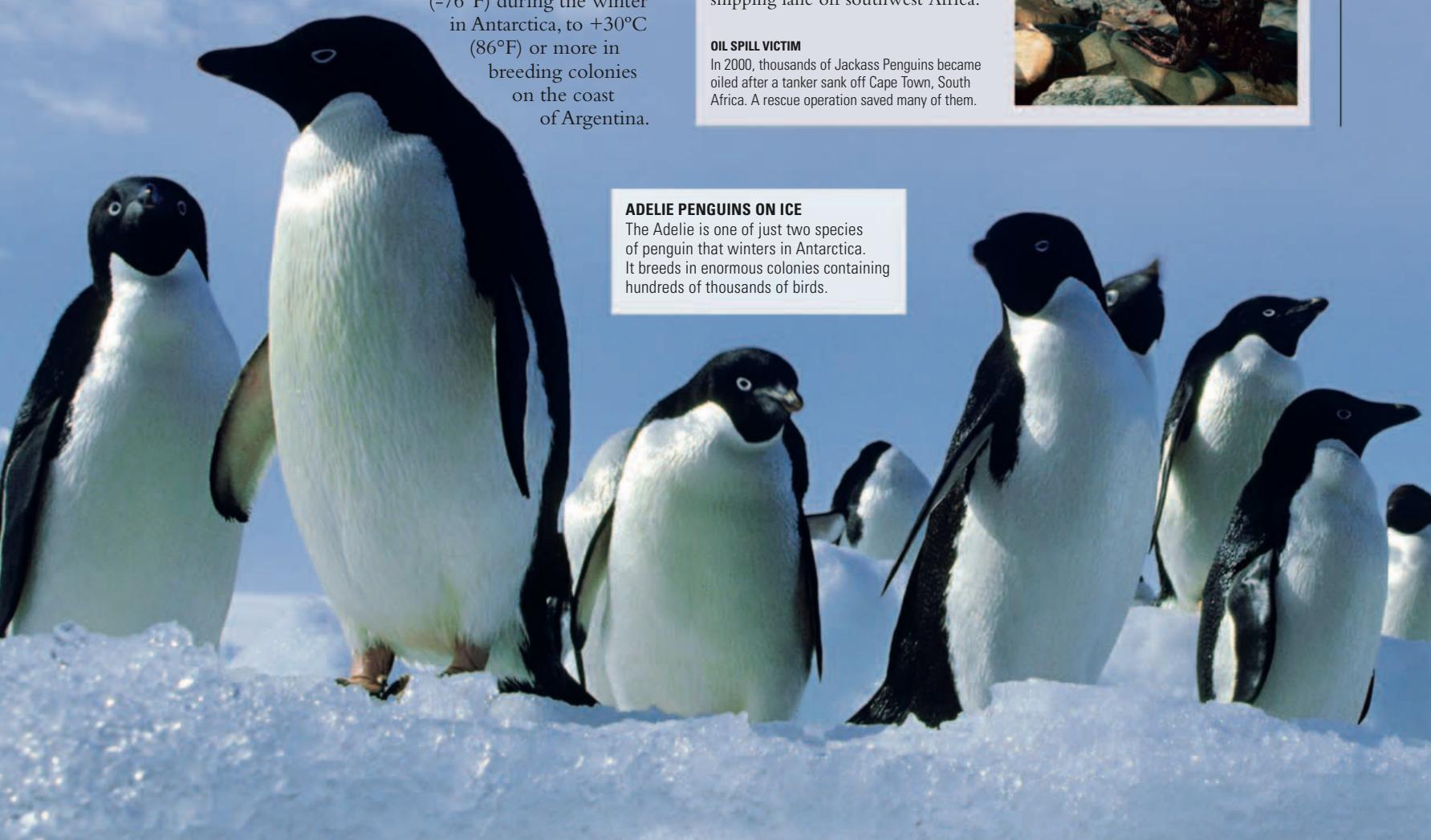


OIL SPILL VICTIM

In 2000, thousands of Jackass Penguins became oiled after a tanker sank off Cape Town, South Africa. A rescue operation saved many of them.

ADELIE PENGUINS ON ICE

The Adelie is one of just two species of penguin that winters in Antarctica. It breeds in enormous colonies containing hundreds of thousands of birds.



PENGUINS AT SEA

Although awkward on land, penguins are superb swimmers, using their wings as underwater flippers. When resting, they float low on the surface, with heads and tails raised, but when hunting they dive. Dives typically last less than a minute but, in the case of Emperor Penguins, they may last for 10 minutes. Emperors can dive to depths of 500m (1,650ft) although they usually hunt closer to the surface. To move at speed, many larger penguins periodically leap clear of the surface – behaviour known as porpoising. This covers their plumage with a layer of friction-reducing bubbles, allowing them to reach speeds of over 25kph (16mph). Adelie Penguins also make spectacular leaps from the water to land on ice or rocks.

FEEDING

In the wild, penguins never feed on land – instead, all their food is caught live at sea. Their eyes work better underwater than in the air, allowing them to pursue their prey by sight. The largest penguins feed on fish and squid, while smaller ones take shrimps and krill. All penguins have spiny tongues, which help them to grip their catch. The food intake of large colonies is enormous: at the height of the breeding season, Adelie Penguins in the South Orkneys are estimated to eat 9,000 tonnes of small fish and krill a day. However, compared to other birds, penguins can go for long periods without eating. Most penguins are forced to fast when they moult, and some also fast during incubation. During this time, they live off their body fat.



DIVING FOR FOOD

Group hunting in shallow water, Galapagos Penguins burst through a shoal of fish. Despite their plump shape, penguins are agile underwater, banking and swerving as they chase their prey.



SWIFT SWIMMER

Head horizontal, a King Penguin speeds through water, propelled by its wings, with webbed feet acting as rudders. Heavy bones help reduce buoyancy.

BREEDING

Penguins are highly social birds, and many species gather in large colonies to breed. These colonies tend to be at fixed sites and archaeological evidence shows that, in some cases, the same sites have been used for thousands of years. The largest colonies are formed by Adelie Penguins: one of the biggest, at Cape Adare in Eastern Antarctica, contains about a million birds. Adelies nest on rocky shores, and gather stones to make rudimentary nests. However, a number of other species nest in burrows. Penguins in the genus *Spheniscus*, such as the Magellanic and Jackass Penguins, occupy their burrows during the breeding season only, but Fairy Penguins live in theirs all year round, coming back to shore only after dark. Emperor and King Penguins make no nest at all. Instead, the single egg is incubated on a parent's feet, and kept warm by a fold of skin. The majority of penguins lay their eggs in late spring or early summer, so that their chicks are fledged and ready to go to sea before the winter begins. However, with Emperor and King Penguins, the incubation and fledging period is too long for this to work. Instead, Emperors incubate their eggs throughout the winter, while King Penguins have one of the strangest breeding cycles in the bird world. They have two egg-laying periods, and they alternate between them, producing two young every three years.



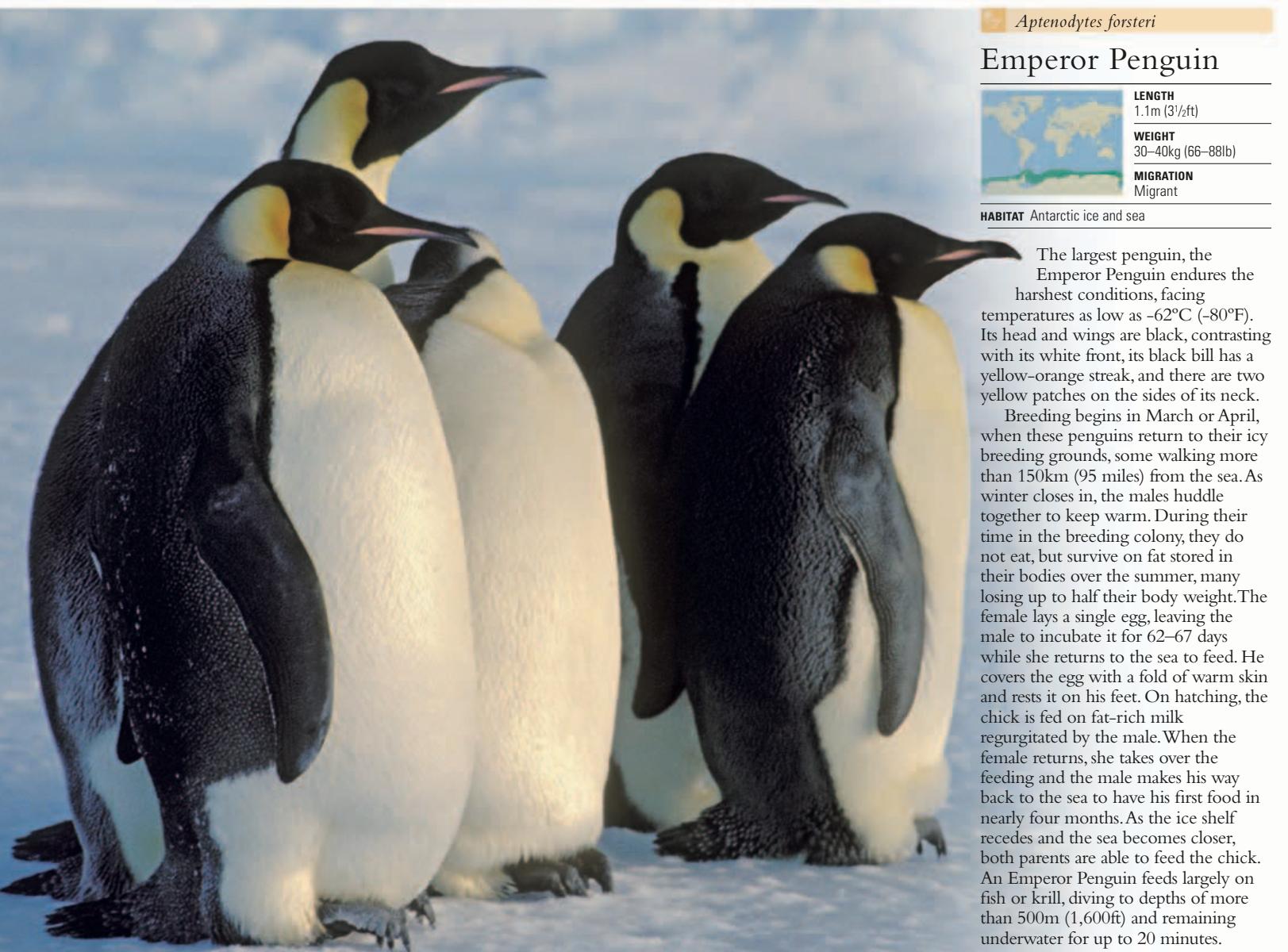
NESTING IN BURROWS

Magellanic Penguins and their relatives nest in burrows on isolated coasts. They lay two eggs, but often only one chick survives.



PENGUIN CRECHES

Seen in summer, this colony of King Penguins consists of adults, and fully grown chicks still with their brown natal down. Chicks remain in creches until they have moulted and grown adult plumage.

*Aptenodytes forsteri***Emperor Penguin****LENGTH**
1.1m (3½ft)**WEIGHT**
30–40kg (66–88lb)**MIGRATION**
Migrant**HABITAT** Antarctic ice and sea

The largest penguin, the Emperor Penguin endures the harshest conditions, facing temperatures as low as -62°C (-80°F). Its head and wings are black, contrasting with its white front, its black bill has a yellow-orange streak, and there are two yellow patches on the sides of its neck.

Breeding begins in March or April, when these penguins return to their icy breeding grounds, some walking more than 150km (95 miles) from the sea. As winter closes in, the males huddle together to keep warm. During their time in the breeding colony, they do not eat, but survive on fat stored in their bodies over the summer, many losing up to half their body weight. The female lays a single egg, leaving the male to incubate it for 62–67 days while she returns to the sea to feed. He covers the egg with a fold of warm skin and rests it on his feet. On hatching, the chick is fed on fat-rich milk regurgitated by the male. When the female returns, she takes over the feeding and the male makes his way back to the sea to have his first food in nearly four months. As the ice shelf recedes and the sea becomes closer, both parents are able to feed the chick. An Emperor Penguin feeds largely on fish or krill, diving to depths of more than 500m (1,600ft) and remaining underwater for up to 20 minutes.

MALE EMPEROR PENGUINS*Aptenodytes patagonicus***King Penguin****HABITAT** Subantarctic islands, free from ice; breeds on sloping beaches

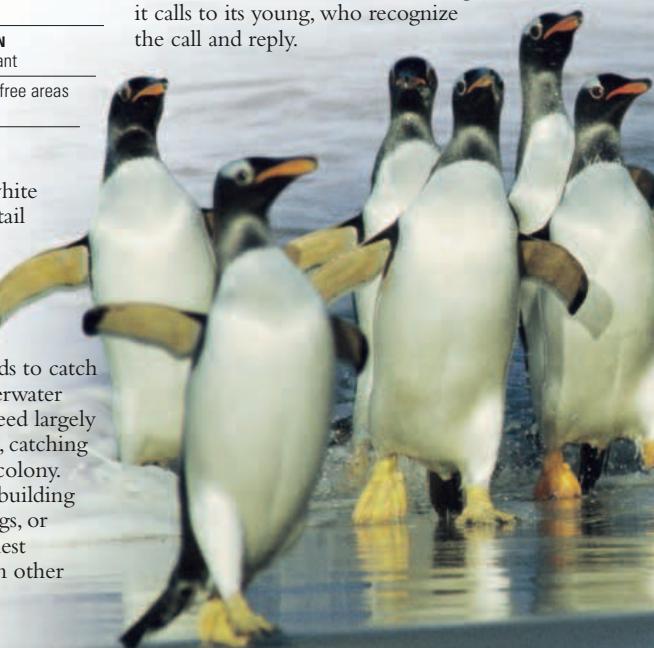
Smaller than the Emperor Penguin (above), the King Penguin has a silver-grey back, black head, and bright orange ear patches. Its streamlined shape and powerful flippers enable it to pursue fish and it may dive more than 100 times a day to feed.

The species lives in large colonies, some numbering tens of thousands of pairs. It has the longest breeding cycle of any penguin. Adults rear only two chicks every three years. The single egg is incubated by both parents in turn until it hatches after about 55 days. This chick remains with its parents for over a year and chicks of very different ages can be found at the same colony.

*Pygoscelis papua***Gentoo Penguin****HABITAT** Subantarctic islands and ice-free areas on the Antarctic Peninsula

The Gentoo Penguin has a distinctive orange bill and white head patch. It has long, stiff tail feathers, which are prominent when it walks or swims. Gregarious at sea, these penguins move in groups of up to several hundred birds to catch prey and are the fastest underwater swimming penguins. They feed largely on krill, and some small fish, catching them close to the breeding colony. They live in small colonies, building circular nests of pebbles, twigs, or seaweed. The male gathers nest material, often taking it from other

nests. The female lays two eggs and both parents incubate and feed the chicks. The young chicks gather with others into groups or crèches, which helps to keep them warm and protects them from predators. When an adult returns from feeding, it calls to its young, who recognize the call and reply.

**PAIR OF KING PENGUINS**

Pygoscelis adeliae

Adelie Penguin



LENGTH	70cm (28in)
WEIGHT	5kg (11lb)
MIGRATION	Migrant

HABITAT Ice-free Antarctic shores with sandy beaches and accessible rocky areas

The smallest of the Antarctic penguins, the Adelie Penguin has a black back and head and white-ringed eyes. When it swims fast, it breaks the water surface and shoots through the air to dive and then surface again, rather like a porpoise. It is among the most southerly breeding of bird species. After the breeding season, it leaves its colony and disperses northwards, up to 600km (375 miles) away, returning in spring. The noisy colonies are filled with the birds' raucous calls. The parents incubate their two eggs in shifts of 11–17 days so that one of them is free to feed.

JUMPING ONTO ICE

Adelie Penguins frequently jump onto ice floes in groups. They swim very fast up to the edge of the floe and leave the water in a leap that can take them about 1m (3½ft) into the air, making them look as if they are flying.



GROUP OF ADELIE PENGUINS



GENTOO PENGUINS AT THE WATER'S EDGE

*Eudyptes chrysophrys*

Macaroni Penguin



LENGTH	71cm (28in)
WEIGHT	4.5kg (10lb)
MIGRATION	Migrant

HABITAT Subantarctic islands with rocky slopes and beaches

RED LIST CATEGORY Vulnerable

Distinguished by its crest of yellow plumes and its large, orange-brown bill, the Macaroni Penguin is the world's most common penguin, with at least nine million pairs, but in the last 36 years its population has reduced by at least 30 per cent. It breeds in large colonies, and a few small groups have been established on the Antarctic Peninsula, usually within colonies of other penguin species. Larger than its relative, the Rockhopper Penguin (left), the Macaroni Penguin walks rather than hops. The female lays two eggs, but usually only the larger second one hatches successfully. Adults take turns in looking after the eggs or chicks in shifts.

ADULT MACARONI PENGUIN

*Megadyptes antipodes*

Yellow-eyed Penguin



LENGTH	66cm (26in)
WEIGHT	5.5kg (12lb)
MIGRATION	Non-migrant

HABITAT Dunes and coastal forests

RED LIST CATEGORY Endangered

Named for its bright yellow eyes, this penguin has a yellow band stretching from its eyes to the back of its head and a stout reddish purple bill. The world's rarest penguin, numbering as few as 5,000 birds, it is found only in New Zealand. Its population has been declining due to habitat loss and natural predators. It is the most retiring of the penguins, each pair nesting well away from other birds. Unlike some other northern penguins, it does not breed in burrows, but uses the cover of forests and other dense vegetation to keep out of the sun. Young females only lay one egg, while older birds lay two.

JUVENILE YELLOW-EYED PENGUIN



**KING PENGUIN**

Penguins move with far more ease and grace in water than on land. Diving in search of fish and squid, King Penguins occasionally reach depths of 200m (650ft).

Eudyptula minor

Fairy Penguin



LENGTH	40–45cm (15½–17½in)
WEIGHT	0.5–2kg (1–4½lb)
MIGRATION	Non-migrant

HABITAT Coasts and offshore islands; breeds in burrows in dunes and vegetated slopes

The smallest of the penguins, the Fairy Penguin has dark blue-grey upperparts and white underparts. It is further distinguished in being the only penguin that can lay two clutches of eggs a year, incubating them for just over a month. The chicks remain in their nest burrows for about two months, with both adults bringing food. When the chicks are almost ready to fledge, the adults visit the burrow only at night. The young do not breed until they are two years old, and like adults, they remain in close proximity to the sea.

The Fairy Penguin is found on the southern coast of Australia, New Zealand, and the Chatham Islands. Its population appears to be stable, although known threats include human disturbances and predation by introduced animals.

Spheniscus demersus

Jackass Penguin



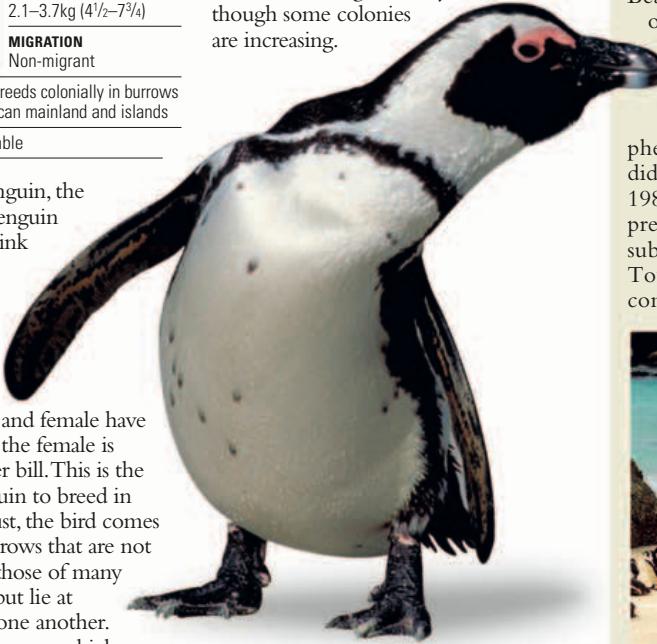
LENGTH	60–70cm (23½–28in)
WEIGHT	2.1–3.7kg (4½–7¾lb)
MIGRATION	Non-migrant

HABITAT Onshore islands; breeds colonially in burrows on rocky ground on the African mainland and islands

RED LIST CATEGORY Vulnerable

A medium-sized penguin, the Jackass, or African, Penguin has a patch of bare pink skin in front of and around the eye, all-black upperparts, and a narrow black band across the otherwise white underside. The male and female have similar plumage, but the female is smaller with a shorter bill. This is the only species of penguin to breed in Africa. In early August, the bird comes ashore to nest in burrows that are not densely packed like those of many Antarctic penguins, but lie at some distance from one another. Most females lay two eggs, which are incubated by both parents, and hatch

in about 5 or 6 weeks. The adults feed the young, which take 2–4 months to fledge, bringing anchovies and other schooling fish to the burrow. As a result of food shortages, oil spillages, and environmental changes, their numbers have declined significantly, though some colonies are increasing.



ADULT JACKASS PENGUIN

GREAT SITES

BOULDERS BEACH

Initially chosen by just a single pair of Jackass Penguins, the Boulders Beach penguin colony (one of only two in mainland South Africa), near the Cape of Good Hope, South Africa, has grown to include over 900 pairs. It is a recent phenomenon, as these penguins did not nest in the area before 1985. The birds suffer no predation as they nest close to the suburban dwellings of Simon's Town and there is no large-scale commercial fishing in the area.



Spheniscus magellanicus

Magellanic Penguin



LENGTH	70cm (28in)
WEIGHT	2.3–8kg (5½–18lb)
MIGRATION	Partial migrant

HABITAT Cold, temperate water; breeds on the mainland or islands, in burrows on slopes

The Magellanic Penguin has pink skin around the eye that reaches down to the bill and two dark breast-bands. It has a black to brown back and a white

GROUP OF ADULTS



chest with black spots. The Magellanic Penguin principally feeds on small crustaceans and fish, which are caught underwater. Since it takes in sea water as well, along with its prey, it has a salt-excreting gland which has evolved to filter out the salt. Appearing ungainly and comical on land, in the water it is an extremely capable swimmer and can swim for long distances. It uses its wings like paddles to propel itself.

Like all penguins, it is gregarious and monogamous. Breeding commences in early spring, when adults come to the shore to

nest in loose colonies. Although the species has not (yet) been recorded in Africa, vagrants have reached as far as Australia. Some birds have been known to migrate as far north as Brazil in winter.

Spheniscus mendiculus

Galapagos Penguin



LENGTH	53cm (21in)
WEIGHT	1.7–2.1kg (3½–4½lb)
MIGRATION	Non-migrant

HABITAT Tropical water; breeds in loose colonies in burrows and crevices on islands

RED LIST CATEGORY Endangered

A thin white stripe from the eye to the chin and a black band around its chest distinguish the Galapagos Penguin from other penguins. The only one of the world's penguins to breed in the tropics, the Galapagos Penguin defies the common perception of penguins as creatures of snow and ice. It is not migratory and stays in coastal water, feeding on small tropical fish, such as sardines and crustaceans.



ADULT GALAPAGOS PENGUIN

DIVERS

ORDER Gaviiformes
FAMILY 1
SPECIES 5

REOWNED FOR THEIR FAR-CARRYING CRIES, this is a small order of fish-eating birds of the northern hemisphere. They breed in remote lakes scattered across the northern forests and Arctic tundra. They have sleek, streamlined bodies, with dagger-like bills and, during the breeding season, all but one species have striking black and white markings across their backs. These are agile on land and in water, and fly well, despite having the smallest wing to weight ratio of any flying bird. With feet set far back towards their tails, they are ungainly on land.

ANATOMY

Even from a distance, divers are easy to recognize, as they have a characteristically low profile in the water, and often hold their bills with an upward slant. They have long bodies with thick necks, and they propel themselves with their large webbed feet. These are positioned almost at the end of the body, like propellers on a ship's stern. Uniquely among birds, only their ankles and feet protrude from the body, which gives them a slow, shuffling gait on land. These birds can adjust their buoyancy by altering the amount of air trapped in their plumage. They also have heavy bones, which makes it easier for them to dive.



Gavia arctica

Black-throated Diver



LENGTH
63–75cm (25–30in)

WEIGHT
2.5–3.5kg (5½–7¾lb)

MIGRATION
Migrant

HABITAT Breeds on islands in freshwater lakes; winters at sea

The summer plumage of the Black-throated Diver (or Loon) is distinguished by its black throat and grey head. It has delicate white spotting on the back and inner wings and narrow black and white

ADULT IN SUMMER PLUMAGE

vertical stripes on the neck. It lacks the distinctive dark collar of the breeding-plumaged Great Northern Diver (right). In winter, the bird is principally grey above and white below. It utters desolate but evocative cries during the spring courtship period, shortly after returning to its breeding lake, but is silent for the rest of the year. It mainly feeds on fish, such as herring, and can remain submerged for a long time,

reappearing some distance from where it initially dived. Its nest is a low mound of aquatic vegetation next to the water.



HEAD UP

In its breeding plumage, a Black-throated Diver shows the striking markings typical of this group of birds. Males and females look identical.

BEHAVIOUR

Divers are migratory, breeding on freshwater and wintering on coasts. They feed mainly on fish, and dive for several minutes at a time to depths of 50m (160ft) or more. In winter, they feed in groups, close to the shore, but they become highly territorial during the breeding season, forming long-lasting monogamous pairs.

Pairs may return to the same lake each year. After elaborate courtship rituals, they nest by the water's edge, often on small islands where they are more secure. Their young are well developed on hatching, and immediately take to the water, where the parents feed them for several weeks.



PARENTAL PROTECTION

A young Red-throated Diver swims alongside a parent. The young peck at insects and other animals near the surface, but it takes many weeks to develop diving skills.

Gavia immer

Great Northern Diver

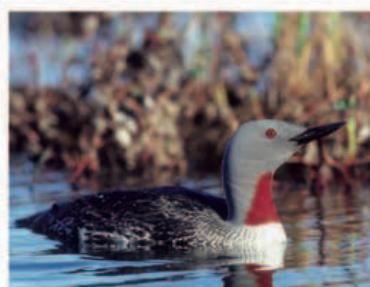


LENGTH
73–88cm (29–35in)

WEIGHT
4.5–5.5kg (10–12lb)

MIGRATION
Migrant

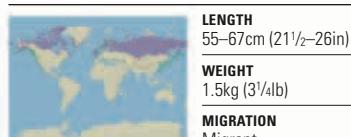
HABITAT Breeds on islands in deep lakes and coastal bays within treeless tundra; winters at sea



ADULT IN BREEDING PLUMAGE

Gavia stellata

Red-throated Diver



LENGTH
55–67cm (21½–26in)

WEIGHT
1.5kg (3½lb)

MIGRATION
Migrant

HABITAT Breeds on small lakes, even pools, in tundra regions; winters at sea

This is one of the most northerly of all aquatic birds. The smallest of its family, the Red-throated Diver (or Loon) has a distinctive breeding plumage, with a grey head, red throat, and white underparts. In winter, it moults to a dowdy grey and white garb. It has red eyes, and its bill is narrower than those of other divers and is usually tilted slightly upwards. It is a fish-eater, diving to 7.5m (25ft) to catch its prey.



BREEDING ADULT

ALBATROSSES AND PETRELS

ORDER Procellariiformes

FAMILY 4

SPECIES 107

OFTEN FOUND FAR OUT TO SEA, and capable of staying on the wing for months at a time, albatrosses and their relatives are the most far-roaming of the world's seabirds. The largest albatrosses have the biggest wingspans of all birds,

but this order also includes shearwaters and storm petrels, some of which are not much bigger than sparrows. A key feature that unites all these birds is their large, tubular, external nostrils – a sign of their unusually good sense of smell. Collectively known as "tubenoses", they typically pluck their food from the surface of the water, travelling enormous distances to feed and to breed.

ANATOMY

Albatrosses are unmistakable birds with large bills and long narrow wings. Instead of beating their wings, they hold them out stiffly and fly by dynamic soaring – a form of flight that exploits strong winds blowing close to the surface of the sea. Other members of this group – particularly shearwaters and petrels – are much smaller, but have the same stiff-winged flight. Completely in their element at sea, tubenoses are often clumsy once they land. Albatrosses and large petrels stand upright on webbed feet, but shearwaters and storm petrels cannot raise their ankles off the ground. As a result, they shuffle rather than walk. This makes them vulnerable to predators, but they can defend themselves by ejecting a strong-smelling stomach oil, which can travel 1m (3ft) or more. As well as having long nostrils, tubenoses have sharp, hook-tipped bills – an adaptation that helps them to snatch up slippery food. In anatomy and behaviour, diving petrels differ from the rest of the group. They have smaller wings and use them to swim underwater, sometimes flying straight through the waves.

WIDESPREAD WINGS

Often mistaken for gulls, Northern Fulmars fly with wings held out stiffly – a characteristic shared by other tubenoses. Unlike gulls, they rarely wander inland.



BEHAVIOUR

Most tubenoses feed at sea, guided by their excellent sense of smell. Their diet includes fish, jellyfish, and small crustaceans, but albatrosses and fulmars are also dedicated ship-followers,

scavenging waste that is thrown overboard. This scavenging lifestyle is even more marked in giant petrels, which feed on the dead remains of marine mammals, as well as preying on other seabirds and their chicks. Storm petrels also follow ships, but their method of feeding is unique: instead of snatching food while in flight, they patter over the sea's surface with their feet, pecking while fluttering their wings. All tubenosed birds are great

travellers, often dispersing thousands of kilometres from their nesting sites after breeding. Some species – including the Wandering Albatross – roam over vast areas of the ocean, wherever favourable winds and food happen to coincide. Albatrosses take many years to become adult and, before they land to breed, those that live in the Southern Ocean may circle the Earth several times. By contrast, many smaller tubenoses have more clear-cut annual migration routes. Manx Shearwaters breed in the North Atlantic, but spend the winter as far south as the seas off Argentina. The Short-tailed Shearwater flies even farther, leaving its breeding grounds near Tasmania and circling the entire North Pacific before heading home – a journey of at least 32,000km (20,000 miles).



SURFACE FEEDING
An Elliot's Storm Petrel appears to walk on the water as it feeds, although it is actually supported by the flutter of its wings.

BREEDING

Tubenoses are long-lived, and reproduce more slowly than other seabirds of their size. They breed in colonies on remote cliffs and islands and typically lay a single egg a year, although Wandering Albatrosses breed only one year in two.

Albatrosses and fulmars nest in the open, but many of the smaller tubenoses nest in burrows, often in vast numbers, and do not come ashore until after dark. Incoming birds find their burrows by listening for their partners' calls, and the air is filled with a bizarre chorus from underground. Tubenose chicks are usually fed by both parents, and often become heavier than the adults on their diet of oily fish. In many species, the adults finally abandon the chick, leaving it to make its own way to the sea.

REUNITED

A Black-browed Albatross tends a solitary chick. The young may be left for days at a time while parents search the Southern Ocean for food.



TUBENOSES

This Southern Giant Petrel clearly shows the long tubular nostrils that are typical of albatrosses and their ocean-wandering relatives.

Phoebetria fusca

Sooty Albatross

**LENGTH**

84–89cm (33–35in)

WEIGHT

1.8–3kg (4½–6½lb)

MIGRATION

Migrant

HABITAT Open ocean or sea; breeds only on cliffs and slopes on remote islands

Evenly dark brown in colour, the plumage of the Sooty Albatross is relieved only by white shafts at the tips of the wings. It has long, broad wings, a long, diamond-shaped tail, and grey feet. It has more solitary nesting habits than other members of its family. As with most albatrosses, the male and female form a life-long bond, and a pair breeds every two years. In the breeding season, a cone-shaped nest is made and a single egg is laid. Both the male and female undertake incubation and bring food for the young. This species now faces the twin threats of longline fisheries and introduced predators.

Thalassarche melanophrys

Black-browed Albatross

**LENGTH**

80–96cm (31–38in)

WEIGHT

2.9–4.6kg (6½–10lb)

MIGRATION

Migrant

HABITAT Open ocean or sea; breeds only on bare rocky areas and slopes on islands**RED LIST CATEGORY** Endangered

The Black-browed Albatross takes its name from the tiny dusky mark running through the eye. It is mostly white with grey highlights. It has yellowish orange webbed feet and an orange bill, tipped darker orange. It flies for hours over the sea, looking for fish, krill, cephalopods, salps, and jellyfish. Unlike many albatrosses, it breeds annually. It nests on terraces

on top of coastal cliffs or steep slopes up to 300m (985m) above sea level. Once, one of the most common and widespread of the smaller species of albatrosses (collectively known as mollymawks), this species has declined dramatically in recent years due to overfishing and longline fisheries.

ADULT BLACK-BROWED ALBATROSS*Diomedea immutabilis*

Laysan Albatross

**LENGTH**

81cm (32in)

WEIGHT

2.4–3.8kg (5½–8¾lb)

MIGRATION

Migrant

HABITAT Open ocean or sea; breeds only on low coral or sandy islands**RED LIST CATEGORY** Vulnerable

An albatross that is almost entirely restricted to the Hawaiian islands during its breeding season, the Laysan Albatross was discovered as recently as the 1890s. Locally known as a "gooney" in Hawaii, it has a white

head, neck, and underparts, while its mantle and upperwings are black. It feeds mainly on squid.

A monogamous bird, the Laysan Albatross breeds in October, when it makes a nest of grass and shrubbery piled into a large mound; only a single egg is laid. The Laysan Albatross faces various threats, including rats on land and Tiger Sharks that feed on fledglings in its breeding lagoons.

ADULT LAYSAN ALBATROSS*Diomedea epomophora*

Royal Albatross

**LENGTH**

1–1.2m (3½–4ft)

WEIGHT

6.5–10kg (14–22lb)

MIGRATION

Migrant

HABITAT Open ocean or sea; breeds on islands and mainland**RED LIST CATEGORY** Vulnerable

Mainly white in colour, with black wing-tips, the magnificent Royal Albatross breeds every two years on islands in the New Zealand subantarctic region, with half the population returning to the colony in

**ADULTS IN COURTSHIP DISPLAY**

any given year. When not breeding, these birds fly over the sea as far afield as the south Atlantic and southern Chile. Until recently, Royal Albatrosses were considered as a single species, but some ornithologists now treat them as two: the northern and southern species.

Diomedea exulans

Wandering Albatross

**LENGTH**

1.1–1.4m (3½–4½ft)

WEIGHT

6.5–11.5kg (14–25lb)

MIGRATION

Migrant

HABITAT Open ocean or sea; breeds only on bare ground in valleys and plains on islands**RED LIST CATEGORY** Vulnerable**ADULT WANDERING ALBATROSS**

The majestic Wandering Albatross appears equally at home in gigantic seas and fierce storms and in calm conditions. The adult male is mostly white, with black-tipped wings and tail, and a pink bill and feet. The female is slightly browner. The juvenile is chocolate-brown with a white face mask and underwing, but it becomes whiter with age. Pairs mate for life and breed every two years. The nest is a mound of

mud and vegetation, and is placed on an exposed ridge near the sea. Capable of flying huge distances in search of food for its young, the Wandering Albatross is the largest flying bird in the world, with a wingspan stretching to 3m (9¾ft).

It feeds mainly on the surface of water, primarily on squid. It also congregates in large numbers to follow trawlers and snatch scraps in their wake.

HUMAN IMPACT**THREAT FROM LONGLINE FISHING**

Long lines with hundreds of baited hooks are used by fisheries to catch tuna and Patagonian toothfish. These also attract large numbers of seabirds, including albatrosses, which drown after becoming ensnared on the hooks. The Wandering Albatross is facing extinction because of this method of fishing.



GREAT SITES

SOUTH GEORGIA



LOCATION South Atlantic Ocean, approximately 1,390km (860 miles) southeast of the Falkland Islands.



One of the bleakest and most isolated wildernesses on Earth, this small and mountainous group of islands lies where the south Atlantic meets the often stormy Southern Ocean. The archipelago is a haven for an extraordinary density of wildlife, including around 30 million breeding birds. South Georgia attracts such magnificent gatherings of seabirds for two reasons. First, there are plenty of safe nesting sites: wide beaches, sea cliffs, steep slopes covered with hummocks of coarse tussac grass, and rocky offshore islets. Second, the archipelago is surrounded by cold waters rich in fish, krill (tiny crustaceans), and other forms of marine life, which provide an abundant supply of food for the adult birds and their chicks.

WHAT TO SPOT



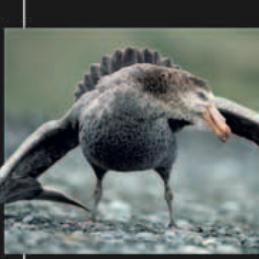
ANTARCTIC TERN
Sterna vittata
(see p.238)



BLACK-BROWED ALBATROSS
Thalassarche melanophrys
(see p.145)



SUBANTARCTIC SKUA
Stercorarius antarcticus



SOUTHERN GIANT PETREL
Macronectes giganteus
(see p.148)

BIRD SPECIES

BIRD-RICH WILDERNESS

South Georgia is largely uninhabited. The island's only visitors are the crews of passing fishing vessels and the tourists who arrive by sea, mostly between December and March during the southern summer, when the seabird breeding season is well under way.

Probably the most impressive seabird seen at South Georgia is the Wandering Albatross, which has the largest wingspan of any bird. Up to 4,000 pairs nest here – 15 per cent of the world population. There are also 100,000 breeding pairs of Black-browed Albatrosses and 80,000 pairs of Grey-headed Albatrosses. Many of these species of albatross are in decline, so South Georgia is vitally important to their conservation.

A wide variety of smaller "tubenoses" breed on South Georgia, including petrels, storm petrels, diving petrels, and prions. Cape Petrels nest on high rock ledges on the coast. Antarctic Terns make their nesting scrapes among rocks or on beaches. South Georgia is also home to vast colonies of penguins, particularly King, Macaroni, and Gentoo Penguins. A single hillside on Bird Island (off the main island of South Georgia) is the breeding ground for 35,000 of the archipelago's two million pairs of Macaroni Penguins.

Only few land birds can survive on South Georgia's rugged terrain. They include Yellow-billed Pintail and the island's only endemic species – the

South Georgia Pipit, which is under threat from introduced rats.

CLIFF-TOP NURSERY

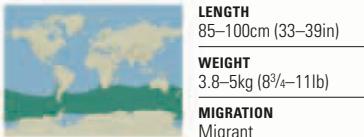
The precipitous, tussac-grass-covered sections of coastline on South Georgia and neighbouring Bird Island provide popular nest sites for the Grey-headed Albatross.





Macronectes giganteus

Southern Giant Petrel



HABITAT Open ocean and sea; breeds on exposed beaches, gravel areas, and tussock grass

RED LIST CATEGORY Vulnerable

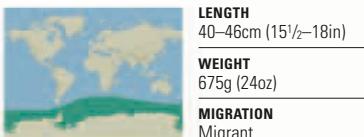
The Southern Giant Petrel occurs in two forms: one is largely dark brown with a white head and neck, and the other, which is less common, is completely white, except for a few scattered dark feathers. Large and aggressive, this bird is a scavenger, detecting food by smell, and feeding on penguin and seal carcasses. It also kills live birds and often gathers near trawlers and sewage outfalls. Like many albatrosses, its decline may be linked to longline fishing.



ADULT SOUTHERN GIANT PETREL

Thalassarche antarctica

Antarctic Petrel



HABITAT Open ocean and sea; breeds on snow-free surfaces on steep slopes and cliffs

The beautiful white and grey-brown Antarctic Petrel is one of the few birds restricted to the Antarctic continent in the breeding season. Its colonies, inhospitable to others, provide one of its main safeguards. It is highly gregarious, both at sea and on land, sometimes congregating in large numbers around trawlers and feeding with whales and dolphins.



ADULT BIRD



NORTHERN FULMARS FEEDING

Fulmarus glacialis

Northern Fulmar



HABITAT Open ocean and sea; breeds in burrows and cliff ledges, on headlands, islands, and buildings

The Northern Fulmar is distinguished by its tubular bill, with its large, raised nasal tubes, its thick neck, and a large head. There are two colour forms: the more southerly light-coloured form has a yellowish white head and breast, and grey back and wings. In the north of the range, the species has blue upperparts.

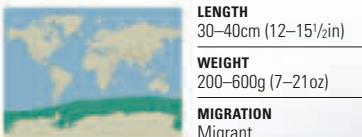
It feeds mainly on fish offal from trawlers – large numbers follow fishing fleets – as well as small fish,

jellyfish, and squid. Unlike many tubenose seabirds, this bird does not make long migrations and is among the first species to return to its breeding colony. The Northern Fulmar generally prefers flatter ground for its nest site than many other species in this family.

This species is a conservation success story, in that it has colonized new sites, even nesting in buildings, and the population is increasing.

Pagodroma nivea

Snow Petrel



HABITAT Open ocean and sea; breeds on cliffs and slopes, in crevices and under boulders

Popularly known as the “angel of Antarctica” for its beauty, the Snow Petrel has pure white plumage and contrasting black eyes and bill. It feeds mainly on krill, staying close to the sea to search for food. Often seen in flocks on icebergs, it ranges north in the Southern Ocean outside the breeding season and is partly nocturnal. An unusual habit is that the young of the Snow Petrel do not return to breed in their original colony.

NESTING IN ANTARCTICA

Breeding farther from the sea than any other bird in Antarctica, up to 300km (185 miles) inland, the Snow Petrel arrives at its nesting colony from October onwards and lays a single egg, which is incubated for about 50 days. However, breeding is affected by snowfall. These birds are unable to breed if their nest-sites are frozen.



ADULT SNOW PETREL



Pachyptila desolata

Antarctic Prion



LENGTH
25–27cm (10–10½in)

WEIGHT
95–225g (3½–8oz)

MIGRATION
Migrant

HABITAT Open ocean and sea; breeding only in burrows on islands

One of the rarest of the prions, with a population estimated at fewer than 100,000 pairs, the Antarctic Prion is under threat from predators, such as rats, cats, and even rabbits, and large-scale harvesting of krill, its main food. The species has blue-grey upperparts, white underparts, and black markings on its wings and tail. The adult nests in burrows, which it excavates itself and the single egg is incubated by both the male and female.

ADULT ANTARCTIC PRION



Pachyptila turtur

Fairy Prion



LENGTH
23–28cm (9–11in)

WEIGHT
90–175g (3¼–6oz)

MIGRATION
Migrant

HABITAT Open ocean and sea; breeds only in rocky crevices and burrows on islands

The six to seven species of prion are all found in the Southern Ocean, but are rarely identifiable at sea. The Fairy Prion is small, with a short bill, a grey crown, an indistinct face pattern, and a broad tail-band. It has richer blue upperparts than most other prions. Like all prions, it is gregarious both on land and at sea, and is highly colonial.



FAIRY PRION PATTING THE WATER

It only returns to its colony at night and is very vocal. The Fairy Prion feeds mainly on small crustaceans and small fish, which it catches by patting the water with its feet and then seizing the prey with its bill. It usually feeds at night.

Pterodroma cookii

Cook's Petrel



LENGTH
25–30cm (10–12in)

WEIGHT
150–200g (5–7oz)

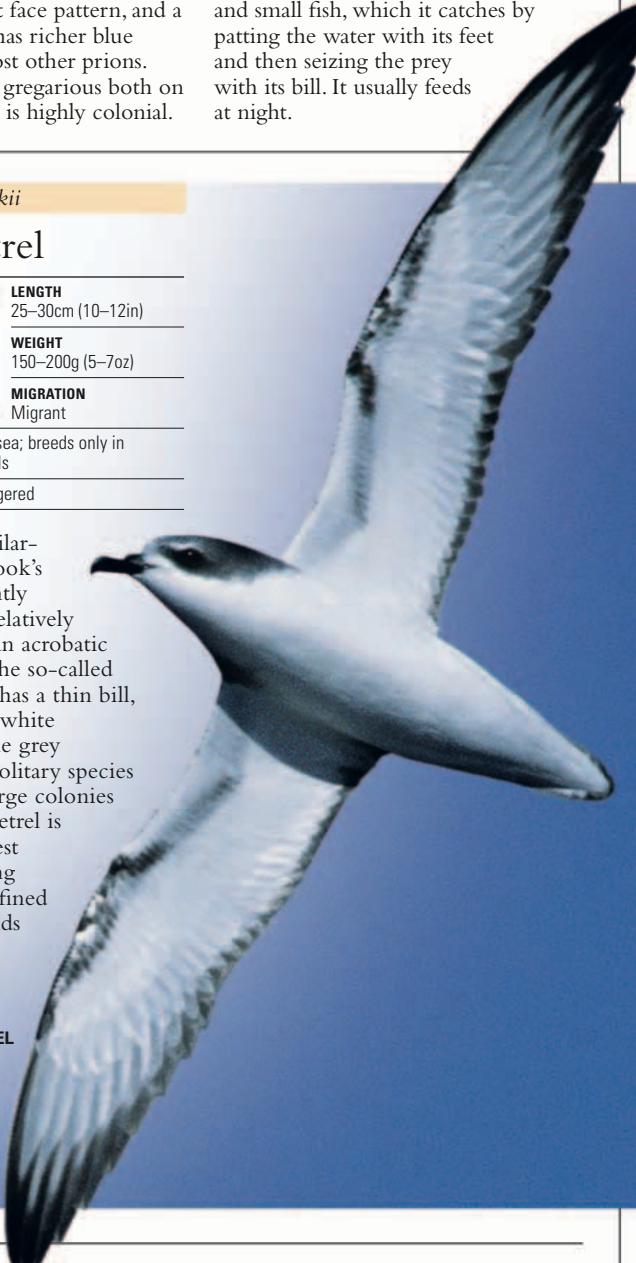
MIGRATION
Migrant

HABITAT Open ocean and sea; breeds only in burrows on forested islands

RED LIST CATEGORY Endangered

One of several similar-looking species, Cook's Petrel is consequently hard to identify. Relatively small in size with an acrobatic flight, it is one of the so-called "gadfly" petrels. It has a thin bill, a pale grey crown, white underparts, and pale grey upperparts. It is a solitary species at sea, but forms large colonies on shore. Cook's Petrel is also one of the rarest seabirds, its breeding grounds being confined to a few small islands off the south and north ends of New Zealand.

ADULT COOK'S PETREL



Pterodroma cahow

Cahow



LENGTH
38cm (15in)

WEIGHT
250g (9oz)

MIGRATION
Migrant

HABITAT Open ocean and sea; breeds in burrows on islets

RED LIST CATEGORY Endangered

One of the "gadfly" petrels (named after their remarkably acrobatic flight), the Cahow, or Bermuda Petrel, was feared extinct for over 300 years, prior to its rediscovery in 1935. The world population currently numbers about 200 birds. This continues to increase slowly on Bermuda's Nonsuch Island due to a strong local protection scheme that closely monitors the birds' breeding success. The Cahow has a dark head, mostly greyish brown upperparts and white underparts, and a pale band at the base of the tail.

Daption capense

Cape Petrel

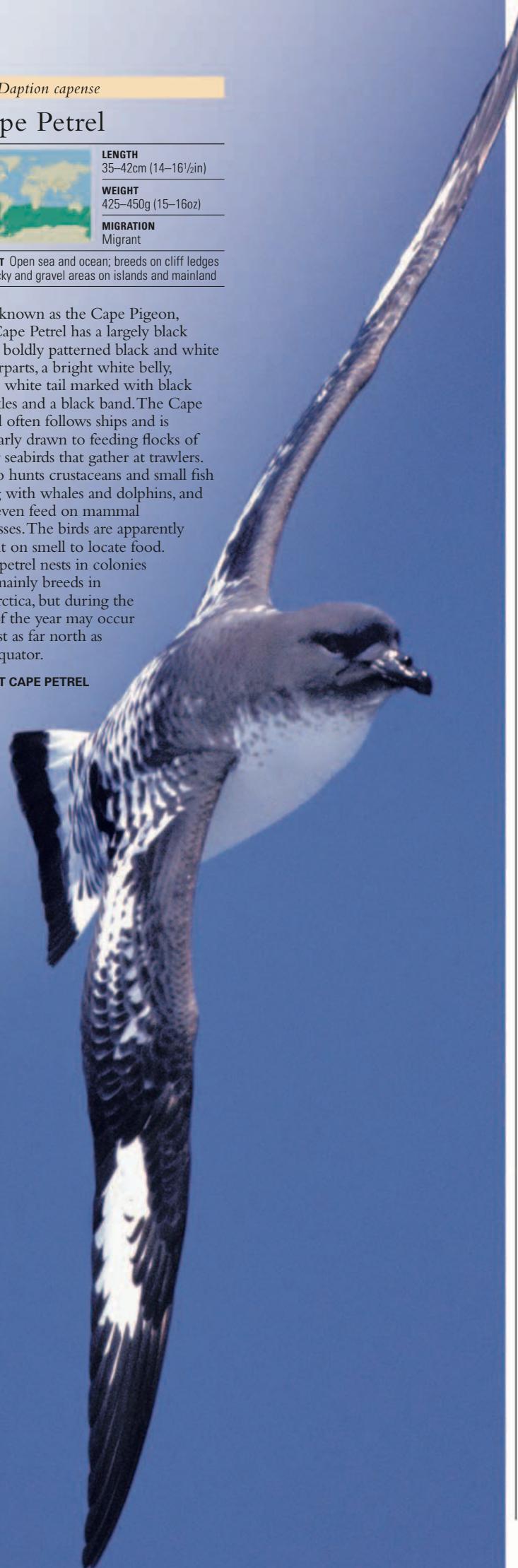


LENGTH	35–42cm (14–16½in)
WEIGHT	425–450g (15–16oz)
MIGRATION	Migrant

HABITAT Open sea and ocean; breeds on cliff ledges and rocky and gravel areas on islands and mainland

Also known as the Cape Pigeon, the Cape Petrel has a largely black head, boldly patterned black and white upperparts, a bright white belly, and a white tail marked with black speckles and a black band. The Cape Petrel often follows ships and is regularly drawn to feeding flocks of other seabirds that gather at trawlers. It also hunts crustaceans and small fish along with whales and dolphins, and will even feed on mammal carcasses. The birds are apparently reliant on smell to locate food. This petrel nests in colonies and mainly breeds in Antarctica, but during the rest of the year may occur almost as far north as the equator.

ADULT CAPE PETREL

Calonectris diomedea

Cory's Shearwater



LENGTH	45–56cm (17½–22in)
WEIGHT	600–1,000g (21–36oz)
MIGRATION	Migrant

HABITAT Open sea and ocean; breeds in burrows or crevices, usually on islands

ADULT CORY'S SHEARWATER

Puffinus griseus

Sooty Shearwater



LENGTH	40–46cm (15½–18in)
WEIGHT	650–950g (23–34oz)
MIGRATION	Migrant

HABITAT Open sea and ocean; breeds in self-excavated burrows on islands and the mainland

With a population of over 20 million pairs worldwide, the Sooty Shearwater is one of the most numerous and gregarious of the tubenose petrels. It is stocky and short-necked, with dark brown plumage. It has long, slender, dark wings with silvery grey underwing feathers (some may have a white underwing lining). Its colonies are tightly packed, visited only at night to avoid predators, and characterized by a cacophony of sound at the height of the breeding season. It is highly social, both at sea (when feeding or on migration) and on land. Both adults and the young learn to distinguish calls in order to locate one another in the dark.

ADULT SOOTY SHEARWATER

Like most petrels, the Sooty Shearwater is not territorial, except in the immediate vicinity of its burrow. The nest burrow is at least partially concealed by vegetation and sparsely lined. A single egg is laid, which is not replaced if taken by a predator, and both male and female share incubation and feeding the young. The chick takes 130–160 days to fledge.

Puffinus tenuirostris

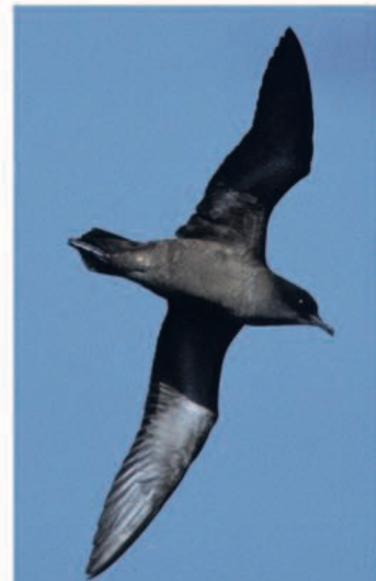
Short-tailed Shearwater



LENGTH	40–45cm (15½–17½in)
WEIGHT	500–800g (18–29oz)
MIGRATION	Migrant

HABITAT Open sea and ocean; breeds in self-excavated burrows in vegetated areas on islands

This large, dark-toned shearwater is similar to the Sooty Shearwater (above), but has a different wing pattern, with flecks of white in the centre of the underwing. A sociable species, it gathers in flocks to feed on krill, small fish, and squid and breeds in large, densely packed colonies. Like most tubenoses, it lays just one egg, which is incubated by both sexes.



ADULT SHORT-TAILED SHEARWATER



ADULT MANX SHEARWATER

Puffinus puffinus

Manx Shearwater



LENGTH	30–35cm (12–14in)
WEIGHT	425–500g (15–18oz)
MIGRATION	Migrant

HABITAT Open sea and ocean; breeds in burrows and under rocks on islands

The Manx Shearwater can be identified by its sooty-black upperparts, with white underparts, including the undertail feathers. The remarkable navigational ability of this species was proved by experiments in the 1950s on its ability to find its way. It is well known for its long-distance migrations, which can take even the young birds, fresh out of the nesting burrow, from their colonies in the north Atlantic to winter off the coasts of southern South America. A young Manx Shearwater, like a great many seabirds, is generally faithful to the colony in which it is born, but does not necessarily return to breed until it is seven years old. Like most tubenoses, Manx Shearwaters have relatively low breeding yields, but this is countered by adult longevity.

Hydrobates pelagicus

European Storm Petrel



LENGTH	15cm (6in)
WEIGHT	20–35g (1/16–1 1/4oz)
MIGRATION	Migrant

HABITAT Open sea and ocean; breeds in burrows, crevices, and even stone walls, mainly on islands

This sooty-black storm petrel recalls the generally similar Wilson's Storm Petrel (above), but is smaller, usually with a variable white band on the underwing and a less obvious pale panel on the upperwing. Its flight is weak and low, and its feet do not project beyond the end of its tail. When feeding, it holds its wings midway above the back and patters on the water's surface with its feet. Most of the population leaves the north Atlantic colonies at the end of the breeding season to winter south of the equator, and the young may remain there until they are two years old.

Oceanodroma homochroa

Ashy Storm Petrel



LENGTH	25–27cm (10–10 1/2in)
WEIGHT	35–40g (1 1/4–1 1/2oz)
MIGRATION	Partial migrant

HABITAT Open sea and ocean; breeds only in crevices and rocky cavities on islands

RED LIST CATEGORY Endangered

This storm petrel is medium-sized, with dark brown plumage, a pale bar on the upperwing, and a noticeably forked tail. Its short wings give it a stout appearance, and this, coupled with its normally slow fluttering flight and shallow wingbeats, helps to distinguish it from other dark storm petrels.

The Ashy Storm Petrel appears to remain in the vicinity of its colonies virtually all year, although it visits land

only at night and is apparently most abundant between February and October. It feeds mostly at night. The bird utters rasping calls from within the burrow and in flight, enabling pairs to establish each other's whereabouts. Most breed on islands off the California coast. Incubation takes about 45 days, and the young remain in the nest for about 84 days, the incubation and feeding of the young being undertaken by both the male and female.

This bird is gregarious, and the entire population spends the summer in Monterey Bay. Its range is restricted, and it is a rare species – the total population is thought to number only about 10,000 birds, at less than 20 colonies, and is threatened by predators, such as gulls and owls, and by oil pollution at sea.

ADULT ASHY STORM PETREL

Oceanites oceanicus

Wilson's Storm Petrel



LENGTH	15–19cm (6–7 1/2in)
WEIGHT	30–50g (1 1/16–1 3/4oz)
MIGRATION	Migrant

HABITAT Open sea and ocean; nests in crevices and burrows on islands

Named after the famous Antarctic explorer and naturalist Edward Wilson, this tiny bird performs one of the longest migrations of all the petrels. It has short, rounded wings, a large white U-shaped rump patch, and a short squared tail. It nests at subantarctic and Antarctic latitudes and moves north in the post-breeding season as far as the north Atlantic and Pacific. This species breeds from November to February.

ADULT WILSON'S STORM PETREL

*Pelecanoides urinatrix*

Common Diving Petrel



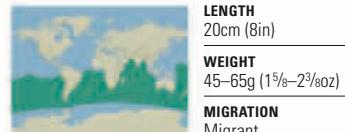
LENGTH	20–25cm (8–10in)
WEIGHT	95–175g (3 3/8–6oz)
MIGRATION	Non-migrant

HABITAT Open sea and ocean; breeds in burrows and rocky crevices on islands

There are four species of diving petrel, all of which have a small bill and are black or dark above, with white underparts. The wings are short and rounded. This petrel comes to land only to nest and breeds in huge coastal colonies. It lays a single egg in a burrow but, unlike many tubenose petrels, replaces it if it is taken by a predator.

Fregetta tropica

Black-bellied Petrel



LENGTH	20cm (8in)
WEIGHT	45–65g (1 1/16–2 9/16oz)
MIGRATION	Migrant

HABITAT Open sea and ocean; breeds among rocks, in depressions on scree and burrows on islands

Essentially dark above, the Black-bellied Petrel has a black head, variable dark markings on the underparts that appear as a black line down the entire belly, white under the wing, and a broad white rump patch. Most of its feeding is nocturnal, and it takes plankton, small fish, and crustaceans by pattering the water surface and then seizing the prey in its bill. Like other petrels in the family, this species visits its colony only at night.

Oceanodroma leucorhoa

Leach's Storm Petrel



LENGTH	18–21cm (7–8 1/2in)
WEIGHT	30–55g (1 1/16–2oz)
MIGRATION	Migrant

HABITAT Open sea and ocean; breeds in crevices and burrows on islands, in grassy or wooded areas

Named after a mollusc expert, Leach's Storm Petrel is a large storm petrel, with long and angled wings, a broad pale bar on the upperwing, a white rump broken by a grey-brown stripe, and a well-forked tail. Like most other species of storm petrel, its plumage is predominantly dark. It feeds on small squid, crustaceans, and fish on the water surface and nests in colonies. It is strictly nocturnal at the breeding sites to avoid predation by gulls and skuas.

GREBES

ORDER Podicipediformes

FAMILIES 1

SPECIES 22

SITTING HIGH IN THE WATER, with long necks and sharply pointed bills, grebes are distinctive, elegant freshwater birds. Found throughout the world on inshore waters, they are renowned for elaborate courtship displays. Grebes dive to catch fish and small animals, propelled with long lobed toes.

HABITAT

Grebes breed on sheltered lakes and freshwater wetlands, but in cold climates they winter on coasts. A few species are very localized and vulnerable to habitat change. In the American tropics, two species have recently become extinct, and the Titicaca Flightless Grebe is endangered.

ANATOMY

Grebes are sleek and streamlined, with sharply pointed bills, long bodies, but almost no trace of a tail. Their legs are set far back, and their feet have lobed toes instead of webbing. Unusually flexible joints allow them to swivel their feet and toes, so they can be used for steering as well as propulsion. Their plumage is thick and lustrous, and works like an adjustable float, allowing grebes to sink out of sight if threatened. Grebes have small, slender wings. Once airborne, most fly rapidly, but some cannot fly at all.

 *Tachybaptus ruficollis*

Little Grebe

**LENGTH**

25–29cm (10–11½in)

WEIGHT

125–225g (4–8oz)

MIGRATION

Partial migrant

HABITAT Mainly freshwater ponds, vegetated lakes, and reservoirs; also on coastal waters in winter

Also known as the Dabchick, this species is one of the smallest of the grebe family. It is widespread in its range, although often quite unobtrusive. Its presence is often revealed by its call, a high-pitched, whinnying trill. The bird's fluffy rear



ADULT LITTLE GREBE

end and short, stumpy tail give it a characteristic dumpy, round shape. In winter, the Little Grebe's plumage is drab and inconspicuous, but in the breeding season, its cheeks and neck turn a rich chestnut colour and a pale patch at the base of the bill becomes yellow.

The Little Grebe feeds mainly on insects and their larvae and is a skilful diver, staying under water for up to half a minute or more. Many of these birds are sedentary, but some may move to coastal areas in winter.

**SAFE PASSAGE**

Grebes are attentive parents, with both male and female taking care of the young. Young Clark's Grebes ride on their parent's back. They stay aboard even when the adult dives.

ASSISTED TAKE-OFF

Running across the water, a Horned Grebe takes to the air. When airborne, grebes tend to trail their feet.

 *Tachybaptus novaehollandiae*

Australasian Grebe

**LENGTH**

23–27cm (9–10½in)

WEIGHT

225g (8oz)

MIGRATION

Partial migrant

HABITAT All kinds of freshwater habitats

The Australasian Grebe is closely related to the Little Grebe (left). In the breeding season, both the male and female are dark brown above the bill, with yellow eyes, a striking chestnut facial stripe, and a prominent pale yellow face spot below. Both are duller, with no chestnut stripe outside the breeding season. The legs of the Australasian Grebe are set well back on its body, and its toes have lobes that open and close against the water, giving a thrust to its backstroke. This enables it to swim and dive powerfully.

**ADULT IN BREEDING PLUMAGE**
 *Rollandia rolland*

White-tufted Grebe

**LENGTH**

24–36cm (9½–14in)

WEIGHT

250–425g (9–15oz)

MIGRATION

Partial migrant

HABITAT Well-vegetated ponds, lakes, and slow-moving waterways



ADULT AUSTRALASIAN GREBE

The White-tufted Grebe is the only member of its family with a tuft of white feathers at each side of its head. The tufts are a feature of the bird's otherwise black and chestnut breeding plumage. In the breeding season, it builds a floating nest anchored to water-margin vegetation during September and October and lays 1–3 eggs. The White-tufted Grebe occurs in lowland areas and at altitudes up to 4,500m (15,000ft).

Poliocephalus poliocephalus

Hoary-headed Grebe

	LENGTH 27–30cm (10½–12in)
	WEIGHT 225–250g (8–9oz)
	MIGRATION Partial migrant

HABITAT Prefers large, open freshwater lakes, but also found on coastal waters in winter



ADULT HOARY-HEADED GREBE

Like all other members of its family, the Hoary-headed Grebe spends most of its time in water, only leaving the water to nest or, occasionally, to rest on dry land. Supremely adapted to its aquatic lifestyle, it has water-repellent and very dense plumage, with more than 20,000 individual feathers. The legs are set well to the rear of the body so that the bird walks in an almost upright, awkward fashion. Both the male and female have dark bills with a pale tip, but the male has a longer bill.

Podiceps grisegena

Red-necked Grebe

	LENGTH 40–50cm (15½–19½in)
	WEIGHT 1kg (2½lb)
	MIGRATION Migrant

HABITAT Breeds in shallow, well-vegetated ponds and lakes; winters near coastal waters

The Red-necked Grebe has a thick, chestnut neck, a grey and white face, and a black cap that reaches below the eyes. Its stout, dagger-like bill has a yellow base. An adept swimmer, this grebe cannot walk on land and awkwardly shuffles to leave its semi-

floating, waterweed nest. The sexes are alike, but the male is slightly bigger and more boldly coloured (as shown in the photograph below, where the bird on the left is the male). Although courtship generally takes place in the water, the actual mating is usually performed on dry land or on the nest.

This grebe has a variety of calls – its vocabulary includes an assortment of whinnies, cackles, honks, grunts, rattles, hisses, and squealing sounds which fulfil a range of functions. During the breeding season, it may call during courtship. The calls of the Red-necked Grebe may be used to advertise its presence, to warn off intruders, to proclaim territory, or to keep contact with its family. The juvenile has a typical call when it is hungry.



MALE AND FEMALE CALLING TO EACH OTHER



ADULT CLARK'S GREBE

Aechmophorus clarkii

Clark's Grebe

	LENGTH 51–74cm (20–29in)
	WEIGHT 0.9–1.3kg (2–3½lb)
	MIGRATION Partial migrant

HABITAT Breeds on bodies of freshwater and brackish water; prefers coastal waters in winter

This species is distinguished by its black cap, white face, and bright yellow bill. Its scientific name – derived from *aikhme*, the Greek word for “spear” and *phorus*, which means “carrier” – refers to its long, spear-like bill, which it uses to catch small fish using a lunging action. It is, however, an opportunistic feeder and will often also take small amphibians, crustaceans, and aquatic insects.

Great Crested Grebe

Podiceps cristatus

Great Crested Grebe

	LENGTH 46–51cm (18–20in)
	WEIGHT 600–750g (21–27oz)
	MIGRATION Migrant

HABITAT Large, open freshwater lakes fringed with vegetation; disperses to coastal waters in winter

A dagger-like bill, an upright, slender neck, and black head plumes are characteristic of this species. It constructs its nest as a floating platform of water weeds with a depression in the middle, usually anchored to aquatic plants away from the bank of the lake. This distance from the shore offers some protection against nest-robbing mammals. When the parent leaves the nest, it covers the eggs with loose nesting material in order to hide them. The female normally lays 3–5 eggs, although as many as nine have been recorded in one nest. Great Crested Grebes dive under water, staying there for long periods in search of fish and aquatic invertebrates.

ADULT ON NEST



COURTSHIP DANCE

In an elaborate and ritualized courtship display in water, both members of the Great Crested Grebe pair dive together under the surface to bring up a piece of decorative pond-weed in their bills. Face-to-face, with crests raised and frills inflated, they shake their heads from side to side. At times, they may lean against each other breast to breast and, by paddling very fast, rise right out of the water, wagging their heads constantly.



FLAMINGOS

ORDER Phoenicopteriformes

FAMILY 6

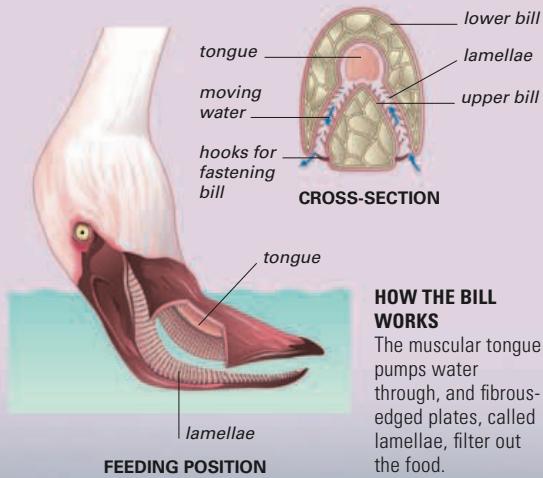
SPECIES 5

DESPITE MANY YEARS OF RESEARCH there are many unsolved questions about how flamingos evolved. However, recent DNA work indicates that the closest living relatives to flamingos are grebes. There is no doubt that they form an ancient and highly unusual group of birds. Their extraordinary shape is matched by

an equally remarkable lifestyle, which involves filtering tiny organisms out of water using a highly specialized bill. Unlike any other bird, a flamingo feeds with its bill upside down, often for many hours a day. Flamingos are social birds, travelling and feeding in large flocks, and their habitat varies from coastal lagoons to desolate salt and soda lakes.

ANATOMY

Relative to their bodies, flamingos have some of the longest necks and legs of all birds. Their wings are long and pointed, and they have feet with three webbed toes. Despite their unwieldy proportions, they fly remarkably well. They can also swim, although they rarely do so once they are adult. A flamingo's bill works like a sieve, with water being pumped through it by the tongue. It is small and straight in newly hatched birds, but slowly develops its characteristic bent shape in the first few months of life. Both halves of the flamingo's bill are fringed with fibrous plates. With the bill held slightly open, they mesh together to form a sieve that traps food.



HOW THE BILL WORKS

The muscular tongue pumps water through, and fibrous-edged plates, called lamellae, filter out the food.

BREEDING

Flamingos form monogamous lifelong pairs, and all species have similar breeding habits. The male and female work together to build a volcano-shaped nest made of mud, which stands about 30cm (1ft) high. The female lays a single egg, and incubates it for about 30 days. After the chick has hatched, the parents feed it on "milk" made in their crops – flamingos being the only birds apart from pigeons to produce liquid food in this way. After several days in the nest, chicks congregate in thousands to form crèches; their parents continue to feed them, locating them by their calls. The young feed themselves from the age of 6–11 weeks.



ONE OF A CROWD

An adult Greater Flamingo inspects its single egg. The flamingo's brilliant colour is derived from its food. Captive flamingos may fade unless given dietary supplements.



UNMISTAKABLE SILHOUETTE

Flamingos fly with legs and necks outstretched. For their length, they are light birds with a low wing loading that enables them to travel long distances.

BEHAVIOUR

Flamingos rarely do anything alone. They feed, breed, and travel en masse, sometimes in groups containing hundreds of thousands of birds. Much of their behaviour – such as noisy head-flagging and courtship displays – seems to have an infectious quality, spreading through a flock until enormous numbers of birds are taking part. Flamingos move on when food becomes scarce, in long, straggling lines. Some are migratory: Greater Flamingos travel from the Mediterranean to tropical Africa, to feed in the Rift Valley salt lakes.



ON THE LOOKOUT

Standing nearly 1.5m (5ft) high, flamingos are quick to spot predators approaching their feeding grounds. If threatened, they produce a noisy chorus of alarm calls.

Phoenicopterus roseus

Greater Flamingo



LENGTH

1.2–1.5m (4–5ft)

WEIGHT

2.5–3.5kg (5½–7¾lb)

MIGRATION

Partial migrant

HABITAT Salt-pans, saline lagoons, large shallow inland lakes, mudflats, and sandbanks

The Greater Flamingo is the largest member of its family. Both the male and female have bright pink plumage, with splashes of red on their wings that are visible when they are at rest or in flight. The female is smaller than the male and has shorter legs. Like other flamingos, the Greater Flamingo's long legs enable it to wade in deep water, while its exceptionally long, slender neck makes it possible for it to sift for aquatic invertebrates from the lake bottom, probing for prey with its blunt, angled bill. This bird normally feeds with its head completely under water. Its diet varies from insects and worms to algae and pieces of vegetation.

The Greater Flamingo is long-lived: the oldest-known wild bird lived for 33 years and the oldest captive bird recorded was 44 years old. Highly gregarious, the species breeds in colonies of up to 200,000 pairs, and its nests are flattened cones of mud. Both parents incubate the single egg.

Phoeniconaias minor

Lesser Flamingo



LENGTH

80–90cm (31–35in)

WEIGHT

1.5–2kg (3¼–4½lb)

MIGRATION

Migrant

HABITAT Inland saline and alkaline lakes, usually with extensive mudflats, and coastal lagoons

As its name suggests, the Lesser Flamingo is the smallest member of the flamingo family, the female being less than half the weight of the male Greater Flamingo (left). The Lesser Flamingo is pale to dark pink and has

a characteristic deep-keeled, dark red bill, with the lower half appearing black at a distance. The bill is adapted to take only small algae, which the flamingo filters carefully from the water surface. Such a specialized feeding method is best carried out in calm water, which is why this species feeds at night to avoid strong daytime

winds. Each flamingo consumes about 60g (2½oz) of algae a day. Some of the colonies of this species consist of over a million birds.

GREAT SITES

RIFT VALLEY LAKES

The Lesser Flamingo gathers in flocks on the alkaline lakes of the Great Rift Valley in East Africa. Outside the breeding season, huge feeding flocks of up to one million birds congregate at sites such as Lake Bogoria and Lake Nakuru in Kenya. The birds breed (often in alternate years and in response to rainfall) on Lake Natron (Tanzania) and Lake Magadi (Kenya).



ENORMOUS FLOCKS

Flocks of up to one million Lesser Flamingos, among the largest bird assemblies in the world, are among nature's most magnificent sights.

long neck

bright red wing feathers

Phoenicoparrus andinus

Andean Flamingo



LENGTH

1m (3½ft)

WEIGHT

2–2.4kg (4½–5½lb)

MIGRATION

Partial migrant

HABITAT High altitude salt-lakes mainly at 3,500–4,500m (11,500–14,800ft)**RED LIST CATEGORY** Vulnerable

The Andean Flamingo is probably the rarest member of its family, with an estimated population of 34,000 birds breeding in only 10 localities. The

ADULT ANDEAN FLAMINGO IN FLIGHT

species has undergone a rapid population decline due to exploitation and deterioration in habitat quality. The slow breeding of Andean Flamingos suggests that the legacy of past threats may persist in generations to come. The Andean Flamingo has a distinctive red-pink neck, breast, and wing coverts. A black triangular patch formed by the wings is clearly visible when the bird is

at rest. Like the Lesser Flamingo (above), the Andean Flamingo has a deep-keeled bill, which helps it to feed on minuscule algae, sifted from tiny spaces between water and sediment. It lays a single chalky white egg on a mud mound. The young have straight bills at first and are fed liquid secretions from the adults' crop until their bills are fully developed.

red-pink wing coverts, obvious in flight

long yellow legs

ADULT GREATER FLAMINGO





GREAT SITES

LAKE BOGORIA NATIONAL PARK



LOCATION In East Africa, 240km (150 miles) north of Nairobi, Kenya.



Part of a chain of lakes along the Great Rift Valley in East Africa, Lake Bogoria covers an area of 107 square km (41 square miles). The lake is dominated by many hot springs that pour superheated water into its highly alkaline waters. These caustic waters are devoid of fish and lack the flocks of migrant ducks, geese, and waders that stop to refuel on the region's freshwater lakes. In their place are up to a million Lesser Flamingos at times, plus smaller numbers of Greater Flamingos.

TOXIC FEEDING GROUND

The huge flocks of flamingos assemble to feed on the blue-green algae and swarms of brine shrimps that smother the surface of the lake. Due to the toxic environment, this vast food supply is unavailable to fish, amphibians, mammals, and most birds, so flamingos have exclusive access. Their populations can reach exceptionally high densities. For reasons that remain unclear, flamingo numbers at Lake Bogoria fluctuate dramatically from one season to the next. Without warning, virtually the lake's entire population of flamingos may shift to nearby lakes Nakuru or Naivasha, returning equally suddenly months later.

The only other birds to enter the lake are the Black-necked Grebe and Cape Teal, mostly where incoming springs lower the water's salinity. Large numbers of African Fish Eagles are attracted to the lake to hunt the flamingos – it is not unusual to see eight or more perched in a single tree at the water's edge. Other species that prey on the flamingos include Marabou Storks and Steppe and Tawny eagles.

Lake Bogoria National Reserve extends beyond the lake to incorporate a variety of other habitats that support a rich selection of tropical African birds, from bee-eaters and barbets to widowbirds, weavers, and hornbills. Resident birds of prey include the Secretarybird, while the reserve's wetlands attract water birds such as the Goliath Heron. In 2000, Lake Bogoria was designated a wetland of international importance under the Ramsar Convention on Wetlands.

FEASTING FLAMINGOS

Masses of Lesser Flamingos stand knee-deep in the hot, stinking waters of Lake Bogoria. The flamingos have tough skin on their legs to protect against caustic salts in the lake's waters.

WHAT TO SPOT



RED-AND-YELLOW BARBET
Tchagra erythrocephalus
(see p.321)



SECRETARYBIRD
Sagittarius serpentarius
(see p.186)



GOLIATH HERON
Ardea goliath
(see p.166)



AFRICAN FISH EAGLE
Haliaeetus vocifer
(see p.189)

STORKS AND HERONS

ORDER Ciconiiformes
FAMILY 3
SPECIES 115

(see p.180). Most storks and herons are solitary hunters, stalking with stealth and patience, and attacking with lightning speed. At night, and during the breeding season, many congregate in trees.

ANATOMY

Storks and their relatives show a great range in size. The smallest bitterns stand just 25cm (10in) high, while the largest storks measure 1.5m (5ft) from head to tail. One of these – the African Marabou – is second only to the Andean Condor in having the largest wingspan in any terrestrial bird. Few of these birds have much webbing on their feet. Instead, they have long flexible toes, which allow them to spread their weight on soft mud, as well as stand high up in trees. Apart from size, the feature that varies most is the shape of their bills. Storks and herons usually have straight bills, sometimes with a dagger-like tip. Ibises have decurved bills, while spoonbills are instantly recognizable, because their bills have rounded and flattened tips.

Most birds in this order fly well. The larger species have a leisurely flapping flight, sometimes interspersed with long bouts of soaring. Most herons and egrets retract their necks into an S-shape during flight, but storks fly with theirs fully extended. The long legs trailing behind are also a noticeable feature in flight.

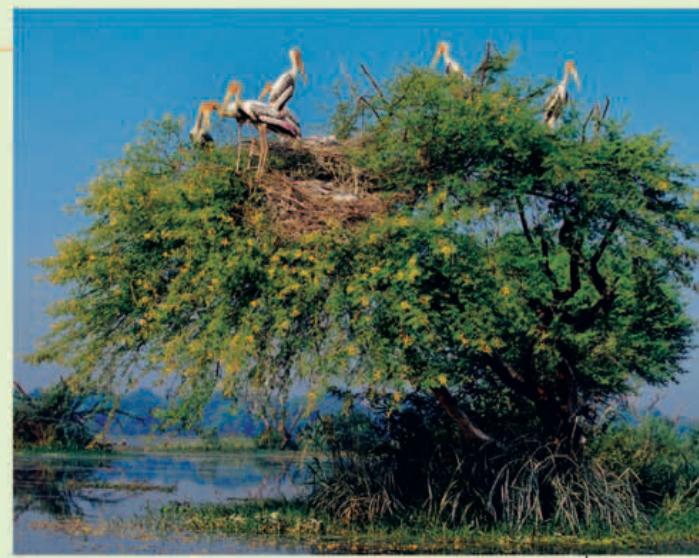
INSTANT STRIKE

With its long sinuous neck, the Tricoloured Heron can stab prey such as fish in a fraction of a second with its dagger-like bill.

LONG LEGS AND POWERFUL BILLS make storks and herons striking birds of freshwater habitats. This order also contains egrets, bitterns, ibises, and spoonbills. Molecular evidence suggests that New World vultures should be included, but customarily they are treated as birds of prey

WATERSIDE RETREAT

In an isolated tree, a small group of Painted Storks stand by their nests. Painted Storks often feed in water, sweeping their half-open bills from side to side to hunt for fish.



BEHAVIOUR

All the birds in this order are carnivorous, and the majority feed on fish, frogs or other amphibians, and insects that they catch on or near water; some species will also eat small birds. Herons and bitterns are visual hunters, capable of waiting motionless for over an hour until prey comes within reach. Most of them hunt by day, but Night Herons are nocturnal, stalking prey with their unusually good night vision. Ibises and spoonbills feel for food in muddy water, using their highly sensitive bills to locate their prey, but storks often feed on land, striding warily through grass or marshy ground, and snapping up any small animals that they disturb. The largest storks have very different habits. They behave more like vultures, soaring high in the sky on immense wings as they search for dead remains.

BREEDING

Despite solitary feeding habits, many of the birds in this order breed in groups, and it is not unusual for several species to nest side by side. Most of the colonial species nest in trees or mangroves, creating an impressive spectacle with birds standing prominently near their nests. Storks and herons typically lay 4–6 eggs in a large platform of sticks, and the young

remain in the nest for several weeks, fed by both parents. Contrasting with these species are bitterns, which nest on their own on marshy ground. They make nests from reeds and other waterplants, and are superbly camouflaged. When the breeding season is over, many species that nest in temperate regions migrate; herons often leave inland waterways and move to the coast.



FOCUSED HUNTER

Clinging to a branch with its slender toes, a Green Heron judges the right moment to strike. Its eyes can face forwards to help judge distances.

HUMAN IMPACT

THREATS AND CONSERVATION

A number of species in this order are currently listed as critically endangered. On the positive side, some species – such as the cattle egret – have benefited from the spread of pasture and paddy fields, which provides them with new feeding grounds.

ENDANGERED IBIS

Critically endangered stork species include the Northern Bald Ibis (shown here), which lives in eastern Europe, the Near East, and North Africa.



Mycteria americana

Wood Stork



LENGTH

0.8–1.2m (2½–4ft)

WEIGHT

2–3kg (4½–6½lb)

MIGRATION

Partial migrant

HABITAT Marshes, wet meadows, mangroves, lakes, and ponds

The only stork native to North America, the Wood Stork is also one of the largest wading birds to breed there. The juvenile's head is covered with white feathers and the bill is yellow. As it ages, the bill turns grey and the head becomes bare and grey. The adult is mostly white, with a contrasting black tail and flight feathers that are visible when the wings are spread. This stork catches small fish in water with its open bill submerged. When it catches a fish, its bill snaps shut in quick reaction.

JUVENILE WOOD STORK

Anastomus lamelligerus

African Openbill



LENGTH

80–94cm (31–37in)

WEIGHT

3–5kg (6½–11lb)

MIGRATION

Partial migrant

HABITAT Mainly wetlands such as marshes, swamps, paddy fields, and margins of rivers and lakes

Named for its unusually shaped bill, the African Openbill is well equipped to feed on its diet of large aquatic snails. A special adaptation, its bill has an obvious gap between the two closed halves (mandibles), which curve away from each other. The snail shell is held in place by the upper mandible,

while the lower mandible slices through the muscle that holds the snail in its shell. Predominantly black in colour, the African Openbill can often be seen wading in shallow water, searching for snails.



ADULT FEEDING

MALE HUNTING WITH ITS YOUNG

Ephippiorhynchus senegalensis

Saddle-billed Stork



LENGTH

1.4–1.5m (4½–5ft)

WEIGHT

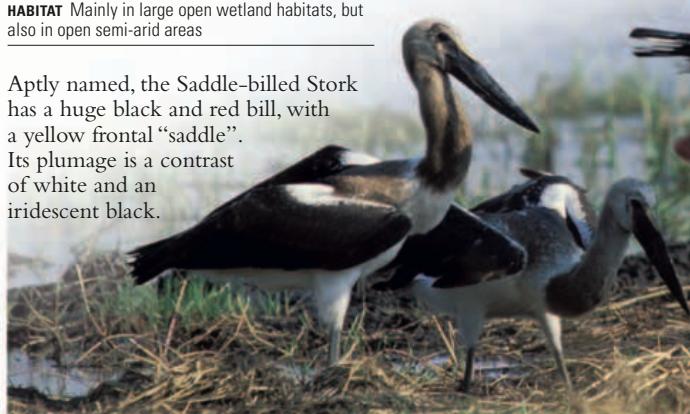
6kg (13lb)

MIGRATION

Non-migrant

HABITAT Mainly in large open wetland habitats, but also in open semi-arid areas

Aptly named, the Saddle-billed Stork has a huge black and red bill, with a yellow frontal "saddle". Its plumage is a contrast of white and an iridescent black.



The female can be distinguished from the dark-eyed male by its bright yellow iris. The species inhabits the plains of Africa south of the Sahara desert, where it lives in pairs or small family groups. Juveniles closely follow their parents and learn to hunt by imitating them as they stab at fish and frogs.



ADULT IN BREEDING PLUMAGE

Ciconia ciconia

White Stork



LENGTH

1m (3½ft)

WEIGHT

2.3–4.4kg (5–9¾lb)

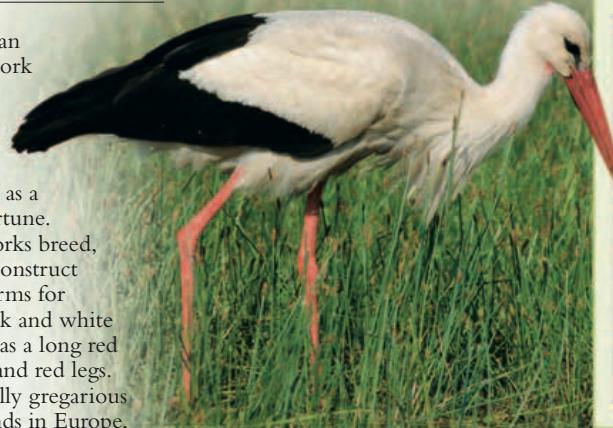
MIGRATION

Migrant

HABITAT Variety of open areas, such as wetlands, grassland, pastures, banks of rivers and lakes

White Storks gather in large flocks at favoured feeding sites on their wintering grounds in Africa and South Asia. Their diet varies from frogs, toads, and small rodents to grasshoppers. Swarms of locusts also attract large numbers of these storks, causing them to congregate in pursuit of a meal.

ADULT WHITE STORK



According to European folklore, the White Stork carries new-born babies to their parents, and throughout its range this bird is welcomed as a harbinger of good fortune. In areas where the storks breed, house owners often construct special rooftop platforms for them to nest on. Black and white in colour, this stork has a long red bill, black wing-tips, and red legs. Although not especially gregarious on its breeding grounds in Europe,

NESTING BEHAVIOUR

The White Stork builds a large, bulky nest of sticks on a high perch, such as a pole, tower, or rooftop. These storks tend to return to the same nest each year, the male usually arriving a few days before the female to repair the nest. If one of the pair does not return, the other finds a new mate.



*Jabiru mycteria*

Jabiru



LENGTH	1.2–1.4m (4–4½ft)
WEIGHT	5–7kg (11–15lb)
MIGRATION	Partial migrant

HABITAT Freshwater wetlands

A large stork with mainly white plumage, the Jabiru can be found from Mexico to Argentina. Its head and neck are featherless, with black skin above a thin band of red. The Jabiru also has an inflatable throat sac that it uses to indicate its excitement or irritation to other birds. The male is larger than the female and has a longer bill. The breeding season extends from December to May.



ADULT INFLATING THROAT SAC

Leptoptilos dubius

Greater Adjutant

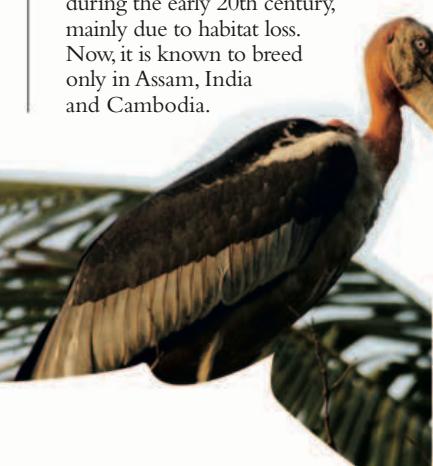


LENGTH	1.2–1.5m (4–5ft)
WEIGHT	5–8kg (11–18lb)
MIGRATION	Migrant

HABITAT Mainly wetlands, but also dry areas such as grassland and open forest**RED LIST CATEGORY** Endangered

This huge, dark stork has a very thick bill and large neck pouch, a distinctive white V-shaped neck ruff, and a combination of yellow and orange skin on its head. The Greater Adjutant is known for its scavenging habits – often it can be found feeding on carrion or at rubbish dumps. However, it will also feed on live prey such as large fish, frogs, reptiles, and injured birds.

The species is globally threatened, with a total population thought to number no more than a thousand individuals. Once common across much of Asia, it declined dramatically during the early 20th century, mainly due to habitat loss. Now, it is known to breed only in Assam, India and Cambodia.



ADULT GREATER ADJUTANT

Threskiornis molucca

Australian White Ibis



LENGTH	63–76cm (25–30in)
WEIGHT	1.5–2kg (3½–4½lb)
MIGRATION	Partial migrant

HABITAT Wetland areas, as well as dry open areas, particularly in towns and cities

AUSTRALIAN WHITE IBIS

As its common name suggests, the Australian White Ibis has white plumage, except for black tips to the wings, which are clearly visible in flight. Its head and long, decurved bill are also black. This species is very similar to the sacred ibis (*T. aethiopicus*) of Africa. Within Australia, however, the only species it can be confused with is the straw-necked ibis (*T. spinicollis*), which is easily distinguished by its dark upperparts.

A sociable species, this ibis is usually seen feeding in groups of around 40–200 birds. As well as scavenging on carrion and rubbish, it probes the ground with its bill in order to find insects or crustaceans. This common Australian species (which also occurs in New Guinea and the Solomon Islands) is frequently found near human habitation and in parks and gardens.

Leptoptilos crumeniferus

Marabou Stork



LENGTH	1.1–1.5m (3½–5ft)
WEIGHT	4–9kg (8¾–20lb)
MIGRATION	Partial migrant

HABITAT Open dry savanna and grassland, as well as lake and river edges

Standing up to 1.5m (5ft) tall, the massive Marabou Stork is a familiar species in much of Africa. To some people, it is one of the world's ugliest birds, with its bald and scabby pink head and huge throat sac. However, once airborne, with a wingspan of almost 3m (10ft), it makes an impressive sight as it soars high above the plains.

The bare skin of its head and neck allows the Marabou Stork to feed on the carcasses of large mammals without getting its feathers soiled, in much the same way as vultures, alongside which the Marabou Stork often feeds.



ADULT MARABOU STORK

A distinctive bird, the Crested Ibis has a bright red face and bushy crest. It is extremely rare, numbering only around 300 birds. Historically, the species occurred in the far east of Russia, as well as Japan and China. However, the only wild population is now confined to central mainland China, where in 1981 it numbered just seven birds. Through intensive conservation efforts, the number has now risen to around 150 birds and is slowly increasing.

Nipponia nippon

Crested Ibis



LENGTH	55–79cm (21½–31in)
WEIGHT	1.9kg (4½lb)
MIGRATION	Non-migrant

HABITAT Marshes, streams, rivers, rice fields, and wetlands, close to large trees**RED LIST CATEGORY** Endangered*Theristicus melanopis*

Black-faced Ibis



LENGTH	70–75cm (28–30in)
WEIGHT	1.7kg (3½lb)
MIGRATION	Migrant

HABITAT Fields and grassland, as well as more marshy areas

With its rufous cap, black face, buff neck and breast, brown upperparts, and jet-black underparts, the Black-faced Ibis of South America is easy to



FORAGING BLACK-FACED IBIS

Eudocimus ruber**Scarlet Ibis**

LENGTH	55–70cm (21½–28in)
WEIGHT	600–750g (21–27oz)
MIGRATION	Partial migrant

HABITAT Estuaries, mudflats, and other wetlands; nests in mangroves or trees around inland wetlands

RED LIST CATEGORY Endangered

One of the world's most brightly coloured wetland birds, the Scarlet Ibis has scarlet plumage and legs, contrasting with its black bill. Some, however, consider it to be just a subspecies (or colour form) of the American White Ibis (*Eudocimus albus*): where the two forms overlap in Venezuela, mixed pairs have been recorded.



SCARLET IBIS

Platalea leucorodia**Eurasian Spoonbill**

LENGTH	70–95cm (28–37in)
WEIGHT	1.1–1.9kg (2¼–4½lb)
MIGRATION	Migrant

HABITAT Shallow wetlands

The Eurasian Spoonbill is a large all-white bird, except in its breeding plumage, when it acquires a variable yellow breast band and off-white crest. It has a distinctive long, black bill, with a spoon-shaped tip that is usually yellow in adults. Most populations of the species are highly migratory, although birds found in India and Sri Lanka are largely sedentary.

ADULT EURASIAN SPOONBILL

**ADULT GLOSSY IBIS****Plegadis falcinellus****Glossy Ibis**

LENGTH	50–65cm (20–26in)
WEIGHT	475–600g (17–21oz)
MIGRATION	Migrant

HABITAT Favours freshwater wetlands, but also found in some coastal areas

The Glossy Ibis can appear dark and unobtrusive when seen in poor light or at a distance. However, when seen clearly, its plumage (particularly that of breeding adults) is a striking iridescent mixture of greens, purples, and browns. Like other ibises, it is a long-legged bird with an elongated, decurved bill that it uses to probe into the ground to search for food. The Glossy Ibis has a wide global distribution, being found in all inhabited continents, except South America (although it has bred in Venezuela). It is a highly migratory species, and as a result vagrant birds also often occur well outside their range, for example, New Zealand.

Platalea ajaja**Roseate Spoonbill**

LENGTH	70–85cm (28–33in)
WEIGHT	1.4kg (3½lb)
MIGRATION	Partial migrant

HABITAT Prefers shallow coastal waters, although also found on inland freshwater wetlands

RED LIST CATEGORY Endangered

The beautiful Roseate Spoonbill is the world's only pink spoonbill. Its neck and upper back are white, graduating to a pale pink beneath. It has a striking bright pink bar across its wings and a large, black-spotted, pale grey bill. During the breeding season, the bare patch of skin on the head and face appears yellow. Juveniles are much paler – almost white, with just a few hints of pink on the wings – and have pink or yellow bills.

**BILL SHAPE**

All six species of spoonbills have long, straight, flattened bills that broaden out at the end into a distinctive "spoon" shape. They feed in a very characteristic way – swinging their heads from side to side, to increase the chance that the large surface area of the sensitive bill will come into contact with prey such as insects and small fish.

ADULT ROSEATE SPOONBILL



The species was common along the Gulf Coast of the USA till the middle of the 19th century. But by 1900, it was almost wiped out by plume hunters. It began to recolonize in the 20th century.

GREAT SITES

KEOLADEO NATIONAL PARK



LOCATION Rajasthan, northern India, about 190km (120 miles) south of New Delhi between the cities of Jaipur and Agra.



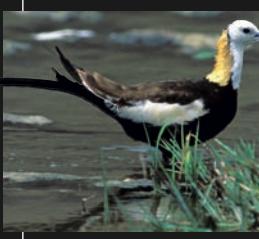
Keoladeo is named after an ancient Hindu temple in the park, and is also known as Bharatpur Sanctuary, after the nearest town. Formerly a duck-hunting reserve of the maharajas, this patchwork of seasonal marshes, tropical dry forest, and scrub lies in the Gangetic Plain, the vast lowland region covering much of north-central India. It is firmly established as one of the best birdwatching destinations in southern Asia. Nearly 380 bird species have been recorded within the park boundaries – around a quarter of the total number found in the entire Indian subcontinent. The park is an important breeding ground for

thousands of storks, herons, and cormorants, which in winter are joined by large numbers of ducks and other migrant water birds from central Asia, China, and Siberia.

WHAT TO SPOT



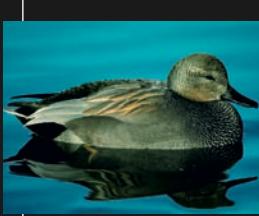
INDIAN ROLLER
Coracias benghalensis
(see p.305)



PHEASANT-TAILED JACANA
Hydrophasianus chirurgus
(see p.227)



INDIAN POND HERON
Ardeola grayii



GADWALL
Anas strepera
(see p.130)

GREEN OASIS

Keoladeo's unspoiled natural appearance is misleading because the lush wetlands are of artificial origin. The landscape we see today was created in the 1850s to store the floodwaters of the summer monsoon. During the monsoon, water is channelled from the swollen Gambhir and Banganga rivers into a system of canals, sluices, and embankments to form extensive marshes and pools up to 2m (6½ft) deep. Following the banning of hunting in Keoladeo in the 1970s, around 29 square km (11 square miles) of the site became a national park in 1982, and three years later it was declared a World Heritage Site.

One of the reasons Keoladeo is a magnet for birds is the aridity of the surrounding countryside, which has a low rainfall and extremely hot, dry summers. For much of the year, the park becomes an oasis of green in an otherwise parched region. In its wetland areas, typical breeding birds include the Sarus Crane, Greater Adjutant, Painted Stork, Asian Openbill, Oriental Darter, Indian Pond Heron, and Pheasant-tailed Jacana, as well as various species of egret, spoonbill, ibis, pelican, and cormorant. Many birds of prey, including at least nine species of eagle, hunt in the park at different times of year and its dry areas are home to a rich array of land birds.

WETLAND NESTING SITE

Thickets of acacia trees scattered throughout the seasonal wetlands of Keoladeo provide ideal nest sites for colonies of water birds, such as these Painted Storks.





*Tigriornis leucocephala*White-crested
Tiger Heron

LENGTH
66–80cm (26–31in)

WEIGHT
1kg (2½lb)

MIGRATION
Non-migrant

HABITAT Marshy areas or streams within dense forest

Named for the stripes or bars all over its plumage, the White-crested Tiger Heron has a crest that is obscured by other feathers on its head. Generally, this heron is an uncommon species. Although it gives its presence away by its booming call, it is difficult to see due to its nocturnal habits and its partiality for dense rainforest streams. As a consequence, very little is known about the behaviour of this enigmatic species.

*Tigrisoma lineatum*Rufescence Tiger
Heron

LENGTH
65–75cm (26–30in)

WEIGHT
800g (29oz)

MIGRATION
Non-migrant

HABITAT Favours wooded, slow-flowing river banks; also found in marshy areas and mangroves



ADULT

The only tiger heron not to be noticeably striped, the Rufescence Tiger Heron is nevertheless an unmistakable species, with its rich chestnut head and breast, which is divided by a clear white stripe. The adult has a very long bill. The plumage of the juvenile is quite different and consists of black barring on a pale brown base. The Rufescence Tiger Heron wades near river banks and hides in undergrowth whenever it can and, like its close relatives, it is a secretive species that scientists know little about. Although it can be difficult to spot, the species is not thought to be uncommon, particularly in parts of Nicaragua, Colombia, and Venezuela.

Botaurus stellaris

Eurasian Bittern



LENGTH
65–80cm (26–31in)

WEIGHT
1.2–1.5kg (2⅓–3⅓lb)

MIGRATION
Partial migrant

HABITAT Breeds in extensive reedbeds; winters in a variety of well-vegetated wetlands

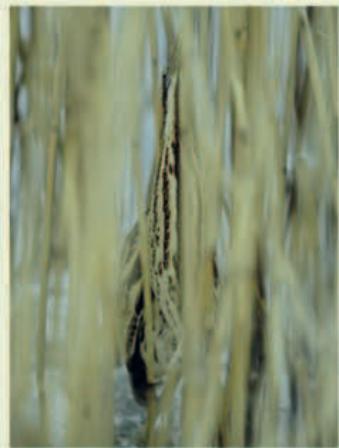
A rare and declining species, the Eurasian Bittern breeds only in extensive reedbeds. In winter, it is marginally easier to observe as it sometimes moves to more open areas.

During the spring and summer, the Eurasian Bittern is very difficult to see. Its presence is much more likely to be detected by the booming mating call emitted by the male, a loud and far-carrying, foghorn-like sound that can be heard from up to 5km (3 miles) away. This boom is often preceded by a couple of short, grunting noises, rather like a cough. Other unusual behaviour includes an impressive display when faced with a threat. The bird crouches with its neck arched backwards, wings spread, and its feathers held aloft so that it appears bigger. With the bird's dagger-like bill pointed menacingly in front of its body, this display must be an effective deterrent to intruders.

ADULT EURASIAN BITTERN

REEDBED
CAMOUFLAGE

A secretive, difficult-to-see species, the Eurasian Bittern rarely ventures far from its favoured reedbed habitat during the breeding season. Its streaked, brown plumage and ability to freeze in an upright standing position, with its bill pointing upwards towards the sky, allow the bird to blend into its surroundings.



Ixobrychus minutus

Little Bittern



LENGTH	27–36cm (10½–14in)
WEIGHT	125g (4oz)
MIGRATION	Migrant

HABITAT Variety of habitats, but prefers well-vegetated wetlands**MALE LITTLE BITTERN***Nycticorax nycticorax*

Black-crowned Night Heron



LENGTH	55–65cm (21½–26in)
WEIGHT	525–800g (19–29oz)
MIGRATION	Migrant

HABITAT Wetlands

Although the male and female have similar plumage, including shades of grey and black, the female Black-crowned Night Heron is slightly smaller than the male. The juvenile is brown and streaked, with a pale yellow bill and greenish yellow legs and feet. This heron feeds on small fish, crustaceans, frogs, aquatic insects, and small mammals. A largely nocturnal species, perhaps to avoid competition for food from other, larger heron species, this heron has a wide global distribution.

**ADULT BIRD***Butorides virescens*

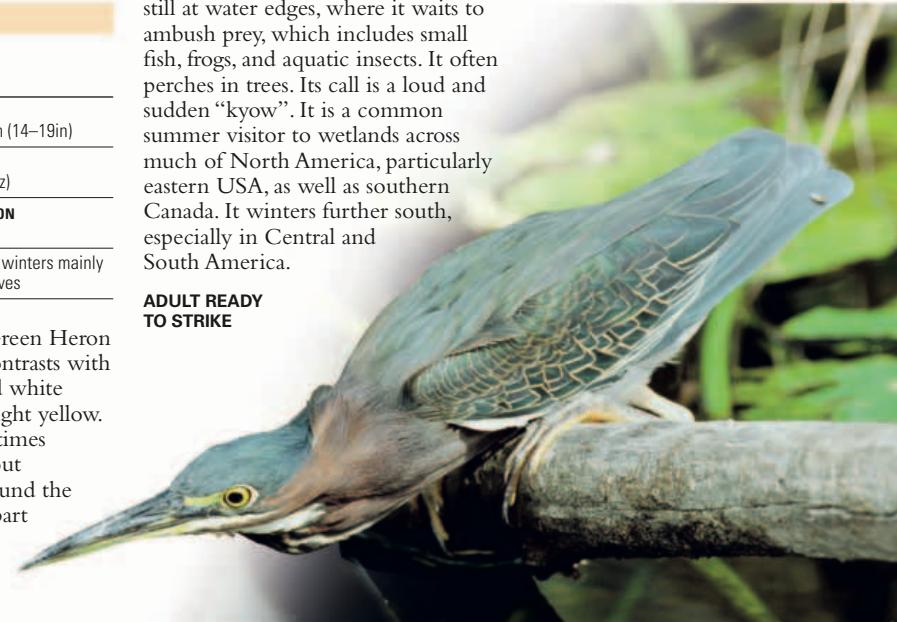
Green Heron



LENGTH	35–48cm (14–19in)
WEIGHT	200g (7oz)
MIGRATION	Migrant

HABITAT Breeds in swampy thickets; winters mainly in coastal areas, particularly mangroves

A small wading bird, the Green Heron has a chestnut neck that contrasts with its green cap and black and white breast stripe. Its legs are bright yellow. The Green Heron is sometimes grouped together with about 30 similar forms found around the world (except Europe) as part of a species known as the Green-backed or Striated Heron (*B. striatus*). The Green Heron stands

*Cochlearius cochlearius*

Boat-billed Heron



LENGTH	45–50cm (17½–19½in)
WEIGHT	600–700g (21–25oz)
MIGRATION	Non-migrant

HABITAT Mangroves and other densely vegetated wetlands

The most striking feature of the Boat-billed Heron is its massive bill. This is used as a scoop to snatch up food such as shrimps, insects, and small fish – a feeding technique that is unique among the heron family. The Boat-billed Heron also has noticeably large eyes, which reflects the fact that the species is largely nocturnal. A number of different subspecies occur, which vary somewhat in their plumage tones. However, all have a distinctive black cap that extends down the back, contrasting with grey upperparts and white or brown underparts.

This species nests alone or in small colonies in mangrove trees, laying 2–4 eggs. Its calls include a deep croak and a high-pitched “pee-pee-pee”.

ADULT BOAT-BILLED HERON*Ardeola ralloides*

Squacco Heron



LENGTH	45cm (17½in)
WEIGHT	300g (11oz)
MIGRATION	Partial migrant

HABITAT Mainly fresh water wetlands

An attractive bird, the Squacco Heron appears very much like an egret (see pp.166–167) in flight, due to its white wings. On the ground, however, its appearance is transformed: its upperparts are ginger in colour during the breeding season, with long-plumed nape feathers and thin black streaks on the back of its head. Adults in winter and juveniles are a duller brown with more extensive streaking.

This heron nests in small colonies on platforms of sticks in trees or shrubs. Migratory populations of the species breed in scattered locations across southern Europe and the Middle East, moving to tropical Africa for the winter. A number of non-migratory populations also occur in Africa. Small numbers of vagrant birds are usually seen annually in northern Europe.

ADULT IN BREEDING PLUMAGE



ADULT IN BREEDING PLUMAGE

*Bubulcus ibis***Cattle Egret**

LENGTH	48–53cm (19–21in)
WEIGHT	300g (11oz)
MIGRATION	Partial migrant

HABITAT Grassland and open cultivated country, often far from water

The Cattle Egret is the world's most abundant heron. In its original home in Africa, as well as more recently colonized regions, it has followed the clearance of land for farming, and exploits other open spaces, such as golf courses. Stumpy and short-legged with a large head and short, thick neck, it is found in drier places than other herons. Breeding Cattle Egrets develop buff plumes on the head and back.

Unlike most herons, the Cattle Egret feeds mostly on grasshoppers and other insects, although during the breeding season it feeds on frogs. Flocks in flight present a flickering, tight-packed effect, often looking much whiter than they appear on the ground.

FOLLOWING THE HERD

Throughout the world, the Cattle Egret is usually found very close to grazing animals. In Africa, these can be buffalo, antelope, zebra, or elephants. In many countries, domestic cattle fill the niche. The Cattle Egret walks close to the animal's shoulder, waiting for insects, frogs, and other prey to be flushed out.



TAKING A RIDE

The Cattle Egret sometimes rides on an animal's back, often probing its skin and ears for parasites and flies.

*Ardea cinerea***Grey Heron**

LENGTH	90–98cm (35–39in)
WEIGHT	1.4kg (3½lb)
MIGRATION	Partial migrant

HABITAT Shallow water along lakes, rivers, estuaries, and shorelines; also reed marshes and mangroves

ROOSTING GREY HERON

Eurasia's most widespread heron, the Grey Heron is the counterpart of the North American Great Blue Heron (below), the neotropical Cocoi Heron (*A. cocoi*), and the Australian white-necked herons. Less persecuted now than in the past, it is increasing both in numbers and in range.

This heron is usually seen hunting singly or spaced out along banks and shores. It stands for long periods and is most active at dawn and dusk. An opportunistic feeder, it takes fish, small mammals, and birds and catches insects on the wing. In winter, it can be found hunting earthworms, rats, and mice in fields. It nests colonially in trees, preferring high branches. Although its flight is heavy and slow, the Grey Heron can glide down nimbly to nests or feeding grounds.



GOLIATH HERON IN FLIGHT

*Ardea goliath***Goliath Heron**

LENGTH	1.5m (5ft)
WEIGHT	4.4kg (10lb)
MIGRATION	Non-migrant

HABITAT Rarely found far from water, both inland and on the coast

The world's largest heron, the Goliath Heron is nearly twice the size of the Purple Heron (*A. purpurea*) it superficially resembles. It may be found feeding in deeper water than other herons and can stand for hours waiting for the large fish that make up a major part of its diet. It is solitary and rarely found near settlements or other sources of human disturbance. The Goliath Heron flies slowly with legs held, not horizontally as in other herons, but at an angle below the body. Able to cover long distances, it flies with slow and heavy wingbeats.



GREY-BLUE FORM

*Ardea herodias***Great Blue Heron**

LENGTH	0.9–1.4cm (3–4½in)
WEIGHT	2.1–2.5kg (4½–5½lb)
MIGRATION	Partial migrant

HABITAT Fresh and salt water, swamps, and dry land

Widespread in North America, the Great Blue Heron occurs in two colour forms: one dark grey-blue and the other all-white. Sometimes considered a subspecies of the Grey

Heron (above), the Great Blue Heron is up to 40 per cent larger. The white form – sometimes called the Great White Heron – can be confused with the Great Egret (opposite). The white form of the Great Blue Heron can be distinguished by its heavier build, larger bill, and pale legs. In the breeding season, the adult Great Blue Heron has black plumes at the back of the crown – the courtship display includes fluffing up its feathers and striking odd poses. This heron is a generalist feeder, catching fish, frogs, small mammals, birds, and a wide variety of insects. It feeds by standing still in water for long periods or

walking along waterways or through marshy vegetation and grassy fields. It can accumulate dangerous levels of toxic chemicals and is a good indicator of environmental quality.

black
"epaulets"

*Ardea alba*

Great Egret



LENGTH
0.8–1m (2½–3½ft)

WEIGHT
800–925g (29–33oz)

MIGRATION
Partial migrant

HABITAT Marine and freshwater habitats and some manmade environments, such as fish ponds

The Great Egret, like several other species, specializes in searching out and killing small prey. Where the Great Blue Heron (opposite) and others wait patiently for hours to catch large fish, the Great Egret devotes most of its day to actively catching its prey – and when there are chicks to feed, much of the

GREAT EGRET IN FLIGHT

night too – seeking small fish as well as insects. Although gregarious and often found hunting in flocks, Great Egrets are aggressive, sometimes killing and eating neighbouring nestlings.

Breeding Great Egrets are easily distinguished from other white herons by the absence of head plumes. The Great Egret is less heavily built than the white form of the Great Blue Heron (opposite) and has a longer neck. Great Egrets have returned to their former numbers and range in the USA, after persecution for their plumes. In Europe, their numbers increased during the 1990s, with the range now extending to newly created habitats.

HUMAN IMPACT

VALUABLE PLUMAGE

In the late 19th and early 20th centuries, various species of white egret were slaughtered for their plumes. Widespread revulsion at this practice led to the founding of the RSPB in Britain and the Audubon Society in the USA.

**EGRET PLUMES**

Long white trains of lacy plumes extend along the back and beyond the tail of the Great Egret during the breeding season.

Egretta novaehollandiae

White-faced Heron



LENGTH
26–72cm (10–28in)

WEIGHT
525–600g (19–21oz)

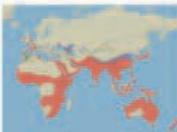
MIGRATION
Non-migrant

HABITAT Mainly inland on wetlands, salt lakes, and rice fields; less in mangroves and tidal mudflats

As its name suggests, this blue-grey heron has a white face. Australia's commonest heron, it is found in all parts of the continent, except for the driest interior. During the 20th century, these herons spread out from Australia to New Zealand, New Guinea, and other Pacific islands, taking advantage of the clearance of forests for agriculture, especially when irrigation was involved. The White-faced Heron has a varied diet, including insects at rubbish dumps, and in New Zealand, it preys on treefrogs. Its breeding season is linked to the arrival of the rains, and unusually for herons, it is a solitary nester. It also hunts alone and is highly territorial. However, it is less aggressive in winter and is sometimes seen feeding in flocks in alfalfa fields and paddocks.

Egretta garzetta

Little Egret

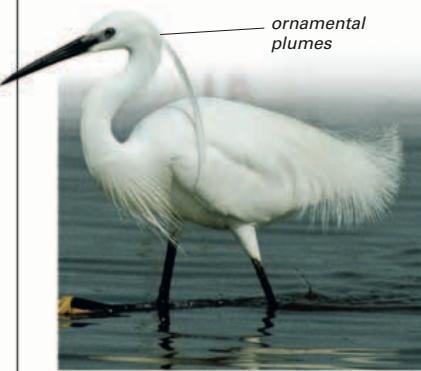


LENGTH
55–65cm (21½–26in)

WEIGHT
350–550g (13–20oz)

MIGRATION
Migrant

HABITAT Watersides from rocky coasts to reedy lakes, especially open, muddy, and sandy shores



ornamental plumes

Egretta thula

Snowy Egret



LENGTH
56–66cm (22–26in)

WEIGHT
375g (13oz)

MIGRATION
Partial migrant

HABITAT All kinds of fresh and salt water; occasionally dry grassland

ADULT IN BREEDING PLUMAGE

This Little Egret is similar to the Snowy Egret (right) but appears larger because of its slightly longer neck and legs. It feeds in a more deliberate way than the Snowy Egret, which rushes about erratically when it forages. The Little Egret's prey includes small fish, frogs, snails, and other wetland animals. Breeding adults may be distinguished by two or three long, straight plumes growing from the back of their heads. Very sociable, this sparkling white egret of marshes, poolsides, and coasts is often found in small, loose feeding flocks and tends to form evening roosts in favoured spots.

Following protection in the USA, the Snowy Egret has fully recovered from its former endangered status. In recent decades, it has expanded its breeding range northwards along the USA's east coast.

During the breeding season, the Snowy Egret has luxuriant "aigrette" plumes on its neck and back and shorter head-plumes forming a crest. This species feeds in shallow water and specializes in flushing out prey with its feet. It is among the most gregarious herons, feeding, roosting, and nesting in flocks, often with other herons. It is also highly vocal and very aggressive in defence of its feeding and nesting places.



bright yellow feet

ADULT SNOWY EGRET



**GREAT EGRETS**

During the breeding season, Great Egrets such as these develop a lime green lore (the patch of skin between the eyes and base of the bill).

PELICANS AND RELATIVES

ORDER Pelicaniformes
FAMILY 8
SPECIES 64

DESPITE BEING RELATIVELY few in terms of species, pelicans and their relatives include some of the most striking and varied fish-eating birds. Pelicans fish from the surface, using an elastic pouch attached to a giant bill. This order also includes

plunge-diving gannets and boobies, surface-diving cormorants and anhingas, and also tropicbirds and frigatebirds, which catch their food while on the wing. Found throughout the world on freshwater, coasts, and the open sea, they make up an ancient group, with a fossil history going back over 100 million years.

ANATOMY

From a distance, the birds in this order seem to have little in common, apart from the fact that they eat fish.

However, they share a number of unusual features that suggest a common ancestry. One of these is the structure of their feet – uniquely among birds, all four toes are connected by webs. Nearly all species have a throat pouch, a feature that is most developed in pelicans and frigatebirds. They fly well, but move with difficulty on the ground. Compared to other fish-eaters, pelicans and their relatives are often large and conspicuous. The Dalmatian Pelican, for example, has a wingspan of nearly 3m (10ft), while the Australian Pelican has the largest bill of any bird, measuring up to 47cm (18½in) long. Frigatebirds have a wingspan of up to 2.3m (7½ft), despite weighing less than 1.6kg (3¼lb).



A LIFE ALOFT

Frigatebirds soar over the sea, but they avoid landing on it because their feathers become waterlogged, making it difficult to take off again.

BEHAVIOUR

Pelicans and their relatives vary greatly in the way that they feed, and in the amount of time that they spend in the water. At one extreme, frigatebirds spend almost all the daylight hours in their air, soaring high over the sea. They snatch food from the surface, or from other birds, but hardly ever settle on the water. Cormorants and anhingas are exactly the opposite: they spend a lot of time on the surface, and can dive for several minutes as they search for food. Between these two extremes, gannets and boobies plunge through the surface into shoals of fish, hitting them in a simultaneous attack. Few of the birds in this order are true migrants, although some species, such as gannets, spend several years wandering at sea before they eventually return to land to breed.



PLUNGE-DIVING

Brown Boobies plunge into a shoal of fish off the coast of Peru. Air sacs under the skin cushion their impact.



SCOOPING FOR FISH

A Brown Pelican's pouch balloons outwards as it reaches underwater. As the pouch stretches and fills, the lower half of the bill bows outwards.

BREEDING

Most birds in this order nest in colonies, often on rocky offshore islands. The largest colonies, formed by gannets, boobies, and cormorants, can contain hundreds of thousands of birds, with each breeding pair spaced just beyond pecking distance from their neighbours. Their courtship rituals are elaborate: gannets have conspicuous "sky-pointing" and greeting ceremonies, while male frigatebirds puff up their scarlet pouches like balloons. Pelicans usually nest on the ground, like most gannets and boobies do. Most birds in this order produce highly dependent young. They often feed their chicks regurgitated food, which allows them to spend several hours fishing before they have to return to the nest.



NESTING IN A CROWD

Gannets, such as these Northern Gannets, nest in huge colonies on rocky islets, often staining them white with their droppings.

FEEDING TIME

Newly hatched pelicans are blind and poorly developed. Here, a young pelican reaches deep into its parent's throat for a meal of partly digested fish.



Phaethon aethereus

Red-billed Tropicbird



LENGTH
90–105cm (35–41in)

WEIGHT
650–700g (23–25oz)

MIGRATION
Non-migrant

HABITAT Marine; breeds along rocky coastlines

The Red-billed Tropicbird is the largest member of a family of three distinctive species. The plumage of all three species is mainly white with

black markings on the head and upperparts, but the Red-billed Tropicbird is distinguished by its red bill, black nape band, barred back, and white tail streamers. It has a long body, thick neck, and long, narrow wings.

The tail is extraordinary, with the central pair of tail feathers elongated into elegant streamers that trail behind in flight. The bill is powerful, with a sharp, serrated edge.

The Red-billed Tropicbird has a powerful, direct flight with strong wingbeats. It often feeds far out to sea, plunge-diving to take prey on the water's surface. It also plunge-dives to catch fish and squid, and occasionally

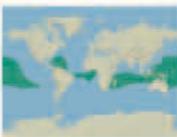
catches flying-fish in flight. The species occurs in all the subtropical and tropical oceans, although it has a restricted distribution in the Pacific Ocean. The Red-billed Tropicbird has been observed

attempting to breed to the north of its normal range, and this change in breeding distribution may reflect increases in sea temperatures in these regions due to global warming.

RED-BILLED TROPICBIRD IN FLIGHT

*Phaethon lepturus*

White-tailed Tropicbird



LENGTH
70–90cm (28–35in)

WEIGHT
225–300g (8–11oz)

MIGRATION
Non-migrant

HABITAT Tropical oceans; breeds on islands and atolls



Although the White-tailed Tropicbird has similar elegant white tail streamers – up to 45cm (17½in) long – to the Red-billed Tropicbird (above), it differs in its yellow bill and a much larger amount of black in the upper wing. It is monogamous and, like other tropicbirds, constructs its nest on the ground, well hidden under bushes, grass, and overhanging rocks in a wide variety of locations, including closed canopy forest. Nests are small unlined scrapes, but are vigorously defended by resident birds.

ADULT ON ITS NEST

Fregata minor

Great Frigatebird



LENGTH
85–105cm (33–41in)

WEIGHT
1.2–1.6kg (2⅓–3⅓lb)

MIGRATION
Non-migrant

HABITAT Tropical oceans; breeds on isolated well-vegetated islands and atolls

Mainly black in colour, the Great Frigatebird has a long blue-grey hooked bill. In the breeding season, the male's display is dramatic as it perches over a suitable nesting site to present an enormous inflated red gular (throat) sac at passing females, continuously shaking its wings as it does so.

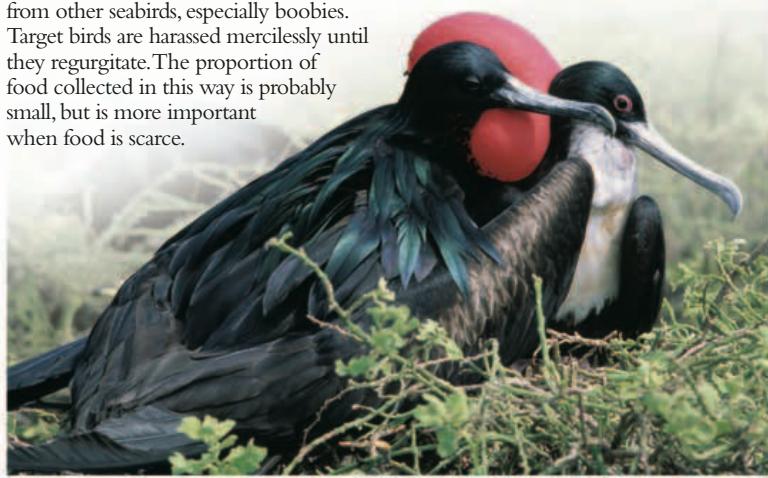
With its remarkably light body, the Great Frigatebird is among the most aerial of all birds, rarely landing during the day, except when breeding. Famously, it obtains food by stealing it in flight from other seabirds, especially boobies. Target birds are harassed mercilessly until they regurgitate. The proportion of food collected in this way is probably small, but is more important when food is scarce.

SILHOUETTE

The flight silhouette of the Great Frigatebird is very distinctive, with long, narrow, pointed wings and a deeply forked tail. Though it soars effortlessly for lengthy periods on thermals or flies purposefully with powerful wingbeats, it is ungainly on land and barely able to walk.



MALE DISPLAYING ITS RED THROAT SACK TO A FEMALE

*Fregata andrewsi*

Christmas Frigatebird



LENGTH
90–100cm (35–39in)

WEIGHT
1.5kg (3¼lb)

MIGRATION
Non-migrant

HABITAT Tropical ocean; breeds in tall forest on shore terraces of Christmas Island

RED LIST CATEGORY Critically endangered

Both male and female Christmas Frigatebirds are mostly black with a white patch on the underparts, but the female also has a white collar and a white spur extending to the underwings. During the mating season, from December to June, the male displays its red throat pouch to attract females.

The Christmas Frigatebird has the most restricted range of the frigatebirds and breeds only on Christmas Island, in the Indian Ocean. Its distribution makes it vulnerable, and its numbers have declined as a result of forest clearance and phosphate mining.

*Scopus umbretta***Hamerkop**

LENGTH	48–56cm (19–22in)
WEIGHT	475g (17oz)
MIGRATION	Non-migrant

HABITAT Wide variety of swampy wetlands**PAIR OF HAMERKOPS****NEST-BUILDING**

Usually unobtrusive, the Hamerkop draws attention to itself by building huge nests of twigs and mud. These massive structures nestle in forked branches of large wetland trees and are built by both members of the pair. Equipped with a side entrance, these structures deter predators from gaining access to the egg-chamber.



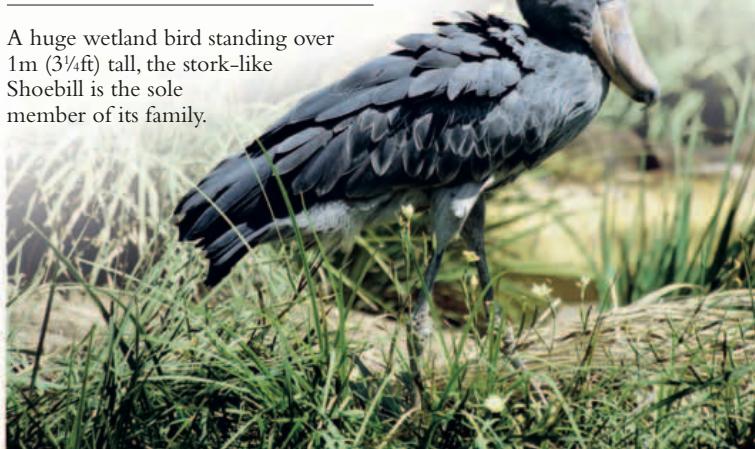
It has grey plumage. The enormous bill, shaped like a clog, gives rise to its name, and is used to catch fish, small reptiles, amphibians, and mammals. The Shoebill catches its prey by a powerful lunge at high speed into a pond or lake, with the bill and feet hitting the water at the same time. This species is threatened by habitat destruction and hunting.

ADULT SHOEBILL*Balaeniceps rex***Shoebill**

LENGTH	1.2m (4ft)
WEIGHT	5.5–6.5kg (12–14lb)
MIGRATION	Non-migrant

HABITAT Swamps, especially with low, floating vegetation, in eastern and central Africa**RED LIST CATEGORY** Vulnerable

A huge wetland bird standing over 1m (3½ft) tall, the stork-like Shoebill is the sole member of its family.



Dull brown, with a pale chin and throat, the Hamerkop is named for its unusual shape – the word “Hamerkop” means “hammerhead” in German and aptly describes the bird’s profile, with its strong bill and heavy crest at the back of its head. The Hamerkop feeds mainly on amphibians, using its strong bill to pick up frogs and fish from shallow water. Its nest is the largest roofed nest of any bird.

**ADULT GREAT WHITE PELICAN****Great White Pelican**

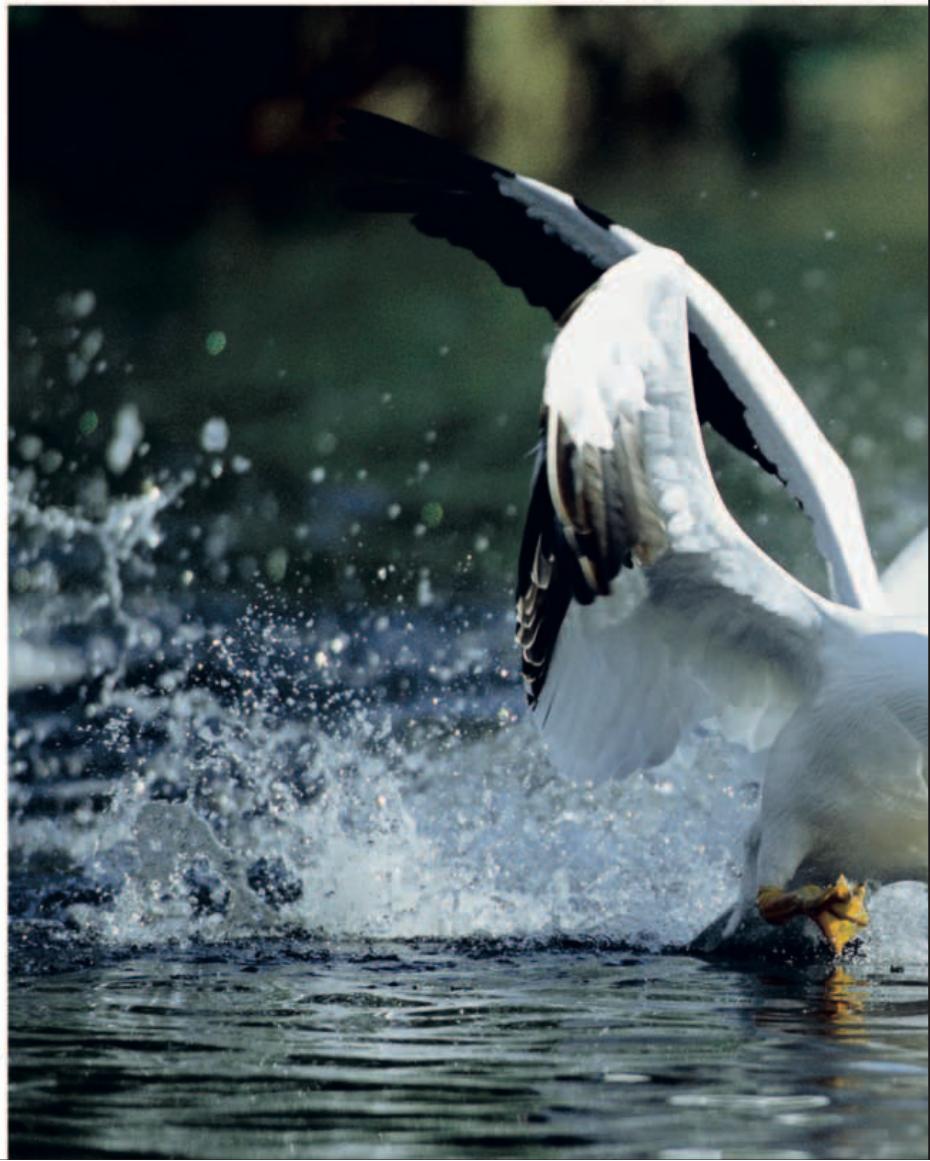
LENGTH	1.4–1.8m (4½–6ft)
WEIGHT	10–11kg (22–24lb)
MIGRATION	Migrant

HABITAT Large, shallow wetlands, mostly freshwater, in warm lowlands

A typical member of its small but widespread family, the Great White Pelican has long, broad wings. At rest, these huge wings fit untidily against the body. This pelican has a bare pink facial patch around the eye, greyish white plumage, and pink legs. Adults develop a crest during the breeding season.

Juveniles are grey and have dark flight feathers. Pelicans are strong fliers, with deep wingbeats and the ability to glide occasionally. They can often be seen soaring in groups over suitable wetlands.

The feature the pelican is best known for is its huge, powerful bill and flexible gular (throat) pouch. The bill is used to catch fish rather than humans would use a dip net. The bird ducks its head under water or upends to scoop at shoals of fish. Water is then carefully spilled from the gular pouch, leaving only the fish, which are swallowed. Groups of pelicans can often be seen hunting co-operatively by herding shoaling fish together. The species is gregarious throughout the year and nests together in noisy colonies.



Pelecanus conspicillatus

Australian Pelican

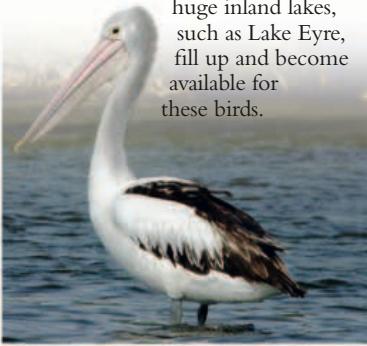


LENGTH	1.6–1.8m (5½–5¾ft)
WEIGHT	4–7kg (8³/₄–15lb)
MIGRATION	Partial migrant

HABITAT Wide range of wetland habitats, including temporary lakes in arid areas

With its short grey crest, elongated hook-tipped bill, and a yellow or pink throat pouch, the Australian Pelican is distinctive. Its legs and feet are blue-grey in colour. A sociable bird, it feeds, roosts, and nests in large flocks. It is the only pelican to be found in Australia. All year, it is seen in the wetter parts of the country; migration occurs when

huge inland lakes, such as Lake Eyre, fill up and become available for these birds.



ADULT AUSTRALIAN PELICAN

Pelecanus occidentalis

Brown Pelican



LENGTH	1.1m (3½ft)
WEIGHT	3.2–3.7kg (6½–7¾lb)
MIGRATION	Partial migrant

HABITAT Coastal, marine habitats

Mainly silver-grey and brown, the Brown Pelican has a long bill with a pouch and a chestnut mane. It is unusual among the pelicans in that it feeds and breeds in coastal marine habitats. Indeed it is rare on inland wetlands and never found far out to sea. Its breeding behaviour is similar to that of other pelicans – the male will select a suitable nest site on the ground or in a tree or bush and display to attract a mate. Once paired, the male brings nesting material to the female, who constructs the nest.

ADULT BROWN PELICAN

yellow head

scarlet throat pouch of breeding adult



PLUNGE-DIVING

While other pelicans swim and fish at the water's surface, the Brown Pelican is the only member of the family to feed by plunge-diving, a spectacular sight. When it spots a fish, it flies up as high as 10m (33ft) before folding back its wings and plunging into the sea to catch it. Brown Pelicans are gregarious, often hunting in this way in small flocks and herding shoaling fish together into a position where they can be caught with ease. In shallow water, however, they use their bills and throat pouches as dip nets, just as other pelicans do.

*Pelecanus erythrorhynchos*

American White Pelican



LENGTH	1.4–1.6m (4½–5½ft)
WEIGHT	5–6.5kg (11–14lb)
MIGRATION	Migrant

HABITAT Breeds on freshwater lakes and shallow lagoons; winters on coasts and inland

The American White Pelican has the bill and gular (throat) pouch structure common to all pelicans. The upper mandible is flat with a strong ridge and is tipped with a sturdy hook. In breeding plumage, the American White Pelican's upper mandible is adorned with an additional keel-like knob. It can distend its large gular pouch at will using its tongue muscles, and can hold up to 10 litres (3 gallons) of water while feeding.

The American White Pelican breeds in wetlands throughout western North America. It winters in central California, along the Pacific coast to Guatemala, and on the shores of the Gulf of Mexico. Like many pelicans, it breeds in large colonies with other wetland birds. Such colonies are vulnerable to severe weather, which can cause high mortality in both adults and juveniles. Breeding in large colonies does, however, reduce the overall impact of predation by other creatures.



ADULT AMERICAN WHITE PELICANS



GREAT SITES

DANUBE DELTA



LOCATION At the mouth of the Danube River, on the western coast of the Black Sea, on the border between Romania and Ukraine.



Before draining into the Black Sea, the Danube River divides into three main branches and countless smaller channels to form the largest delta in Europe, covering 4,175 square km (1,610 square miles). This vast wetland is one of the last truly great European wildernesses. Heavily laden with silt, the murky brown river water disperses throughout the delta, giving rise to a complex mosaic of diverse habitats. More than 315 species of bird, including around 175 breeding species, have been recorded here, ensuring that the Lower Danube region ranks among the top birdwatching destinations in Europe. In 1991 approximately half of the delta's core area was inscribed as a UNESCO World Natural Heritage Site.

WATER BIRD DIVERSITY

The Danube Delta consists of a complex network of watercourses and shallow lakes and lagoons that are carpeted with water lilies in summer. There are also tree-fringed islands, and floating islets of decaying reeds called plaur, interspersed with extensive reedbeds, marshes, and seasonally flooded plains. The area is of massive importance for its breeding water birds. It supports significant numbers of Pygmy Cormorants and Dalmatian Pelicans, together with most of the European populations of Great White Egrets and White Pelicans. In addition, the delta's islands host large breeding colonies of Glossy Ibises, Eurasian Spoonbills, Eurasian Bitterns, and various herons. Whiskered Terns elegantly hawk for insects over the surface of virtually every pool, and the reedbeds are teeming with warblers. Patches of riverine woodland are home to nesting raptors and woodpeckers, while drier areas have shrikes, European Rollers, and Red-footed Falcons.

In April or early May, the northward passage through the delta of several million migratory birds can be spectacular and from November onwards, the delta provides shelter for wintering flocks of waterfowl, including at times 500,000 White-fronted Geese and 45,000 Red-breasted Geese – almost the entire world population of this rare species. But perhaps the most impressive resident is the White-tailed Sea-eagle, up to 40 of which overwinter in the delta.

PELICAN SANCTUARY

A group of White Pelicans gather on a nest-platform hidden amid the reedbeds. There are about 2,500 breeding pairs of this species in the Danube Delta.

WHAT TO SPOT



RED-BREASTED GOOSE
Branta ruficollis
(see p.126)



DALMATIAN PELICAN
Pelecanus crispus



RED-FOOTED FALCON
Falco vespertinus



EUROPEAN ROLLER
Coracias garrulus
(see p.304)

Morus bassanus

Northern Gannet



LENGTH	87–100cm (34–39in)
WEIGHT	2.4–3.6kg (5½–7¾lb)
MIGRATION	Partial migrant

HABITAT Temperate marine waters; breeds on inaccessible islands and cliffs

BREEDING COLONIES

Northern Gannets nest in colonies that are usually situated on isolated rocks or small uninhabited islands. Colonies can also occur on steep inaccessible cliffs on larger islands and the mainland. The total population is estimated at 530,000 birds and a huge proportion of these nest in the largest colony on Boreray, an island in the St Kilda archipelago off northwest Scotland. This massive colony holds over 60,000 pairs.



NESTING FAMILY

A pair of gannets and their offspring are seen here at their nest – built on a cliff, it is made of marine flotsam, feathers, and droppings.

A majestic seabird, the adult Northern Gannet is mainly white with black wing-tips and a buff-yellow tinge to the head. It has a streamlined shape that is used to good effect when it plunge-dives for fish from 10–40m (32–130ft) above the surface of the sea. During the dive, the Northern Gannet can plunge to 15m (50ft) below the surface. Air sacs around its throat and neck help to absorb the impact of such high-speed dives, and

its nostrils can also be closed when diving. Dives are usually short-lived, lasting up to 20 seconds, while the bird catches its prey. It usually feeds on fish up to 30cm (12in) long, but also occasionally eats squid.

Northern Gannets breed on both sides of the Atlantic Ocean, and the populations have increased markedly since the early 20th century. Pairs may remain together for years and they also use the same nest for several years.

STREAMLINED SHAPE

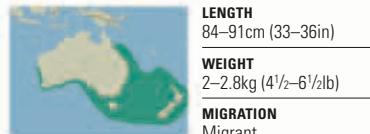
With its torpedo-shaped body, long narrow wings, and a dagger-like bill, the Northern Gannet is well adapted to plunge-diving for fish.



ADULT AUSTRALASIAN GANNET

Morus serrator

Australasian Gannet



LENGTH	84–91cm (33–36in)
WEIGHT	2–2.8kg (4½–6½lb)
MIGRATION	Migrant

HABITAT Marine, over continental shelf; breeds in isolated rocks, stacks and islands, and mainland cliffs

Similar to the Northern Gannet (left), the Australasian Gannet differs from it in having black secondary feathers when adult, and a black tail with white outer feathers. This species frequents the temperate waters around the east and south coasts of Australia and along the entire coastline of New Zealand. It is one of the least numerous of the gannets and boobies.

Sula dactylatra

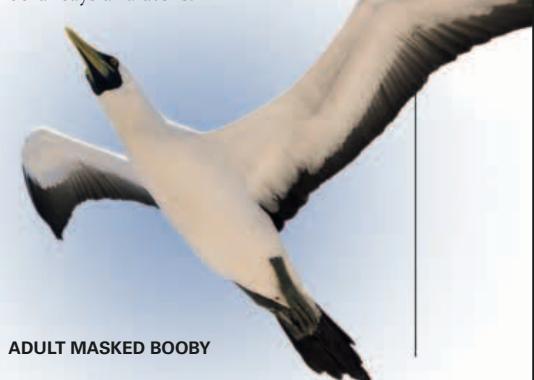
Masked Booby



LENGTH	75–85cm (30–33in)
WEIGHT	2–2.5kg (4½–5½lb)
MIGRATION	Migrant

HABITAT Marine; breeds on oceanic islands, atolls, and cays

The largest booby in the world, the Masked Booby has striking black and white plumage and a long yellow bill. Unlike the gannets that feed in shallow coastal zones, it is an oceanic wanderer, accustomed to the vastness of tropical and sub-tropical oceans. It breeds on remote oceanic islands and low-lying coral cays and atolls.



ADULT MASKED BOOBY



Sula nebouxii

Blue-footed Booby



LENGTH	76–84cm (30–33in)
WEIGHT	1.3–1.8kg (3½–4½lb)
MIGRATION	Non-migrant

HABITAT Marine; breeds on rocky coasts, cliffs, and islands

Aptly named for its bright blue feet, the Blue-footed Booby has pale brown plumage streaked in white and a white patch on its neck. It is monogamous, and strong bonds are maintained between male and female by repeated courtship displays at the nest site. The most impressive display is the "sky-pointing" ritual (pictured here). Both adults adopt a posture in which the bill is pointed skywards and the wing-tips and tail are

raised. The adults walk in an exaggerated fashion and display each foot in turn, with their eyes focused downwards and the head moving slowly up and down. Sky-pointing is performed just before one of the pair flies out to sea. This species eats only fish caught by diving into the ocean, sometimes from great heights, and swimming underwater.

ADULTS PERFORMING SKY-POINTING COURTSHIP DISPLAY



Sula variegata

Peruvian Booby



LENGTH	71–76cm (28–30in)
WEIGHT	1.5kg (3½lb)
MIGRATION	Partial migrant

HABITAT Marine (coastal); breeds on rocky islands and cliffs

The Peruvian Booby is white and brown in plumage, with a black patch around the bill. It is found down the west coast of South America and breeds along the coast between northern Peru and central Chile. This species once fed on just one type of fish, the anchoveta, which was very

PERUVIAN BOOBY BREEDING COLONY

abundant in the productive, cool upwellings associated with the Humboldt Current. Overfishing up to the 1970s saw anchoveta stocks collapse completely and this was mirrored in the decline in populations of the Peruvian Booby. Since then, this bird seems to have successfully diversified its diet to include other fish species, but recent ocean-atmosphere climate fluctuations have resulted in further population declines. However, the Peruvian Booby is a robust species and its numbers appear to build up strongly after such reversals – it is currently not considered threatened. The species breeds throughout the year, with up to four eggs laid during nesting.

Sula sula

Red-footed Booby

LENGTH	70–80cm (28–31in)
WEIGHT	925–975g (33–35oz)
MIGRATION	Non-migrant

HABITAT Tropical oceans; breeds on oceanic islands, atolls, and cays

The Red-footed Booby is unusual among the gannets and boobies in that there are two adult plumage types. In the brown form, the head, neck, upperwing, and underparts are

ADULT (BROWN FORM)



pale brown. The flight feathers are darker brown and the tail is white. In the other form, the pale brown parts of the brown form are coloured white and only the flight feathers are dark. There is also a wide range of intermediate forms, which have varying amounts of brown and white in the plumage. However, it is easy to identify the Red-footed Booby by the coloration of its bare parts, which never varies; the pink-based blue bill and the striking red or orange feet. Unlike most species of booby, the Red-footed Booby nests in trees or shrubs and not on the ground. Its nest is made of twigs or other material and quickly becomes coated in guano (droppings).

Phalacrocorax pygmeus

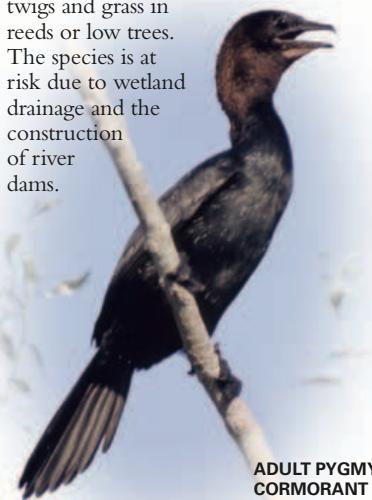
Pygmy Cormorant



LENGTH	45–55cm (17½–21½in)
WEIGHT	750g (27oz)
MIGRATION	Partial migrant

HABITAT Freshwater lakes and coastal deltas; more rarely on rivers and reservoirs

Black, with a bronzed neck, the Pygmy Cormorant is small-billed and short-necked. It normally fishes alone, usually by diving from low perches, and catches fish such as pike and carp. It nests in colonies, building a nest of twigs and grass in reeds or low trees. The species is at risk due to wetland drainage and the construction of river dams.



ADULT PYGMY CORMORANT

Leucocarbo aristotelis

European Shag



LENGTH	68–78cm (27–31in)
WEIGHT	2kg (4½lb)
MIGRATION	Partial migrant

HABITAT Coastal cliffs and small marine islands, but sometimes on inland reservoirs, lakes, and rivers



PAIR OF ADULTS

This slender bird, with its green-glossed black plumage, has a tufted head and yellow gape on the sides of its thin, slightly hooked bill. It flies fast and low over water and is frequently seen perched on rocks. The species breeds in loose colonies and the nests are placed in caves or in the crevices between large boulders.



ADULT FLIGHTLESS CORMORANT

Phalacrocorax harrisi

Flightless Cormorant



LENGTH	89–100cm (35–39in)
WEIGHT	3.5kg (7¾lb)
MIGRATION	Non-migrant

HABITAT Inshore waters; on land, always near the shoreline, on shingle and lava outcrops

With its tiny, ragged-looking wings, the Flightless Cormorant is unable to fly. Its habitat, the islands of Fernandina and Isabela in the Galapagos, was once free of predators,

allowing the bird to lose its flying ability. It is dark in colour, with black upperparts and brown underparts, and has a hooked bill. The male is usually larger than the female.

These unusual cormorants nest in small groups of a few pairs, mainly in March to September, and on islands in the coldest waters, where food is plentiful. Its flightlessness increases the bird's vulnerability to oil spills and it is now threatened by the introduction of rats and cats in the Galapagos islands, where the species breeds. It can also be affected by environmental changes, as it is not known to disperse beyond its small range.

Phalacrocorax auritus

Double-crested Cormorant



LENGTH	74–89cm (29–35in)
WEIGHT	1.5–2.1kg (3½–4½lb)
MIGRATION	Non-migrant

HABITAT Sheltered coasts; inland lakes and rivers

Largely black, with a green sheen, and brown upperparts with black scaling, the Double-crested Cormorant has bright orange skin around its bill. The ear tufts, to which its name refers, are a feature only of breeding birds. These tufts are largely white in birds of its western range but are typically black in eastern populations. In flight, this cormorant shows a prominent crook in its neck.

The species is highly sociable and usually occurs in flocks, although solitary birds are occasionally seen. The Double-crested Cormorant breeds in colonies, often placing its nest, made of twigs and grasses, low over water in mangrove swamps or other wooded places.

BREEDING ADULT

*Leucocarbo bougainvillii*

Guanay Cormorant



LENGTH	71–76cm (28–30in)
WEIGHT	2.5kg (5½lb)
MIGRATION	Non-migrant

HABITAT Mainly marine; breeds on low, flat islands

Confined to the Humboldt Current region off western South America, Guanay Cormorants have been well known to local people for centuries, being one of the most famous of the "guano" birds, so-named for the economic value of their droppings, used as a fertilizer. In the early 20th century, a single breeding island of Guanay Cormorants could be worth several million dollars, due to the dense accumulation of guano.

The back of this cormorant is mainly black, with a green-blue iridescence, while its throat and chest are white. It also has a red patch around the eye and a grey bill. Guanay Cormorants form dense flocks, both in the water, where they feed en masse, and on land. Some colonies were once considered to number millions of birds, but the species is now declining.

ADULT GUANAY CORMORANTS





Phalacrocorax carbo

Great Cormorant



LENGTH
77–94cm (30–37in)

WEIGHT
1.9–3kg (4½–6½lb)

MIGRATION
Partial migrant

HABITAT All types of coasts, but also on expanses of inland water, including reed marshes and reservoirs

The Great Cormorant has one of the most widespread territories in its family. Though it is generally black with a bright yellow throat patch, this

JUVENILE GREAT CORMORANT

is a species with a variable plumage. In the north of its range, the breeding adult is principally black, with a green gloss and white feathering on the head, but much browner and paler below in other seasons. Further south in the species' range, the adult has extensive white underparts.

Like most cormorants, this species breeds in colonies numbering up to 2,000 pairs. Nests are normally constructed of seaweed, twigs, or reeds, usually on elevated ground or on trees. It prefers to hunt in shallow water but can dive to depths of 30m (100ft).



Leucocarbo atriceps

Imperial Shag



LENGTH
75cm (30in)

WEIGHT
2.5kg (5½lb)

MIGRATION
Non-migrant

HABITAT Largely marine, but breeds on large flat-topped islands

A large black and white cormorant with a blue eye-ring, short crest, and yellow knobs above the bill, the Imperial Shag is one of many similar-looking species found mainly on islands and remote continental areas throughout the southern hemisphere.

IMPERIAL SHAG ON ITS NEST

The Imperial Shag breeds in large, dense colonies, which are often situated close to those of the Rockhopper Penguin (see p.139) and the Black-browed Albatross (see p.145), ensuring that such places produce a cacophony of sound. The nest is made of mud and algae, with a lining of grasses for the 2–4 eggs.

These cormorants travel great distances from their colonies to find food, mainly crustaceans and small fish that they catch by diving deep under water. Although their habitat is now used by fisheries, they do not appear to favour commercially exploited fish, thus avoiding conflict with humans.

Anhinga



LENGTH	85–89cm (33–35in)
WEIGHT	1.2kg (2½lb)
MIGRATION	Non-migrant

HABITAT Usually calm bodies of fresh water, from large estuaries to small ponds

The Anhinga or Darter, as it is also known, has a slender, straight bill, elongated neck, and long tail. It is snake-like in appearance as it glides through the water, so low as to be almost invisible. When the adult is at rest and extends its wings to dry, the large white patches on its back and upper

wing are noticeable. The juvenile is pale brown in colour, with paler underparts. Unlike cormorants, the Anhinga lacks a hook at the tip of its bill and is also different in flight, as it circles high on thermals like a bird of prey, flapping its large, broad wings.

The Anhinga constructs a nest of twigs and leaves. It is sociable when breeding, nesting in colonies with other tree-nesting birds, such as herons, ibises, and cormorants.



ADULT ANHINGA



FEEDING TECHNIQUE

The Anhinga feeds principally on fish, which it captures by using its long, spear-shaped, narrow bill. The bird swims stealthily through shallow water, stalking fish just below the surface, before stabbing one and raising it out of the water, still skewered by its bill. It then flips the fish in the air and swallows it head-first.

BIRDS OF PREY

ORDER Falconiformes

FAMILY 3

SPECIES 304

WITH SOME SPECIES having enormous wingspans, birds of prey include the world's largest flying carnivores. Also known as raptors, most of them catch their food with their talons – something

that requires superb eyesight and fast reactions, particularly when catching prey in mid-air. This large order contains eagles, hawks, kites, and falcons, together with carrion-eating vultures. As a group, they live throughout the world except in Antarctica.

ANATOMY

Birds of prey vary hugely in size. Some eagles have a wingspan of nearly 3m (10ft), compared to just 20cm (8in) for the smallest falconets from southeast Asia. Despite this huge difference in size, all birds of prey share a similar body plan, although with markedly different proportions, particularly in the shape of their wings. Birds of prey have powerful feet armed with sharp claws or talons, and their legs are often feathered as far as the ankle joint. All of them have strongly hooked bills, which they use for tearing up their food, rather than for catching their prey. They also have forward-facing eyes – a vital adaptation for judging distances accurately when they move in to make a kill. Owls have a similar anatomy, but unlike them, almost all birds of prey hunt by day.



WEDGE-TAILED EAGLE



RED KITE



PEREGRINE FALCON

WING SHAPES

With its widely spaced primary flight feathers, the Wedge-tailed Eagle is a typical soaring bird of prey. The Red Kite's kinked wings make it agile in the air, while the Peregrine Falcon's slender wings are shaped for speed.

WINGS AND FLIGHT

Even from the far distance, their distinctive wing shape and flight path help to identify different birds of prey. Eagles, buzzards, and vultures typically fly high in the sky, soaring effortlessly on their broad, outstretched wings. One species of African vulture – Rüppell's Vulture – is on record as the highest flier of this order of birds, after colliding with an aircraft at over 11,000m (36,000ft). However, such high-flying birds are an exception, because most birds of prey operate much closer to the ground. Kites and harriers criss-cross open country and woodland, flying at a leisurely pace relatively near the ground as they watch for potential prey below. Birds of the kestrel family are instantly recognizable, because they are among the few birds of prey that hover while they watch for food. Other birds of prey, such as peregrines and sparrowhawks, are pursuit hunters. These have a flight pattern more like that of a fighter plane: they burst through the air at high speed, diving or swooping on other birds, which are their main prey, and move on straight away if they fail to make a kill.

CLASSIFICATION

Birds of prey are classified in a single order. However, DNA and anatomical studies suggest that American vultures are not closely related to vultures from the Old World, and may be closer to storks. Their outward similarity to Old World vultures is probably the result of convergent evolution, creating similar body forms for similar ways of life.

A CASE OF CONVERGENCE

Like other American vultures, the King Vulture (right) has long legs and weak feet, without strongly curved toes. The Griffon Vulture (far right) is a typical Old World vulture, with grasping feet that are much more like those of eagles and buzzards.



HUNTING AND DIET

Despite their reputation as heavyweight hunters, some birds of prey have unusual and surprising diets. The Snail Kite, for example, lives entirely on freshwater snails, while the Palm-nut Vulture from Africa feeds on the fruit of oil and raffia palms. Small falcons often prey on dragonflies, while some large raptors – such as the Common Buzzard – will stoop to eating earthworms if the weather is too cold or wet for soaring. But given good conditions, most raptors are specialists, concentrating on particular kinds of prey. The fish-eating Osprey has spiny toes which help it to grip its catch, while snake eagles grip their prey just behind the head, preventing it from striking back. In tropical forests, Harpy Eagles snatch monkeys and sloths out of the treetops, carrying prey weighing up to 6kg (13lb) – about two-thirds of their own body weight. Aerial hunters, such as Peregrine Falcons and sparrowhawks, can kill birds substantially bigger than themselves. The latter grip their prey with their talons, but Peregrine Falcons slash it as they dive past, leaving the stricken bird to fall tumbling to the ground, where it is retrieved by the successful hunter.

NATURE'S RECYCLERS

Vultures are most common in dry, open habitats where columns of rising air make it easy to soar. These White-backed Vultures in Namibia have gathered around a zebra carcass.

BIRD EATS BIRD
The Eurasian Sparrowhawk flies low over hedges and woodland, preying on other birds. This adult female is feeding on a Grey Partridge. It plucks its victim's breast, eats the flight muscles, but leaves the rest.

Despite their reputation as heavyweight hunters, some birds of prey have unusual and surprising diets. The Snail Kite, for example, lives entirely on freshwater snails, while the Palm-nut Vulture from Africa feeds on the fruit of oil and raffia palms. Small falcons often prey on dragonflies, while some large raptors – such as the Common Buzzard – will stoop to eating earthworms if the weather is too cold or wet for soaring. But given good conditions, most raptors are specialists, concentrating on particular kinds of prey. The fish-eating Osprey has spiny toes which help it to grip its catch, while snake eagles grip their prey just behind the head, preventing it from striking back. In tropical forests, Harpy Eagles snatch monkeys and sloths out of the treetops, carrying prey weighing up to 6kg (13lb) – about two-thirds of their own body weight. Aerial hunters, such as Peregrine Falcons and sparrowhawks, can kill birds substantially bigger than themselves. The latter grip their prey with their talons, but Peregrine Falcons slash it as they dive past, leaving the stricken bird to fall tumbling to the ground, where it is retrieved by the successful hunter.



SUCCESSFUL CATCH

The Osprey is one of the most widespread birds of prey. It fishes on lakes, reservoirs, and coasts, flying back to a favourite perch after making a catch.



HUMAN IMPACT

THREATS AND CONSERVATION

A quarter of all birds of prey are currently listed as vulnerable, threatened, or endangered. In southern Asia, some vultures have declined by over 95 per cent in less than a decade. Birds of prey are also threatened by habitat destruction – something that particularly affects large, tropical forest species.



CHECKING UP

A biologist fits a leg band to a Peregrine Falcon chick, so that its movements can be followed once it leaves the nest.

NESTING AND PARENTING

Birds of prey rarely build elaborate nests, and falcons often take over the disused nests of other birds. However, many species show great site tenacity, using the same nest year after year. These birds often add new nesting material each time they breed, creating enormous structures that can weigh over a tonne.

Compared to other birds, birds of prey

produce relatively few eggs, and they begin incubation as soon as the first is laid. In large eagles, the incubation period can be as long as seven weeks, but in all cases, it starts as soon as the first egg has been laid. Once the eggs have hatched, the chicks can take over two months to fledge. If food runs short during this period, the largest chick frequently eats its smaller siblings.

SWOOPING FOR THE KILL

With its wings, talons, and tail outstretched, a Golden Eagle swoops down onto its prey. Birds of prey instinctively attack mammals from behind, minimizing their chances of being seen until it is too late for their prey to escape.

GROWING FAMILY

High in a pine tree, an adult Northern Goshawk tends its three chicks. As with most birds of prey, the parents bring food back to the nest, and tear it up into pieces that are small enough for their chicks to swallow.



*Cathartes aura***Turkey Vulture**

	LENGTH 76cm (30in)
	WEIGHT 1.4kg (3½lb)
	MIGRATION Partial migrant

HABITAT Open or semi-open areas, often nesting on open ground where there are few other nests

A common bird of North and South America, the Turkey Vulture is so named because its bare-skinned head is similar to that of a Wild Turkey (see p.109). Its grey-brown plumage with two-tone wings contrast with its bright red to pink head and neck, and it has a hooked white bill. This vulture has a keen sense of smell, enabling it to locate prey even in thick jungle.

ADULT TURKEY VULTURE**ROADSIDE SCAVENGERS**

Well known for its habit of feeding on carcasses, the Turkey Vulture is a common roadside scavenger in its range, often seen feeding on roadkill. Its fondness for carrion probably accounts for its increase in populated areas.

*Coragyps atratus***Black Vulture**

	LENGTH 60cm (23½in)
	WEIGHT 2–2.7kg (4½–5½lb)
	MIGRATION Non-migrant

HABITAT Open areas, including urban habitats, but avoids forests

**ADULT BLACK VULTURE**

The Black Vulture is predominantly a black bird, but the slightly iridescent feathers on its back make it appear green in bright light. The undersides of its wings are usually paler than the black plumage on the rest of its body, and it has long, grey-white legs. Its tail is short and squared, barely extending beyond the wing.

While its main food is carrion, it is also an opportunistic scavenger, eating even fruit and other birds' eggs. When alarmed, these vultures are able to regurgitate food to lighten their weight so that they can quickly escape. The Black Vulture is not agile in the air – its flight appears laboured, with long periods of gliding between a few wing flaps. It is often seen soaring on warm updraughts.

The Black Vulture often forms large groups, usually together with Turkey Vultures (see above), although they are always dominant over the latter.

In the breeding season, the female lays two eggs in a suitable structure such as a tree stump, or in dark recesses like rocky crevices, hollow logs, tree cavities, and caves. However, the species is now often found nesting in sheltered parts of buildings. Its population is increasing, showing an expansion into urban areas. It is often seen in markets, fishing docks, and rubbish dumps and has adapted well to habitats disturbed by human activity.

*Sarcoramphus papa***King Vulture**

	LENGTH 80cm (31in)
	WEIGHT 3–3.8kg (6½–8¾lb)
	MIGRATION Non-migrant

HABITAT Forests and open areas to an altitude of 1.5km (1 mile)

This spectacular bird has contrasting black and white wings, which make it noticeable in flight, but its ornate black, yellow, and red markings on the

**WINGS ON DISPLAY**

The King Vulture spreads its broad wings to display its impressive wingspan of 2m (6½ft).

bare head set the King Vulture apart from other vultures. It also has a fleshy growth above its beak that is often bright orange in mature individuals. Unlike many birds, both the males and females develop this growth, the main function of which is to show dominance when they gather with others to feed at a carcass.

Unusually for a scavenging bird, this species detects food by watching and then following other scavengers, not by using smell. It is not recorded as a true predator as it feeds only on carrion. Like most vultures, it has no voice box, its calls being limited to grunts and hisses.

**BLACK AND WHITE SPLENDOUR**

Even at rest, the King Vulture is a magnificent bird with its white plumage set off by its jet black flight feathers and tail.





Gymnogyps californianus

California Condor



LENGTH
1.3m (4½ft)

WEIGHT
9–11kg (20–24lb)

MIGRATION
Non-migrant

HABITAT Open areas, but also wooded areas, scrubland, and rocky habitats.

RED LIST CATEGORY Critically endangered

Now found mainly in captivity or in controlled conditions in the wild, California Condors were on the brink of extinction, but despite some losses, are slowly increasing in number today (see panel, below). This species has black plumage with white-tipped wing feathers, a bare-skinned head tinged orange or pink, a black neck ruff, a hooked white bill, and pink legs and feet. It eats large carrion, but can survive several days without feeding.



CALIFORNIA CONDOR

HUMAN IMPACT



CAPTIVE BREEDING

To save the California Condor from extinction, all remaining birds in California were trapped for a captive breeding programme in 1987, which to some extent reduced this risk. When captive-bred birds are reintroduced in the wild, they are continually monitored by numbered wing-tags (see left) and radio transmitters.



Vultur gryphus

Andean Condor



LENGTH
1.2m (4ft)

WEIGHT
11–15kg (24–33lb)

MIGRATION
Non-migrant

HABITAT Mountainous areas, but also found in lowlands to the west of the Andes

A huge bird, the Andean Condor has the largest wing area of any bird. The adult male has a prominent fleshy comb stretching from the beak to the top of the head. It also shows large areas of white to the trailing edge of the wing when seen from above.

Most populations are threatened due to the limited geographical range of the species and a slow breeding rate in remote sites. The Andean Condor has an important role in South American folklore yet persecution is widespread due to a perceived threat to livestock although many of the birds are in sparsely inhabited areas.

ADULT MALE

Caracara cheriway

Northern Crested Caracara



LENGTH
51–60cm (20–23½in)

WEIGHT
0.8–1.2kg (1¾–2⅓lb)

MIGRATION
Non-migrant

HABITAT Mainly open and semi-open country, such as grassland, bushland, farmland, and ranchland

The Northern Crested Caracara is not a fast-flying aerial hunter, but it uses its long legs to search for prey on ground. When excited, the



bare skin on the face changes colour, from orange or shades of red to bright yellow. The sexes are similar, but the juvenile has a brown back, buff neck and throat, and pale breast streaked with brown. This species is omnivorous and will eat reptiles, amphibians, and carrion. It nests in a tree or on the ground, laying 2–4 eggs.

ADULT FEEDING ON A LIZARD

Milvago chimachima

Yellow-headed Caracara



LENGTH
40–46cm (15½–18in)

WEIGHT
300–325g (11–12oz)

MIGRATION
Non-migrant

HABITAT Ranchland, savanna, palm groves, and open country with scattered trees



ADULT BIRD

The adult Yellow-headed Caracara has a buff head and underparts, with contrasting dark brown upperparts, while the juvenile is mottled with brown on the underparts. The Yellow-headed Caracara has a buoyant flight with even wingbeats and occasional sweeping glides. The call of the species is a screamed "schreeee". It is omnivorous and is often seen feeding on roadkill. It will also take ticks from cattle, earning it the name of "tickbird".

Herpetotheres cachinnans

Laughing Falcon



LENGTH
43–52cm (17–20½in)

WEIGHT
575–675g (21–24oz)

MIGRATION
Non-migrant

HABITAT Forest edges and clearings, savanna, palm groves, and plantations

The common name of this unusual, large-headed Neotropical falcon comes from its cackling alarm call. It is a specialist snake-eater and often remains for hours on an exposed perch, on the lookout for food. It catches snakes by pouncing on them and then biting them just behind the head. It supplements its diet with lizards, small rodents, and also bats and centipedes. This falcon flies with quick, shallow wingbeats interspersed with glides and it seldom soars. It nests in rock- or tree-cavities, or uses the abandoned nests of other raptors.

*dark
upperparts*



ADULT LAUGHING FALCON

Polihierax semitorquatus

Pygmy Falcon



LENGTH
18–21cm (7–8½in)

WEIGHT
60g (2⅓oz)

MIGRATION
Partial migrant

HABITAT Dry acacia savanna, thornbush, and sub-desert scrub

This tiny falcon is closely associated with the Sociable Weaver (see p.452) and White-headed Buffalo Weaver (see p.454) colonies and breeds in their massed multi-chamber nests. It can often be seen scanning the ground from an exposed branch of a tree or a telephone pole and dropping in a quick swoop to catch large insects and small lizards. The male has a grey back, while the female's back is chestnut.



ADULT MALE

Falco tinnunculus

Common Kestrel



LENGTH
27–35cm (10½–14in)

WEIGHT
175–200g (6–7oz)

MIGRATION
Partial migrant

HABITAT Wide range of areas, including farmland, forest edges, grassland, and suburban places

Often seen hovering over open country and along roadsides, the Common Kestrel is one of the most well-known birds of prey in Europe. The male has a blue-grey head and a red-brown back, spotted with black, while the female has a brown head and tail. The Common Kestrel's tail is slim, with a black band on each feather. This kestrel preys on small mammals, including voles, as well as small birds, large insects, earthworms, and frogs. Sensitive to ultraviolet rays, it can see the urine trails of rodents, which reflect ultraviolet light. It has excellent eyesight, and can see a beetle about

HOVERING

While scanning the ground for its prey, the Common Kestrel can hover in one place for a long time, beating its wings very rapidly. As it hovers, its tail spreads out like a fan, displaying a black band across its feathers. The fan-shaped tail acts as a brake when it is about to land.



50m (165ft) from its perch. It nests on bare ledges on cliffs, quarries, tree-holes, unoccupied crows' nests, or even old, unused buildings.

ADULT FEMALE



Falco rupicoloides

Greater Kestrel



LENGTH	29–37cm (11½–14½in)
WEIGHT	250g (9oz)
MIGRATION	Non-migrant

HABITAT Open grassland and savanna with scattered trees

The Greater or White-eyed Kestrel is widespread in Africa. As its name suggests, it has a pale eye, which helps to distinguish it from similar all-brown kestrels. The tail is grey, with thick black bars along its length. The juvenile has a browner tail and dark eye. There are three different subspecies, with well-defined ranges. The Greater Kestrel nests in trees, usually using the abandoned nest of another bird, and lays 3–5 eggs.

Falco columbarius

Merlin



LENGTH	24–32cm (9½–12½in)
WEIGHT	175–225g (6–8oz)
MIGRATION	Migrant

HABITAT Tundra, arctic-alpine, and temperate areas in summer; open places and coasts in winter

The Merlin relies on speed and agility to hunt its prey, which mainly consists of small birds such as larks and pipits, although it also eats a variety of large flying insects. It hunts by flying fast and

FEMALE MERLIN



low, often less than 1m (3½ft) above the ground, in order to surprise its prey. The male Merlin is blue-grey above, and cream to rufous-buff below, with dark streaks; its pale grey tail has a black band. The female is brown above and has cream, brown-streaked underparts, its banded tail being brown and cream.

This species nests on the ground throughout most of its range, but also uses abandoned nests of other birds, especially crows' nests. It breeds from April to June and 3–6 eggs are laid. The male's call is a quick, sharp "kik-kik-ki-kik", while the female has a deeper, more nasal, "kee-kee-kee-kee", but both are quiet when nesting and in winter.

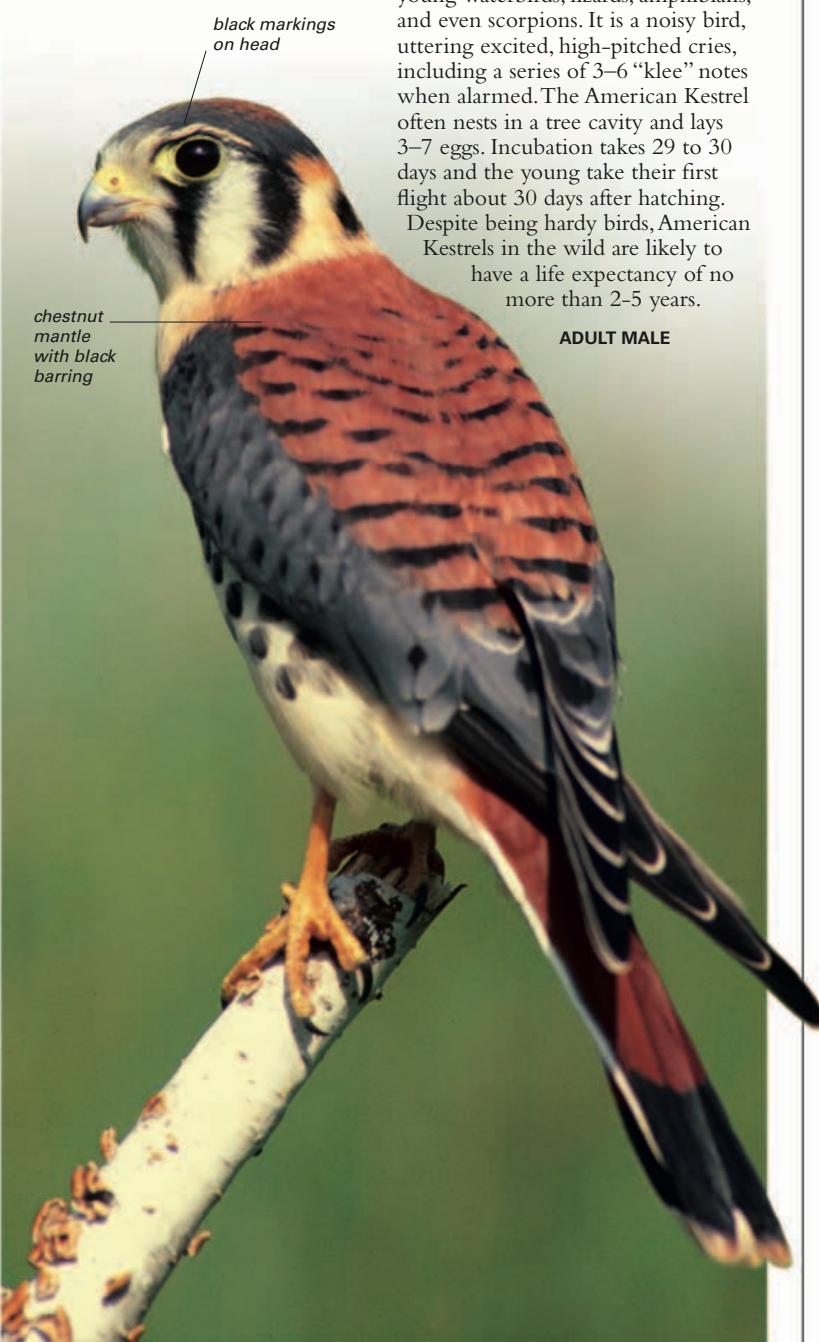
Falco sparverius

American Kestrel



LENGTH	21–27cm (8–10½in)
WEIGHT	100–125g (3½–4½oz)
MIGRATION	Migrant

HABITAT Wide variety of habitats, including urban areas, but not dense forests or tundra

*Falco subbuteo*

Eurasian Hobby



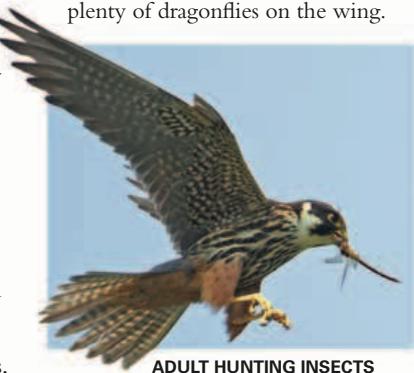
LENGTH	28–34cm (11–13½in)
WEIGHT	200–225g (7–8oz)
MIGRATION	Migrant

HABITAT Edges of temperate forest and woodland in summer; grassland in winter

This sleek, sickle-winged falcon is a long-distance migrant, breeding from Europe to Russia and wintering mainly in southern Africa.

The adult has white cheeks that contrast with the black hood; it is slate-grey above and streaked below. At close range, the red vent and thigh feathers can be seen. The Eurasian Hobby is a fast and skilful hunter. It can be seen catching large dragonflies,

which it eats in flight, and regularly preys on swallows and even swifts. The female uses abandoned nests of crows and other birds, laying 2–4 eggs. Its breeding season is carefully timed to feed its young – it has chicks in the nest when the recently fledged young of small birds are numerous, and the young leave the nest when there are plenty of dragonflies on the wing.



ADULT HUNTING INSECTS

Falco biarmicus

Lanner Falcon



LENGTH	39–48cm (15½–19in)
WEIGHT	500–725g (18–26oz)
MIGRATION	Partial migrant

HABITAT Open dry country, desert, semi-desert, rocky wadis, lightly wooded savanna, and grassland

This small and beautifully marked falcon is one of the most familiar raptors in its range. It has two vertical facial lines and its rufous back is barred in black. There are dark spots on its pale yellow breast.

The American Kestrel hunts from a perch or on the wing, and often hovers. It mainly eats large insects during the summer, while in winter, when insects are scarce, it turns to mice and small birds. It also takes young waterbirds, lizards, amphibians, and even scorpions. It is a noisy bird, uttering excited, high-pitched cries, including a series of 3–6 "klee" notes when alarmed. The American Kestrel often nests in a tree cavity and lays 3–7 eggs. Incubation takes 29 to 30 days and the young take their first flight about 30 days after hatching.

Despite being hardy birds, American Kestrels in the wild are likely to have a life expectancy of no more than 2–5 years.

ADULT MALE

A fast-flying bird, the Lanner Falcon preys on birds and bats. It has a black-bordered rufous cap and nape, which contrasts with its steely-grey upperparts and white underparts. The juvenile is a bluish grey. This species usually hunts by horizontal pursuit. It is prized in falconry, as it displays a docile nature often lacking in more powerful falcons. The Lanner Falcon may be identified by its strident call, which has a repeated "kak-kak" sound.

Falco rusticolus

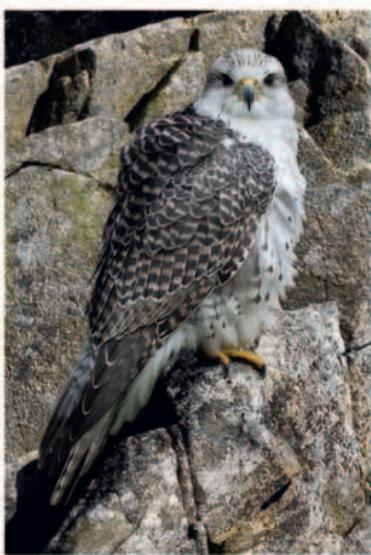
Gyrfalcon



LENGTH	50–60cm (19½–23½in)
WEIGHT	1.2–1.7kg (2½–3½lb)
MIGRATION	Partial migrant

HABITAT From coastal cliffs to mountain crags, including tundra and woodland edges

The Gyrfalcon is the world's largest falcon and is found in three colour forms – white, grey, and dark. It feeds on birds and mammals, from small finches to large geese, and from voles to hares. It perches, watching for food, then flies low and fast to surprise its prey. Birds may be chased, but are usually caught on the ground or on water. This species is highly prized by falconers.



ADULT GYRFALCON

Falco mexicanus

Prairie Falcon

LENGTH	37–47cm (14½–18½in)
WEIGHT	600–900g (21–32oz)
MIGRATION	Partial migrant

HABITAT Grassland, prairies, desert, and wooded mountains, from high tundra down to sea level

The Prairie Falcon is a large, slim bird, with a grey-brown plumage. Outside the breeding season it can be highly nomadic, moving to where its food is plentiful. In some parts, its breeding is linked with the emergence of ground squirrels, an important prey item. As well as mammals and birds, it also eats lizards and large insects. It can be noisy and aggressive at times.



ADULT PRAIRIE FALCON

ADULT PEREGRINE FALCON

*Sagittarius serpentarius*

Secretarybird



LENGTH	1.1–1.5m (3½–5ft)
WEIGHT	4kg (8¾lb)
MIGRATION	Non-migrant

HABITAT Open and bushy grassland, large cereal farms, and semi-desert with scrub

Unlike any other bird of prey, the Secretarybird has extraordinarily long legs, a long wedge-shaped tail, and a crest of black feathers on the back of its head. It gets its name from the crest, which resembles a row of quill pens, once used by secretaries. It spends most of its time on the ground and

has the ability to run fast, taking off with a flapping run and sometimes soaring high on thermals, like other birds of prey.

Grasshoppers, beetles, small rodents, and snakes make up its main food items. Most of its prey is killed on the ground, sometimes with its bill, but also by stamping on it. It is often attracted to bush fires, where it will search for dead insects and other small animals. The Secretarybird does not migrate, but will move some distance to find food, responding to rainfall, fires, and cropping or grazing activities. It usually nests in the top of an acacia tree in a stick nest lined with grass, wool, and animal dung.

ADULT SECRETARYBIRD WITH PREY



SNAKE KILLER

The Secretarybird is famous for killing snakes, tackling even venomous species. It kills a snake by holding it under its feet and tearing it up, or flying up with the snake in its bill and dropping it on the ground.

STAMPING ON PREY

A fast runner, the Secretarybird chases its prey, which when caught, is stamped to death, the talons aiming at the head of the prey.

Falco peregrinus

Peregrine Falcon

LENGTH	35–51cm (14–20in)
WEIGHT	0.5–1.2kg (1–2½lb)
MIGRATION	Migrant

HABITAT Open country from mountains to coasts; large cities along rivers

The Peregrine Falcon is the fastest bird of prey, and can travel at speeds of up to 250kph (155mph), perhaps even faster. It will spot its prey from

high in the sky, close its long wings, and dive down in a stoop. It preys mainly on birds, taking a wide variety, such as ducks, waders, pigeons, and parrots. The female is about double the size of the male and can catch larger prey. The upperparts of this bird are slate-grey and it is barred below. Its head has a helmeted pattern with a dark moustache.

The Peregrine Falcon has a wide distribution throughout the world. Arctic breeding birds will migrate south of the equator, while tropical populations are resident. There are 16 different subspecies, which vary in size and plumage.



 *Pandion haliaetus*

Osprey



LENGTH	50–66cm (19½–26in)
WEIGHT	1.5kg (3½lb)
MIGRATION	Migrant

HABITAT Always found near water, salt or fresh; lakes, large rivers, estuaries, and coastal lagoons

Once known as the Fish-Hawk, the Osprey is well equipped to catch fish, which form its main diet. It hunts by flying or sometimes hovering over a lake, river, or estuary and then plunging into the water to grab a fish from close to the surface. Its claws are specially adapted to help it grasp its prey; the soles are spiny and the front outer talon is reversible and can be moved back to enable two talons to grip each side of the fish. The Osprey also has a strongly curved bill. Its other distinguishing features are its white head, a broad black mark through its cheek and the sides of its neck, its dark brown upperparts with a purple sheen, and its long tail with narrow bars.

It usually builds its nest at the top of a tree or on an island shore, and many nests are traditional, with pairs or their offspring returning to them year after year. The provision of nesting platforms has helped the Osprey to breed again in many areas from which it had vanished, due to past persecution and DDT poisoning.

This species is found in every continent except Antarctica. Most of the North American population migrate south to spend the winter in Central America and northern South America, while Eurasian birds fly to Africa, south of the Sahara.

OSPREY GRIPPING FISH WITH ITS TALONS



 *Pernis apivorus*

European Honey Buzzard



LENGTH	55cm (21½in)
WEIGHT	700g (25oz)
MIGRATION	Migrant

HABITAT Lowland forest and woodland with glades and open areas

MALE, FEMALE, AND YOUNG AT THEIR NEST



The European Honey Buzzard is not a true buzzard, in fact, it is more closely related to kites. Unusually for a bird of prey, it feeds on wasps, bees, and hornets as well as their nests, larvae, and pupae. Its forehead and face are covered with small scale-like feathers to protect it from stings. It has a shallow, curved bill and relatively underdeveloped talons.

In its courtship flight, called a "sky-dance", the male flies high, then swoops and dives down and up again in a undulating pattern, holding its wings high and quivering them.

 *Elanoides forficatus*

Swallow-tailed Kite



LENGTH	52–62cm (20½–24in)
WEIGHT	450g (16oz)
MIGRATION	Migrant

HABITAT Over woodland, forest edges by rivers, wetland areas with trees and bushes

An agile flier, the Swallow-tailed Kite has long, pointed wings with black flight feathers and white wing linings. It catches most of its insect food on the wing, twisting its long, forked tail as it gracefully glides on high air currents. It often swoops down on water to drink. Its black bill, dark brown eyes, and black upperparts, contrasting with the white head and underparts, also make it easy to spot.

Birds that breed in southeastern USA and Central America migrate south to spend the winter in South America. Small groups may breed and feed together and flocks of several



ADULT SWALLOW-TAILED KITE

hundreds can be seen on migration. The nest of this species is usually built in a tree-top concealed by thick foliage. Lined with leaves and lichen, it is made of sticks, moss, and pine-needles and is built by both the male and female. The 2 or 3 eggs laid are incubated by both parents, but mostly by the female.

Rostrhamus sociabilis

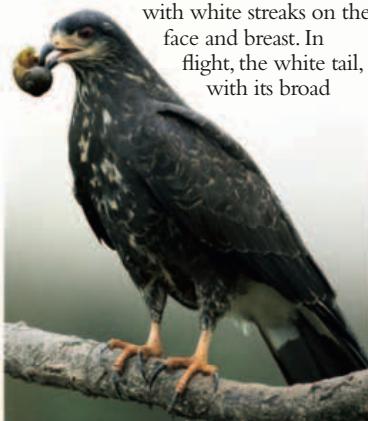
Snail Kite



LENGTH	40–45cm (15½–17½in)
WEIGHT	300–450g (11–16oz)
MIGRATION	Partial migrant

HABITAT Freshwater lowland marshes

The Snail Kite has a specially adapted narrow, hooked bill enabling it to quickly and easily prise out the flesh from the shells of aquatic apple snails, which constitute most of its specialized diet. During droughts, when snails are scarce, the kite will switch to different prey such as crabs. The male and female differ in their plumage: the male is grey-black, while the female is dark brown, with white streaks on the face and breast. In flight, the white tail, with its broad

**FEMALE SNAIL KITE**

dark tip is clearly visible. The bird flaps its large wings slowly as it flies above marshes, keeping its eyes pointed downwards in search of prey.

Populations from the south of the range are migratory – more northern populations move in response to drought conditions and in order to find food. The species is rare in the USA, where it is found only in Florida. Elsewhere, it occurs from Mexico and the Caribbean to the pampas of Argentina.

GREAT SITES

THE FLORIDA EVERGLADES

The entire North American population of Snail Kites is confined to Florida, where they number up to 500 birds in all. The shallow freshwater marshes of the Florida Everglades are the stronghold of the species, which is dependent on habitats that support aquatic apple snails, its staple food.

*Haliaeetus albicilla*

White-tailed Eagle



LENGTH	70–90cm (28–35in)
WEIGHT	4–5.5kg (8¾–12lb)
MIGRATION	Partial migrant

HABITAT Diverse range of wetlands including coasts, lakes, large rivers, and marshes

The White-tailed Eagle is the largest eagle in northern Europe – it has a wingspan of 2.5m (8½ft), and the female (which is heavier than the male) weighs up to 5.5kg (12lb). It is dark brown in colour, with a pale head, yellow bill, and a short white tail. The juvenile is a uniform darker brown, taking five to six years to attain adult plumage and a further two years before it acquires the white tail.

In flight, the White-tailed Eagle is often referred to as a “flying barn door”, highlighting the fact that its long wings are exceptionally broad. The tips of the primary feathers are distinctly spread in flight, giving the bird a classic eagle profile. Its flight is heavy and direct, with deep wingbeats, and it soars on flat wings. The species prefers coastal habitats and can also be found inland near lakes and along rivers.

The White-tailed Eagle eats a variety of food. Fish, which are

caught from the water's surface, probably form the bulk of its diet, but other prey, which include water birds and mammals (usually carrion), are also consumed.

In the north and east of its range, White-tailed Eagles are mainly migratory and winter gatherings can be up to 30 birds, but populations in Greenland, Iceland, and Norway are largely sedentary. This species builds its nest, made of sticks, seaweed, grasses, and bones of prey, on sea cliffs or in the flat crowns of large woodland trees.

*Ictinia mississippiensis*

Mississippi Kite



LENGTH	35–38cm (14–15in)
WEIGHT	250–300g (9–11oz)
MIGRATION	Migrant

HABITAT Broad-leaved woodland; hunts in more open areas, such as farmland

Small and slender, the Mississippi Kite has a pale grey head (paler in the male) and breast, darker grey upperparts, long, pointed wings, and black wing-tips. The juvenile is brown and heavily streaked. The Mississippi Kite feeds mainly on small insects such as grasshoppers and cicadas, often eating them in mid-air, though larger prey, such as mice or small reptiles, are also taken. Its flight is smooth and graceful, with steady wingbeats and occasional glides.

The Mississippi Kite breeds in southern USA, nesting in loose colonies. Although it commonly occurs in the state of Mississippi, its name is actually derived from the fact that the first scientific specimen of the species was collected there. After breeding, the species undergoes a long-distance southerly migration to winter in Paraguay and northern Argentina. Flocks containing hundreds of these kites can be seen in winter, often together with other raptor species.

ADULT RED KITE

Milvus milvus

Red Kite



LENGTH	60–65cm (23½–26in)
WEIGHT	950–1200g (34–43oz)
MIGRATION	Partial migrant

HABITAT Open woodland and farmland

This large and red-brown raptor, the Red Kite has a strikingly angular appearance in flight. When seen from below, the black tips and inner white feathers highlight the length of its wings. The species also has a long and distinctively forked tail, which is pale rust-red in colour. It flies in fast and twisting dives, with flexibility and elasticity in its movements.

The Red Kite is classified as near threatened due to a recent decline in its numbers, particularly in France, Spain, and Germany. In Britain, however, a successful reintroduction campaign has led to a growing population.

*Milvus migrans***Black Kite**

LENGTH	55–60cm (21½–23½in)
WEIGHT	550–950g (20–34oz)
MIGRATION	Partial migrant

HABITAT Wide variety, from farmland to open woodland

Slightly smaller and less angular-looking than the Red Kite (opposite), the Black Kite also has a less deeply forked tail. Overall, its plumage is brown in tone, not black, as its name suggests. It feeds on dead or dying fish from water or from shores and is also a scavenger, snatching scraps and offal in quick swoops. The species has a wide global distribution, occurring across much of Europe, Asia, Africa, and Australia. The European population is highly migratory, but other populations are largely sedentary.

ADULT BLACK KITE**ADULT BRAHMINY KITE***Haliastur indus***Brahminy Kite**

LENGTH	45–50cm (17½–19½in)
WEIGHT	325–650g (12–23oz)
MIGRATION	Non-migrant

HABITAT Coastal wetlands and estuaries; also forest and farmland

A distinctive bird, the adult Brahminy Kite has rich chestnut upperparts that contrast with its snow-white neck, head, and breast. In flight, the white breast is particularly noticeable, set against its red-brown underwings and tail. The sexes are alike. The juvenile is brown in colour. The species feeds on fish, frogs, insects, and carrion. It nests in isolated trees near water.

*Haliaeetus vocifer***African Fish Eagle**

LENGTH	63–73cm (25–29in)
WEIGHT	2–3.5kg (4½–7¾lb)
MIGRATION	Non-migrant

HABITAT Large rivers, lakes, dams, coastal estuaries

Widespread in Africa, south of the Sahara, the adult African Fish Eagle has a striking white head and breast, dark brown wings, and a chestnut belly and back. Its large bill is two-toned yellow and black in colour. The juvenile is mottled brown and much harder to distinguish from other eagles. A large bird, the African Fish Eagle has a

wingspan of almost 2m (6½ft) and, similar to other raptors, the female is much bigger and heavier than the male. The species has a loud ringing call and is very vocal, both on its perch and in flight.

As its name suggests, the African Fish Eagle feeds mainly on fish. It scours the surface of the water from a perch, swooping down on to its prey with a backward swing of the feet, and seizing the fish in its large talons. It will also steal food from other species such as herons, and occasionally take other types of prey such as small mammals, young waterfowl, or carrion. It breeds during the dry season, building a large nest, made of sticks and pieces of wood on a tree. Incubation of the eggs takes about 42–45 days.

**ADULT AFRICAN FISH EAGLE****TERRITORIAL DISPUTE**

At sites where White-tailed Eagles gather for food, fights tend to break out – like this one between an adult (left) and juvenile (right).



GATHERING TO FEED

In winter, large numbers of Bald Eagles gather at the spawning grounds of salmon, well before the fish have arrived. Hundreds of salmon die shortly after spawning, which makes it easy for these eagles to feast on dead or dying fish on the shore, without entering the water. They also steal food from other predatory birds and often fight among themselves for food.



Haliaeetus pelagicus

Steller's Sea Eagle



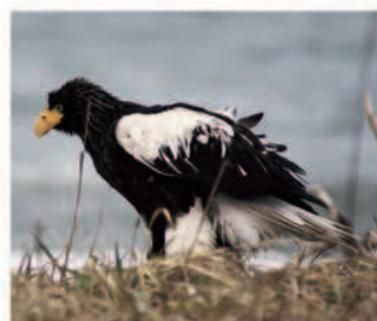
LENGTH
85–105cm (33–41in)

WEIGHT
6–9kg (13–20lb)

MIGRATION
Partial migrant

HABITAT Confined entirely to coastal regions of eastern Asia

RED LIST CATEGORY Vulnerable



ADULT STELLER'S SEA EAGLE

Haliaeetus leucocephalus

Bald Eagle



LENGTH
71–96cm (28–38in)

WEIGHT
3–6.5kg (6½–14lb)

MIGRATION
Partial migrant

HABITAT Mostly near water, including rivers, lakes, and coastal sites to an altitude of 2,000m (6,500ft)

The conspicuous white head of the adult Bald Eagle, along with its white neck and tail, contrasts with the dark brown of its wings and back. Its massive beak and strong feet are yellow. The juvenile's plumage is in various shades of brown – it develops adult plumage at four years of age.

This fishing eagle snatches its prey from the water surface, using its sharp talons. It also takes small mammals or carrion on farmland and is known for scavenging on picnic litter and partly eaten fish left by bears.

Once an abundant species, the Bald Eagle was chosen as the national bird of the USA in 1782, but the population declined drastically in the 20th century due to the use of pesticides, over-hunting, and pollution of rivers. However, a successful recovery programme was initiated, and it is currently proposed for removal from the endangered species list.

BALD EAGLE AT ITS NEST

Gypohierax angolensis

Palm-nut Vulture



LENGTH
57–65cm (22½–26in)

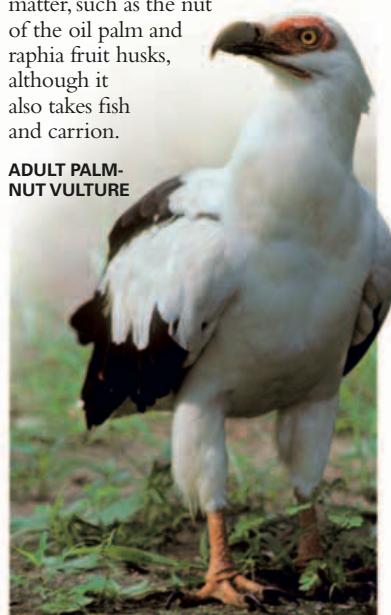
WEIGHT
1.3–1.7kg (3½–4½lb)

MIGRATION
Non-migrant

HABITAT Forests and mangroves, always close to palm trees and water

Black and white in coloration, the Palm-nut Vulture develops an orange to red face patch at maturity, with the intensity of colour dictated by the amount of palm-nut oil the bird eats. Unusually for a vulture, it eats vegetable matter, such as the nut of the oil palm and raphia fruit husks, although it also takes fish and carrion.

ADULT PALM-NUT VULTURE



Gypaetus barbatus

Bearded Vulture



LENGTH
0.9–1.2m (3–4ft)

WEIGHT
5–7kg (11–15lb)

MIGRATION
Non-migrant

HABITAT Mountainous areas and high steppes at altitudes of 1,000m–4,500m (3,300–14,500ft)

A large vulture, the adult Bearded Vulture has an orange front, from the base of the tail to the chin, while its upper back and wings are white. Its face is also white, with a black mask. The food it scavenges always contains bones and it will discard the flesh, preferring to extract the bone marrow. It does this by dropping bones or live tortoises on rocks to crush and break them.



ADULT BEARDED VULTURE

Neophron percnopterus

Egyptian Vulture



LENGTH	54–66cm (21½–26in)
WEIGHT	1.6–2.2kg (3½–4½lb)
MIGRATION	Migrant

HABITAT Plains, deserts, and rocky areas; also in towns and up to 2,500m (8,200ft) in mountains

Mostly white, with black flight feathers and a bare yellow face, which turns orange during nesting, the Egyptian Vulture is one of the smallest vultures found in Africa, Asia, and Europe. The juvenile, which matures at five years, has a speckled brown plumage which gradually gets lighter.

This vulture builds its nest of sticks, bits of debris, and skeletal remains on a rocky ledge or niche. It carries its nesting material in its beak, unlike most birds of prey, which use their talons for this purpose. Pairs mate for life and the female lays two eggs a few days apart.

The Egyptian Vulture is mostly a scavenger and feeds on carrion scraps left by other vultures because it is too small to compete for first place at a carcass. It is particularly well known for using stones as tools for breaking open the eggs of ostriches and other birds. It also actively hunts small mammals and reptiles, and drops tortoises on rocks to break their shells.

ADULT EGYPTIAN VULTURE



RUËPPELL'S VULTURE

Gyps rueppellii

Rüppell's Vulture



LENGTH	85–97cm (33–38in)
WEIGHT	7–9kg (15–20lb)
MIGRATION	Non-migrant

HABITAT Mountains to 4,500m (14,800ft); open areas of savanna

The plumage of Rüppell's Vulture is a dark mottled brown, with two rows of white spots across its wings. It flies at heights of over 6,000m (19,700ft), with a record of 11,300m (37,000ft) for a bird that collided with an aircraft. These vultures sometimes feed in groups of more than 100 birds. Aggressive at a carcass, they often gorge themselves until they can barely fly.

The species is not adapted to cold weather, despite sometimes being found at high altitudes, and the winter range of the migratory population is across central Africa and parts of India.

Gyps africanus

White-backed Vulture



LENGTH	78–90cm (31–35in)
WEIGHT	5.5kg (12lb)
MIGRATION	Non-migrant

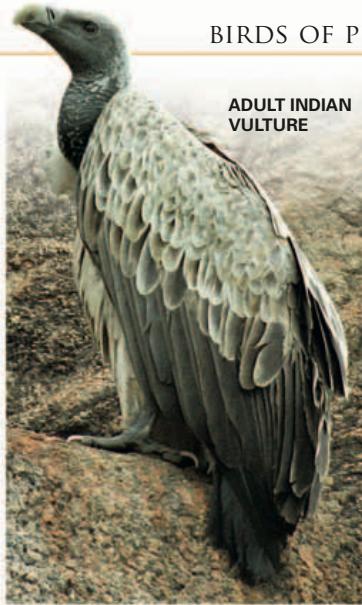
HABITAT Plains and savanna, but also at altitudes up to 3,000m (10,000ft)

A collar of white feathers on its upper back gives the White-backed Vulture its name, the white back and inner wing contrasting with the darker flight feathers. This vulture is the most widespread of the African vultures.

The White-backed Vulture is less dominant than other species when scavenging, being unable to open up a fresh carcass, and it has to jostle with other vultures to get its food. It nests in colonies and in trees, laying only a single egg. Its population has declined in some areas, the main threats being power lines and accidental poisoning.



ADULT WHITE-BACKED VULTURE



ADULT INDIAN VULTURE

Gyps indicus

Indian Vulture

LENGTH	89–103cm (35–39in)
WEIGHT	5.5–6.5kg (12–14lb)
MIGRATION	Non-migrant

HABITAT Semi-desert and dry areas up to 1,500m (4,900ft) but also around villages

RED LIST CATEGORY Critically endangered

Smaller and less heavily built than the Griffon Vulture (below left), this vulture has a long bill, broad wings, and a short tail. Its population has declined as a result of feeding on domestic animals treated with diclofenac, a drug now banned from veterinary use. An extensive captive breeding programme is now in place.



LAPPET-FACED VULTURES

Aegypius tracheliotus

Lappet-faced Vulture

LENGTH	73–82cm (29–32in)
WEIGHT	14kg (31lb)
MIGRATION	Non-migrant

HABITAT Open areas and semi-desert up to altitudes of 4,000m (13,100ft)

RED LIST CATEGORY Vulnerable

Gyps fulvus

Griffon Vulture

LENGTH	93–110cm (37–43in)
WEIGHT	6–10kg (13–22lb)
MIGRATION	Partial migrant

HABITAT Mountains up to 3,000m (10,000ft) but also open plains and deserts

One of the larger vultures of Europe, Asia, and Africa, the Griffon Vulture has a pale brown head and neck, with a dull white ruff, contrasting with its sandy coloured body and wings. Like other vultures, it is a scavenger, feeding mainly on carrion. Its numbers are known to fluctuate in response to changes in the climate but the species is not a threatened one. The Griffon Vulture has been reintroduced into parts of Europe with reports of increasing numbers in Spain.

GROUP OF GRIFFON VULTURES





**LAPPET-FACED VULTURE**

The largest African vulture, the Lappet-faced Vulture uses its strong bill to open carcasses. Not surprisingly, other vultures usually give way to it when feeding.

Circaetus pectoralis

Black-chested Snake Eagle



LENGTH
63–71cm (25–28in)

WEIGHT
1.2–2.3g (2½–5½lb)

MIGRATION
Partial migrant

HABITAT Wooded grassland, savanna, thornbush, and desert

Widespread in its range, this raptor has a distinctive black head and chest. The plumage of the adult is in a bold black and white pattern, while the juvenile is browner above and bright rufous below. As its name indicates, this bird feeds mostly on snakes, but will also prey on lizards, small mammals, and frogs.



ADULT BLACK-CHESTED SNAKE EAGLE



ADULT BIRD

Spilornis cheela

Crested Serpent Eagle



LENGTH
50–75cm (19½–30in)

WEIGHT
0.5–1.8kg (1–4½lb)

MIGRATION
Partial migrant

HABITAT Broad-leaved evergreen, semi-deciduous, and deciduous forest

A conspicuous large raptor of south and southeast Asian forests, the Crested Serpent Eagle can often be heard giving it ringing cries while in flight. As its name suggests, it is a predator of reptiles, particularly snakes. The adult Crested Serpent Eagle has a black crest with white spots and reddish brown underparts with small white markings. The species builds a smaller nest than most raptors, made of sticks, and lined with green leaves.

Terathopius ecaudatus

Bateleur



LENGTH
55–70cm (21½–28in)

WEIGHT
1.8–3kg (4½–6½lb)

MIGRATION
Non-migrant

HABITAT Open savanna and grassland, desert thornbush, and open woodland

The only member of the genus *Terathopius*, the Bateleur is an unusual type of snake eagle, although it mainly eats mammals and birds. It also feeds on fish, reptiles, and insects – groups of these eagles may gather at termite mounds to feed. The female is similar to the male except that it has grey, rather than black, secondary flight

feathers. Typically, the adult has rufous-chestnut upperparts, but a small number have creamy upperparts. The juvenile is plain brown with some white mottling and has pale green facial skin. It takes about seven or eight years to reach full maturity.

Named after its fast, gliding flight – the word “bateleur” means “acrobat” in French – in which it sways from side to side, this eagle displays a rocking and rolling flight during courtship, almost stopping in mid-air with the wings held open. It builds its large stick nest in an open-branched tree. A single egg is laid, which is incubated by the female alone, for about eight weeks. It takes another three to four months before the young are independent. The adults pair for life and will use the same nest for a number of years.

SILHOUETTE IN FLIGHT

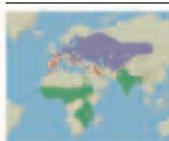
Etched against the sky, the outline of the Bateleur is distinctive as the eagle glides in the air. The shape is formed by its disproportionately long, broad, bow-shaped wings with narrow, upturned tips, bulky head, and the extremely short tail, a combination of features that no other raptor shows. Its impressive wingspan extends to 1.75m (6ft).

PLUMAGE PATTERN

The gleaming white underwing feathers of this eagle contrast sharply with its black body and red face and feet.

*Circus aeruginosus*

Western Marsh Harrier



LENGTH
42–54cm (16½–21½in)

WEIGHT
600–825g (21–29oz)

MIGRATION
Partial migrant

HABITAT Extensive reedbeds, marshland, swamps, reedy ditches through cultivated areas

Often simply called the Marsh Harrier, the Western Marsh Harrier, is a familiar sight over European marshlands. Like other harriers,

MALE WESTERN MARSH HARRIER

it has long wings held in a shallow V-shape as it flies low. It is also similar to other harriers in that the male and female have different plumage. The male has a grey and brown wing pattern with black tips, a chestnut belly, and a grey tail. The female and the juvenile are mainly uniform brown, with creamy white head markings. The male is smaller than the female.

This harrier hunts small mammals, insects, and birds, catching them unawares as it drifts low over reedbeds and fields. It often perches on bush tops or trees for long spells, looking out for prey. The Western Marsh Harrier breeds in dense reedbeds. It is migratory, except in the mildest regions, and winters mainly in Africa.



MALE BATELEUR





Circus melanoleucus

Pied Harrier



LENGTH	43–50cm (17–19½in)
WEIGHT	300–400g (11–14oz)
MIGRATION	Migrant

HABITAT Breeds in steppes and boggy scrub; winters in open areas, including marshland and farmland



ADULT MALE

With its boldly patterned black and white plumage, the male of this species is one of the most attractive harriers. Its eyes are yellow and the feet yellow to orange-yellow. The female is much less striking, being mostly brown and grey, with a streaky hood and barred wings, and the juvenile is a uniform dark brown. The species feeds mainly on small mammals, but also takes frogs, lizards, ground birds, and insects. The nest is built on the ground, and is made of grass, reeds, and weeds.

Polyboroides typus

African Harrier-Hawk



LENGTH	51–68cm (20–27in)
WEIGHT	575–700g (21–25oz)
MIGRATION	Partial migrant

HABITAT Woodland, preferably with palm trees, and often near water; forest edges

This highly adapted relative of the harriers has a very flexible leg joint that allows it to forage on the branches and trunks of trees. It will hang onto tree branches by its feet, with its wings dangling down for balance, and probe for food with its slender bill. It can often be seen hanging from weaver nests, preying on the eggs and young. The adult is mainly grey, with black and white banding on the belly and tail. Its bare facial skin changes colour from yellow to deep crimson. The juvenile is brown in colour.

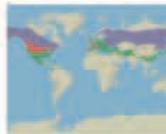
JUVENILE



FEMALE NORTHERN HARRIER

Circus cyaneus

Northern Harrier



LENGTH	42–50cm (16½–19½in)
WEIGHT	300–525g (11–19oz)
MIGRATION	Migrant

HABITAT Moorland, open taiga, steppes, marshes, and dunes in summer; various open areas in winter

GROUND NESTING

Unusually for a bird of prey, the Northern Harrier makes its nest on the ground, often among heather-like vegetation or grass. Made of sticks and grass and lined with fine material, the nest is built by both the male and the female. About 4–6 eggs are laid and are incubated for around four weeks. The dull brown plumage of the female (see right) helps keep it camouflaged on the nest.



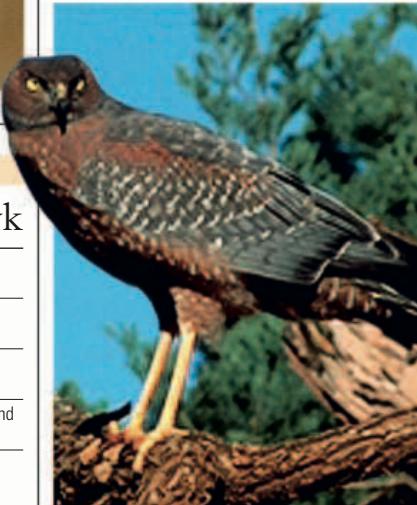
Kaupifalco monogrammicus

Lizard Buzzard



LENGTH	30–37cm (12–14½in)
WEIGHT	250–300g (9–11oz)
MIGRATION	Non-migrant

HABITAT Broad-leaved woods with tall grass, savanna, and thornbush



ADULT SPOTTED HARRIER

Circus assimilis

Spotted Harrier



LENGTH	50–60cm (19½–23½in)
WEIGHT	475–675g (17–24oz)
MIGRATION	Non-migrant

HABITAT Grassland, scrub, and woodland

This widespread Australian raptor is the world's largest harrier. Unlike most harriers, the adults have similar plumage. The upperparts are blue-grey with subtle darker markings, and there are striking white spots and bars on the chestnut underparts.

The female, however, is larger. It glides slowly, with up-swept wings.



ADULT LIZARD BUZZARD

*Melierax metabates*

Dark Chanting Goshawk



LENGTH	45cm (17½in)
WEIGHT	650–850g (23–30oz)
MIGRATION	Non-migrant

HABITAT Broad-leaved woodland and wooded savanna, avoiding drier areas

ADULT DARK CHANTING GOSHAWK

A common bird in sub-Saharan Africa, the Dark Chanting Goshawk is a medium-sized, long-legged hawk. It hunts mostly small reptiles and rodents. However, it also takes birds and carrion. Prey is caught by gliding from a perch and is pursued on foot if missed during the swoop. Birds are caught in flight by a typical hawk technique of twisting through and between trees. It takes its name from the male's tuneful "chants" early in the breeding season.

Accipiter minullus

Little Sparrowhawk



LENGTH	23–27cm (9–10½in)
WEIGHT	70–100g (2½–3½oz)
MIGRATION	Non-migrant

HABITAT Mainly smaller wooded areas, typically along watercourses

Small and grey, with barred underparts, the Little Sparrowhawk hunts birds and bats in flight and is particularly agile among trees. A bold species, despite its relatively small size, it takes prey such as reptiles from the ground. The population is mostly found in southern Africa, but has a more northerly distribution to the east of the range. The Little Sparrowhawk is not a threatened species and readily colonizes exotic tree plantations.

ADULT BIRD

*Accipiter virgatus*

Besra



LENGTH	23–36cm (9–14in)
WEIGHT	85–150g (3–5oz)
MIGRATION	Non-migrant

HABITAT Wide range of wooded habitats, from rainforest to pine and mangrove

Distinguished by its chestnut coloration and barred underwings, the Besra is a small species found throughout southern Asia from India to south China and Indonesia. The juvenile has browner upperparts than the adult. The species feeds mostly on birds, although insects and reptiles are also taken. It is a fast and agile bird-catcher.

Accipiter novaehollandiae

Grey Goshawk

LENGTH	38–55cm (15–21½in)
WEIGHT	250–475g (9–17oz)
MIGRATION	Non-migrant

HABITAT Rainforest, but some populations are found in drier forests or on woodland edges

Widespread in Australia, Tasmania, and New Guinea, the Grey Goshawk has a number of subspecies. Two forms are known – the grey form has a pale grey back, dark wing-tips, and white underparts with pale grey barring on the breast. The white form has an all-white plumage.

The Grey Goshawk takes its prey on the ground or by gliding from a perch. It feeds on birds up to the size of a heron or mammals as big as a rabbit. In the breeding season, it builds a nest of sticks, lined with leaves, and often uses the same nest the next season. It lays 2 or 3 eggs and fledging occurs within 30–42 days of hatching.

**GREY GOSHAWK (WHITE FORM)**

below. The male and female are significantly different in size and this is reflected in their choice of prey – the smaller male predominantly hunts smaller birds such as finches, buntings, and thrushes, while the female is capable of taking pigeons. European populations are largely resident, but Scandinavian birds and populations across Russia are migratory.

Accipiter nisus

Eurasian Sparrowhawk

LENGTH	28–38cm (11–15in)
WEIGHT	100–350g (3½–13oz)
MIGRATION	Partial migrant

HABITAT All types of woodland, including urban parks, and to the edge of the tree line on mountains

Feeding almost exclusively on other birds, the Eurasian Sparrowhawk often hunts around the edges of woodland or in clearings. The male is slate-grey above and barred reddish brown below, while the female has grey bars

MALE EURASIAN SPARROWHAWK



HUNTING STRATEGIES

The eight different hunting techniques of the Eurasian Sparrowhawk have been studied and described. It takes birds in flight, flying low and fast. It also catches its prey by dropping from a perch, co-operative hunting, or hunting from the ground. It kills smaller species by stabbing with its talons and kills larger prey mostly during consumption.



*Accipiter cooperii***Cooper's Hawk**

LENGTH
37–49cm (14½–19½in)

WEIGHT
225–600g (8–21oz)

MIGRATION
Partial migrant

HABITAT Dense forest, but uses both coniferous and deciduous trees

A widespread species in North America, Cooper's Hawk is migratory in the northern part of the range, reaching Central America in winter. The adult has red-brown bars across the breast and belly. Like many hawks, the female Cooper's Hawk is larger than the male and may weigh twice as much.

Cooper's Hawk surprises and captures small and medium-sized birds

ADULT COOPER'S HAWK

from cover or while flying quickly through dense vegetation. It also feeds on lizards, frogs, snakes, and large insects, as well as small mammals such as squirrels and chipmunks.

The female sometimes breeds in its first year, although most birds do not reach maturity until the second year. The usual clutch size is 3–6 eggs and the young are fledged 27–30 days after hatching. The maximum observed lifespan is eight years, but it is thought that some birds live longer. This species is not globally threatened, although a significant decline in numbers was seen during the 1940s and 1950s due to the use of pesticides.

*Butastur rufipennis***Grasshopper Buzzard**

LENGTH

35cm (14in)

WEIGHT

300–375g (11–13oz)

MIGRATION

Migrant

HABITAT Woodland edges, but also found in arid areas and over burnt grassland

Grey-brown above, with rufous underparts, the Grasshopper Buzzard has streaks on its plumage. It predominantly eats insects, but also takes some smaller vertebrates. Nearly all its prey are captured on the ground, although some insects are caught in flight as well.

Hunting often takes place over freshly burned grass or in association with grazing animals or egrets. The species is common in sub-Saharan Africa and makes movements in response to rainfall levels.

ADULT BIRD*Accipiter gentilis***Northern Goshawk**

LENGTH

50–70cm (19½–28in)

WEIGHT

0.5–1.5kg (1–3½lb)

MIGRATION

Non-migrant

HABITAT Mature woodland, mostly coniferous, but is also found in deciduous forest

The Northern Goshawk has a black crown with distinctive white eyebrows, a blue-grey back, and a long, rounded to wedge-shaped tail. It favours large prey such as grouse and crows, but will also take hares. Prey preferences vary according to the region, and reptiles are particularly

important in parts of southern Europe. This species is found throughout the northern hemisphere, except in Greenland and Iceland. The range stretches through North America, Europe, and Russia.

The species is not globally threatened.

ADULT BIRD*Geranospiza caerulescens***Crane Hawk**

LENGTH

45–51cm (17½–20in)

WEIGHT

225–350g (8–13oz)

MIGRATION

Non-migrant

HABITAT Rainforest and drier woodland or coastal mangroves, up to 730m (2,500ft).

The Crane Hawk is pale grey above and usually finely barred and darker grey below. It hunts a wide range of prey, such as lizards, snakes, and frogs, but large insects and bird nestlings are also taken. It catches

**ADULT CRANE HAWK**

its prey by reaching into tree-holes or between leaves for frogs. It has a vocal courtship display and a long breeding season in parts of its range.

Leucopternis plumbeus

Plumbeous Hawk



LENGTH

35cm (14in)

WEIGHT

500g (18oz)

MIGRATION

Non-migrant

HABITAT Tropical rainforest

When perched, the Plumbeous Hawk appears dark grey with black wings. In flight, it has a conspicuous white band through its black tail, and when seen from below, its white underwings are clearly visible. Its legs and cere (the fleshy covering at the base of the upper mandible) are orange. The Plumbeous Hawk is a little-known species, with a small range in Panama, Colombia, Ecuador, and Peru.



ADULT COMMON BLACK HAWK

Leucopternis albicollis

White Hawk



LENGTH

50cm (19 1/2in)

WEIGHT

600–850g (21–30oz)

MIGRATION

Non-migrant

HABITAT Mainly rainforest; also forest edges and pasture

The White Hawk has very broad wings and has a white head, body, and underwings. The upperwings are black, and the very short tail is black with a broad white band. It has a black bill and yellow legs. The sexes are similar, but the female is larger and heavier. The White Hawk hunts from a perch, often on the outskirts of a forest, and is easy to spot in Central and South America.



HABITAT Dense wooded forests

The Common Black Hawk is found from southern USA through to northern parts of South America. Its plumage is a striking black or dark brown, with a yellow cere, legs, and lores (the area in front of the eye). Its tail has a distinctive horizontal white band that is conspicuous when it is in flight. The sexes are similar, but the female is larger. The juvenile is browner above, with a dark-streaked pale front.

The Common Black Hawk feeds mainly on crabs, but also takes small vertebrates and eggs. Its nest is large, built with sticks in a mangrove tree. Its call is a distinctive "spink-speenk-spink-spink-spink".

Harris's Hawk is a rich chocolate-brown colour overall, which contrasts with its bright rufous wings and leg plumage. In addition, the species has a two-tone black and white tail, as well as a bright yellow cere and legs. The female is bigger than the male. The juvenile is less distinctive and much more streaked. It stays with its parents for up to three years.

The striking plumage and the desirable social behaviour of Harris's Hawk are the reasons why the species is such a popular choice for falconry – although the main reason is probably its habit of hunting and feeding in groups. When the prey is flushed, these hawks work together to corner the animal, thereby compensating for their relatively low speed. In the wild, this behaviour is often shown by family parties of Harris's Hawk, which hunt cooperatively to increase their chances of catching larger prey, such as jack rabbits. It also takes a variety of other prey, including smaller birds and lizards. It nests in a tree or cactus, and usually lays 2–4 eggs.

ADULT HARRIS'S HAWK

*Buteogallus meridionalis*

Savanna Hawk



LENGTH

45–60cm (17 1/2–23 1/2in)

WEIGHT

825–1,050g (29–38oz)

MIGRATION

Partial migrant

HABITAT Wide range of habitats from woodland to savanna

The Savanna Hawk is a distinctively coloured species. The plumage of the adult is primarily a pale cinnamon, with grey mottled areas on the back and fine dark barring on its underparts. It has a black and white banded tail and long yellow legs. The juvenile is much darker – with dark brown and rufous areas on the wings and a white eyebrow.

The Savanna Hawk is an opportunistic feeder, taking a wide range of small animals, reptiles, birds, and insects. It also scavenges prey from other bird species, such as storks, and is known to follow behind grass fires, picking up creatures trapped by the flames.



JUVENILE SAVANNA HAWK

ADULT BLACK-COLLARED HAWK

Busarellus nigricollis

Black-collared Hawk



LENGTH

45–50cm (17 1/2–19 1/2in)

WEIGHT

700–800g (25–29oz)

MIGRATION

Non-migrant

HABITAT Around wetlands and rivers

Found throughout much of Central and South America, the Black-collared Hawk has an almost uniform rufous plumage, which contrasts with its pale head (whiter in the southern

subspecies) and black throat patch. In flight, it looks unusual with its short tail and very broad black-tipped wings. The juvenile is browner and more streaked.

The Black-collared Hawk is often conspicuous as it perches in the open, waiting to swoop and catch a fish from the water's surface. Small spines on the undersides of its feet help the bird grasp its prey. Although it mainly eats fish, it will also take aquatic insects and snails, and, on rare occasions, lizards and rodents. The species breeds around swamps and marshes. Its nest is a large platform of sticks located up to 15m (50ft) high in a tree.

Harpyhaliaetus solitarius

Solitary Eagle



LENGTH	65–70cm (26–28in)
WEIGHT	3kg (6½lb)
MIGRATION	Non-migrant

HABITAT Forested mountain slopes and upland forest

Also known as the Black Solitary Eagle, to help differentiate it from the similar (but paler) Crowned Solitary Eagle (*H. coronatus*), the Solitary Eagle is a Central and South American species that is rare throughout its restricted range.

In appearance, the adult Solitary Eagle is a uniform dark slate-grey, except for a white tail band and tip. It has a bright yellow eye, cere, and legs, which make a striking contrast to its dark plumage. The juvenile is dark brown above, with a streaked head and neck, pale streaked underparts, and a rufous back.

*Buteo lineatus*

Red-shouldered Hawk

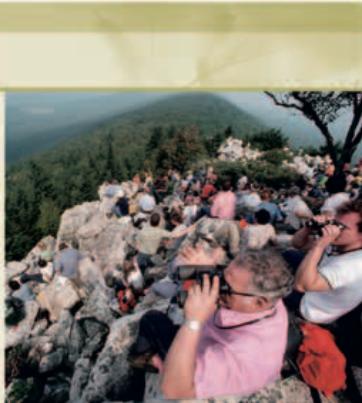


LENGTH	45–60cm (17½–23½in)
WEIGHT	550–700g (20–25oz)
MIGRATION	Partial migrant

HABITAT Lowland forest, close to water

The Red-shouldered Hawk is a forest-dwelling species, which is usually found near water. It is brightly coloured when seen at rest – orange below with a mottled brown back. Birds found in California are brighter, with more orange plumage tones. In flight, it has a number of narrow white bands across its dark tail. The juvenile is duller and more streaked. The species hunts mainly from perches, favouring small mammals as well as some amphibians and reptiles.

ADULT (ORANGE FORM)



GREAT SITES

HAWK MOUNTAIN

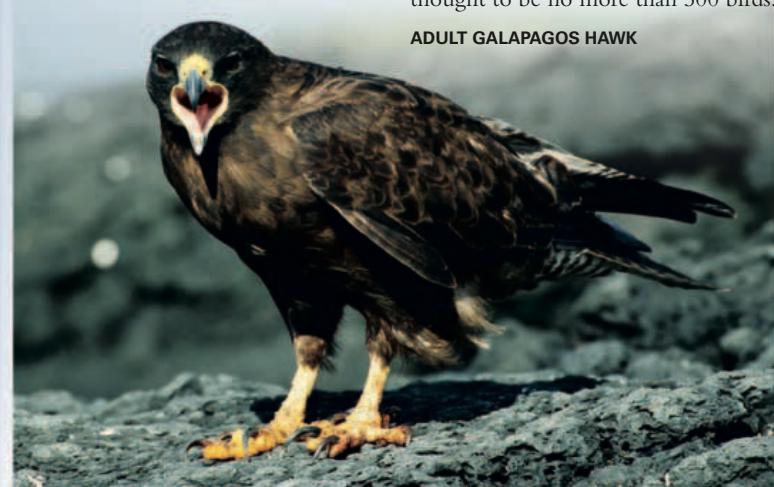
One of the best places to see the Red-shouldered Hawk is Hawk Mountain. Located in east-central Pennsylvania, the site is the venue for the spectacular migration of around 20,000 hawks, eagles, and falcons each autumn. The most commonly observed species is the Broad-winged Hawk (*B. platypterus*), but around 250 Red-shouldered Hawks are also usually seen.

Buteo galapagoensis

Galapagos Hawk



LENGTH	55cm (21½in)
WEIGHT	0.9–1.3kg (2–3½lb)
MIGRATION	Non-migrant

HABITAT All island habitats, from barren lava fields to coastal areas**RED LIST CATEGORY** Vulnerable

A plain, dark brown species, the Galapagos Hawk is the only raptor found in the Galapagos. It hunts and scavenges, and its prey includes seabirds, rats, centipedes, grasshoppers and even large iguanas. This hawk practises co-operative polyandry and as many as four males may mate with a single female, all of which aid the female in caring for the eggs and young. Up to three fledglings may be raised at a time. The total world population of the Galapagos Hawk is thought to be no more than 500 birds.

ADULT GALAPAGOS HAWK

Buteo swainsoni

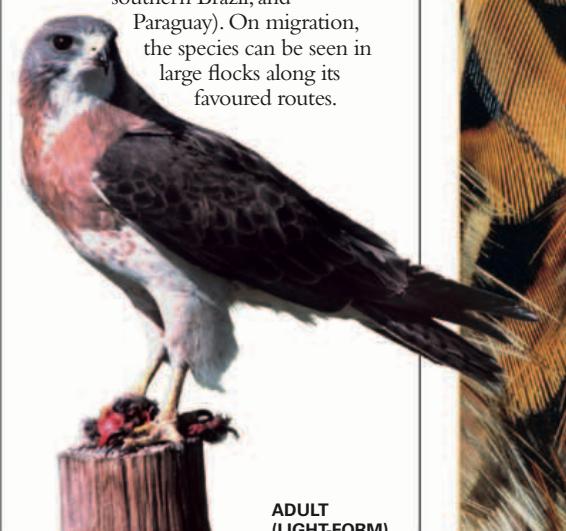
Swainson's Hawk



LENGTH	50–55cm (19½–21½in)
WEIGHT	850g (30oz)
MIGRATION	Migrant

HABITAT Mainly open country

A slender hawk, with pointed wings and a relatively long tail, Swainson's Hawk occurs in three distinct colour forms – light, dark, and intermediate. Light-form birds, with their distinct chestnut chest patch and white face, are the most common. Swainson's Hawk is a very variable bird, which breeds in grasslands and open country in the western half of the USA, Canada, and Mexico, before migrating south to winter in South America (mainly north Argentina, southern Brazil, and Paraguay). On migration, the species can be seen in large flocks along its favoured routes.



ADULT (LIGHT-FORM)

Buteo albonotatus

Zone-tailed Hawk



LENGTH	45–55cm (17½–21½in)
WEIGHT	600–900g (21–32oz)
MIGRATION	Partial migrant

HABITAT Wooded canyons, riverside woodland, ranchland

The Zone-tailed Hawk is found from southern USA through to Central and South America. It is found primarily in wooded canyons and tree-lined areas along rivers in the USA, as well as other lowland woodland elsewhere in its range.

It is an all-dark, almost black, species, except for three pale bands on its tail. It has a yellow cere and feet. The sexes are similar in plumage. In flight, it is very similar to the more common Turkey Vulture (*Cathartes aura*), often soaring with its wings held in a V-shape. However, the Zone-tailed Hawk is smaller and darker than its vulture counterpart. The juvenile is similar to adults, also appearing all-dark, although it has some white spotting on its underparts.



ADULT LONG LEGGED BUZZARD

Buteo rufinus

Long-legged Buzzard

	LENGTH 50–65cm (19½–26in)
	WEIGHT 1–1.3kg (2⅓–3⅓lb)
	MIGRATION Partial migrant

HABITAT Steppes, semi-desert, and other open uncultivated country; also scrub and open woodland

More likely to be seen on the ground than other buzzards, the Long-legged Buzzard stalks its prey on foot or waits at the entrance to burrows. Often described as sluggish, it spends a lot of time perching. But, like other buzzards, it also soars in circles on the lookout for prey. Sometimes seen over farmland in winter, it occasionally takes poultry. However, its diet consists mainly of rodents, reptiles, and insects.

Buteo jamaicensis

Red-tailed Hawk



LENGTH	45–56cm (17½–22in)
WEIGHT	1–1.2kg (2⅓lb)
MIGRATION	Partial migrant

HABITAT Coniferous and tropical rainforest, prairies, and semi-deserts

Like other hawks and buzzards, the Red-tailed Hawk is very variable in plumage, with pale, dark, and rufous forms. A mostly white form is known as Krider's Hawk (*B. j. krideri*) and the dark form found in Alaska is called Harlan's Hawk (*B. j. harlani*). Both these forms lack the distinctive red tail of the Red-tailed Hawk.

The most common large hawk in most of North America, the Red-tailed Hawk is an adaptable feeder, taking carrion, mammals (including hares), reptiles, amphibians, and the occasional fish. In deserts, snakes comprise up to half its diet. In open country, Red-tailed Hawks tend to hunt from perches, but in forests they ambush their prey from the air. They are equally adaptable nesters, using rocks with ledges, trees, cacti, and electricity pylons.

SNAKE-PROOF BOOTS

The tarsi (lower "legs") of species such as the Red-tailed Hawk that hunt snakes are protected by thick scales. Snake-eating raptors generally have short, strong toes to hold reptiles down while they are safely killed with the bill. Short toes also help the hawk to seize and hold onto rodents, which also form an important element of their diet.



STALKING ON GROUND

The feet of the Red-tailed Hawk are equally well adapted for walking on the ground, even in snow covered areas, where they stalk for prey.



FEEDING ON CARRION

Buteo buteo

Common Buzzard

LENGTH	50–57cm (19½–22½in)
WEIGHT	775–975g (28–35oz)
MIGRATION	Partial migrant

HABITAT Woodland, open ground with trees, and woodland edges next to farmland

The Common Buzzard with its broad wings and a rather short, but ample tail is often seen perching on fence posts next to roads, waiting for prey to appear in the grass, but also well placed for roadkill. Its call is a ricocheting "pee-ow". Like the Red-tailed Hawk (left), it has many plumage variations, including light, rufous, and dark forms. These birds soar in pairs, and at the end of breeding, whole families take to the sky together.

Buteo regalis

Ferruginous Hawk



LENGTH	56–69cm (22–27in)
WEIGHT	1–1.7kg (2⅓–3⅓lb)
MIGRATION	Migrant

HABITAT Dry open country, grassland, and farmland with nearby cliffs or rocky outcrops

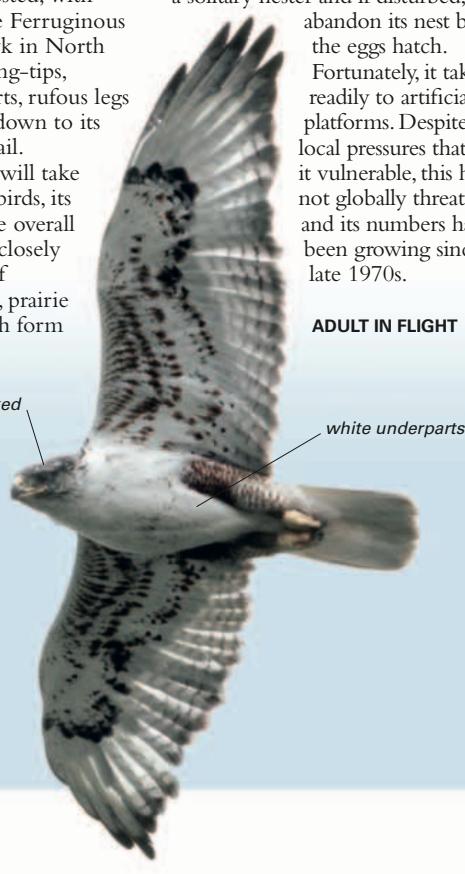
Powerful and broad-chested, with a relatively big head, the Ferruginous Hawk is the largest hawk in North America. It has dark wing-tips, reddish brown upperparts, rufous legs that are fully feathered down to its yellow feet, and a pale tail.

Although this hawk will take meadowlarks and gamebirds, its breeding success and the overall size of its population is closely tied to the availability of ground squirrels, rabbits, prairie dogs, and gophers, which form

the bulk of its diet. Fewer pairs will nest in the years when these mammals are scarce, and while three juveniles may be successfully reared when prey is plentiful, this number can fall to an average of less than one juvenile a nest. In areas where farmers control gopher and prairie-dog numbers, there can be a significant reduction in numbers or loss of the entire local Ferruginous Hawk population. These hawks have also suffered from the destruction of suitable nesting sites. The Ferruginous Hawk is a solitary nester and if disturbed, will abandon its nest before the eggs hatch.

Fortunately, it takes readily to artificial nest platforms. Despite the local pressures that make it vulnerable, this hawk is not globally threatened, and its numbers have been growing since the late 1970s.

ADULT IN FLIGHT

*Harpia harpyja*

Harpy Eagle

LENGTH	89–105cm (35–43in)
WEIGHT	4.8kg (11lb)
MIGRATION	Non-migrant

HABITAT Tropical and sub-tropical rainforest with unbroken tree cover

One of the biggest and most powerful eagles, the Harpy Eagle has massive legs, feet, and talons capable of taking adult howler monkeys, small deer, and agoutis. Sloths make up to a third of its diet, captured as they come to the treetops in the early mornings. The Harpy Eagle mates for life but reproduces very slowly, breeding every two or three years.



JUVENILE HARPY EAGLE



PALE FORM

*Morphnus guianensis***Crested Eagle****LENGTH**
71–84cm (28–33in)**WEIGHT**
1.8kg (4½lb)**MIGRATION**
Non-migrant**HABITAT** Tropical and subtropical forest

This large bird of prey occurs in two colour forms: a pale form and a less common dark one. Like the Harpy Eagle (opposite), it has a twin-pointed crest. It can be distinguished in flight by its broad, rounded wings and long, pointed tail. The Crested Eagle hunts by scanning downwards from bare branches near the tops of trees, taking snakes, small monkeys and other mammals, birds, and tree frogs. The Crested Eagle is rare and near-threatened, poorly known, and probably decreasing. It usually nests high in tall trees but very few nests have been found and studied.

*Pithecopaga jefferyi***Philippine Eagle****LENGTH**
86–102cm (34–40in)**WEIGHT**
4.4–6kg (10–13lb)**MIGRATION**
Non-migrant**HABITAT** Primary tropical forest; now mainly confined to undisturbed forest in mountains**RED LIST CATEGORY** Critically endangered

Long brown feathers adorn the head of the Philippine Eagle, giving it the appearance of a lion's mane. Its upperside is brown and the underside is white. Formerly called the Monkey-eating Eagle, its name was changed when it became the national bird of the Philippines. It feeds more often on flying lemurs and palm civets than monkeys. It also takes a range of other prey, which it finds as it moves from perch to perch.



ADULT PHILIPPINE EAGLE

*Ictinaetus malayensis***Indian Black Eagle****LENGTH**
67–81cm (26–32in)**WEIGHT**
1kg (2½lb)**MIGRATION**
Non-migrant**HABITAT** Forested hills and mountains; clearings and regrown forest

The Indian Black Eagle with its long wings and tail is distinguished by its graceful, buoyant flight, during which it snatches prey from treetops. Its highly specialized feet with the outer toe helps it seize an entire nest and eat the nestlings and eggs in flight. It also attacks nests of ground-dwelling species and often takes bats and flying squirrels as prey. As part of its courtship display, it folds its wings in spectacular dives.

creatures such as water voles, frogs, and fish, but will take other food, including carrion. It is a versatile hunter, soaring and diving down on its prey, or waiting on perches. It will also stalk on foot. Generally solitary, these eagles gather where large food sources suddenly become available, such as locust swarms or animals fleeing from grass fires.

JUVENILE GREATER SPOTTED EAGLE*Aquila clanga***Greater Spotted Eagle****LENGTH**
60–70cm (23½–28in)**WEIGHT**
1.7–2.5kg (3½–5½lb)**MIGRATION**
Migrant**HABITAT** Marshy forest and forest edges near swamps and wet meadows**RED LIST CATEGORY** Vulnerable

This medium-sized to large eagle has a dark brown head and wings, and a white patch can often be seen on its upper wings. The species gets its name from the white spots on the juvenile. A raptor of wet places, the Greater Spotted Eagle lives on small aquatic

*Aquila heliaca***Asian Imperial Eagle****LENGTH**
72–84cm (28–33in)**WEIGHT**
2.5–4.5kg (5½–10lb)**MIGRATION**
Partial migrant**HABITAT** Woodland with clearings and open country with scattered trees**RED LIST CATEGORY** Vulnerable

long wing feathers

JUVENILE ASIAN IMPERIAL EAGLE

A large eagle with yellowish white crown and neck feathers, the Asian Imperial Eagle has dark wings. The adult develops a white nape, while the juvenile is brown with dark flight feathers. The prey of the Asian Imperial Eagle consists largely of small to medium-sized mammals, such as ground squirrels and hamsters, and reptiles, including tortoises. It hunts from perches or by soaring, which helps it to find carrion, another regular part of its diet.

Over much of its range, the Asian Imperial Eagle has retreated to remote places. Originally a lowland species, it now inhabits higher altitudes because of human disturbance to its breeding sites and habitat loss due to the destruction of lowland forests. In winter, it seems to prefer wetlands.

The closely related Spanish Imperial Eagle is distinguishable from the Asian Imperial Eagle by its wings, which are more extensively white. Its diet consists of rabbits, on which it is dependent. Also listed as vulnerable, the Spanish Imperial Eagle (*A. adalberti*) has adapted to a more typically Mediterranean landscape, including scrub and dunes.



Aquila chrysaetos

Golden Eagle



LENGTH
75–90cm (30–35in)

WEIGHT
2.8–6.5kg (6½–14lb)

MIGRATION
Partial migrant

HABITAT Open and deserted areas to an altitude of 5,500m (18,000ft) in parts of the range

An impressive wingspan of 2.3m (7½ft) makes the Golden Eagle one of the largest land eagles in the northern hemisphere. It gets its name from the tawny-golden feathers on its head and nape. Its plumage is dark brown, and it has feathered legs and yellow feet.

The Golden Eagle prefers medium-sized prey, such as hares, grouse, and reptiles, but has been known to injure or kill deer by swooping at them. Unusually for a bird of prey, it sometimes takes carnivores, such as wild cats and foxes. The species is mostly sedentary, but Golden Eagles in northern Russia, Canada, and Alaska are migratory, with some individuals being found up to the summer snow line in the Himalayas. Distribution in its range is mostly limited to mountainous areas or places that are not densely populated.

Success in breeding is influenced by weather and the availability of food, and it is common for pairs to fail to breed in certain years. The chicks have a high mortality rate, but surviving adults have been known to live up to 38 years in the wild. The Golden Eagle is not globally threatened, but there have been historic declines in some parts of the range due to persecution.



ADULT HUNTING FOR PREY

AT THE NEST

The eyrie (nest) of the Golden Eagle is often built on an inaccessible cliff ledge. This nest is used for several years, with the eagle adding sticks to the structure each breeding season. Two eggs are laid, but the younger chick is often killed before fledging. The one that survives is dependent on the parents for several months or longer.

*Aquila audax*

Wedge-tailed Eagle



LENGTH
80–100cm (32–39in)

WEIGHT
2–5.5kg (4½–12lb)

MIGRATION
Non-migrant

HABITAT Wide range of habitats up to 2,000m (6,500ft); avoids densely populated areas



ADULT WEDGE-TAILED EAGLE

Australia's largest bird of prey, the Wedge-tailed Eagle has dark brown plumage and a long, graduated tail, which gives it a distinctive silhouette in flight. It hunts by soaring or swooping from a prominent perch. It takes a wide range of prey, but in the southern part of the range, it shows a preference for rabbits and hares. Young kangaroos and wallabies, domestic animals, large reptiles, and birds are also taken. It builds its nest on cliff ledges or in trees, lining it with leaves, but it has been known to breed on the ground in remote areas away from human habitation. Two eggs are usually laid, but only a single egg is produced by the bird in Tasmania.

Aquila verreauxii

Verreaux's Eagle



LENGTH
80–90cm (31–35in)

WEIGHT
3–6kg (6½–13lb)

MIGRATION
Non-migrant

HABITAT River gorges and rocky outcrops near colonies of hyrax (herbivorous mammals)



ADULT VERREAUX'S EAGLE

A spectacular black and white bird, Verreaux's Eagle has a narrow wing base and broad primary feathers. It relies heavily on the rock hyrax for food and hunts on the wing, stooping on to its prey. Although not threatened, the patchy distribution of this species means that it is under pressure from human encroachment.

Hieraetus wahlbergi

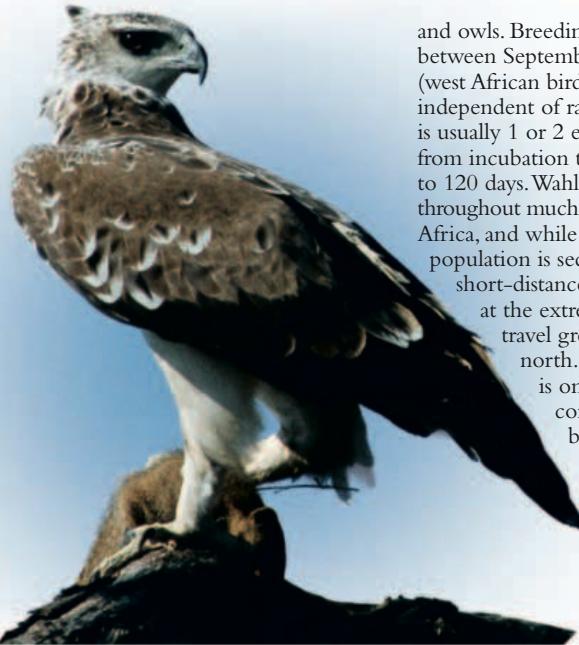
Wahlberg's Eagle



LENGTH	55–60cm (21½–23½in)
WEIGHT	450–1,400g (15–50oz)
MIGRATION	Partial migrant

HABITAT Woodland and wooded savanna up to 1,800m (6,000ft)

Wahlberg's Eagle is a variable species and a number of colour forms have been described. The most common form is the dark form in which the birds are uniformly brown. The pale form (as shown here) is characterized by brown wings that contrast with its otherwise white or cream plumage. It is a slender species, resembling a kite when in flight. Its diet consists of mammals, reptiles, and birds, including large prey such as herons, goshawks,



and owls. Breeding usually takes place between September and February (west African birds breed earlier) and is independent of rainfall. The clutch size is usually 1 or 2 eggs, and the period from incubation to fledging takes up to 120 days. Wahlberg's Eagle is found throughout much of sub-Saharan Africa, and while most of the population is sedentary or comprises short-distance migrants, some birds

at the extremes of the range travel great distances to the north. Wahlberg's Eagle is one of Africa's most common eagle species but has suffered a moderate decline in numbers in parts of its range due to indirect human interference.

ADULT WAHLBERG'S EAGLE (PALE FORM)

Polemaetus bellicosus

Martial Eagle



LENGTH	78–86cm (31–34in)
WEIGHT	3–6kg (6½–13lb)
MIGRATION	Non-migrant

HABITAT Open areas including steppes, grassland, and woodland

One of the largest eagles in the world, the Martial Eagle has a crested appearance and prominent eyebrows. The adult's plumage is a contrasting dark grey and white, the white abdomen being marked with grey to black speckling. The juvenile is generally paler, showing grey instead of the black in the adult's plumage.

The Martial Eagle takes a wide range of vertebrate prey from 1–5kg (2½–11lb) in weight, including gamebirds and waterfowl, or mammals to the size of small antelopes. It hunts almost exclusively in flight, with a shallow stoop to make the kill after extensive soaring. In the breeding season, a single egg is laid in a nest made of sticks, usually in small trees, but now increasingly on power pylons. The chick fledge more than 90 days after hatching and may remain dependent

on the adults for up to one year after leaving the nest.

The Martial Eagle is not migratory, but the juveniles disperse widely after they leave the nest.

ADULT MARTIAL EAGLE

*Spizaetus philippensis*

Philippine Hawk-Eagle



LENGTH	64–69cm (25–27in)
WEIGHT	1.1kg (2½lb)
MIGRATION	Non-migrant

HABITAT Lowland and hilly forests

RED LIST CATEGORY Vulnerable



JUVENILE PHILIPPINE HAWK-EAGLE

Stephanoaetus coronatus

Crowned Eagle



LENGTH	80–99cm (31–39in)
WEIGHT	2.7–3.6kg (5½–7¾lb)
MIGRATION	Non-migrant

HABITAT Forests of all types, but hunts in more open areas

Spizastur melanoleucus

Black-and-white Hawk-Eagle



LENGTH	51–61cm (20–24in)
WEIGHT	850g (30oz)
MIGRATION	Non-migrant

HABITAT Tropical forest and also in open areas of savanna

As its name indicates, this hawk-eagle is black and white in colour, with a white head and underparts and black upperparts. It also has a yellow patch around the bill. The Black-and-white Hawk-Eagle takes a wide range of prey, mostly small to medium-sized mammals and birds, usually on the edge of the tree line, where it can hunt by soaring and stooping from a height.





GREAT SITES

KRUGER NATIONAL PARK



LOCATION In northeastern South Africa, bordered by Mozambique to the east and by Zimbabwe to the north.



One of Africa's oldest game reserves, Kruger was established as long ago as 1898, and in 1926 it became a national park that today covers almost 19,000 square km (7,350 square miles). The reserve lies within an enormous zone of grassland and scrub, which stretches across the highland plateau of northeastern South Africa and reaches into neighbouring Mozambique and Zimbabwe. This varied subtropical landscape, called bushveld, is a patchwork of open grassy areas and impenetrable thorny thickets, strewn with boulders, rocky outcrops, and stunted trees.

MIGRATION DESTINATION

Kruger National Park is best known for its herds of grazing animals and for the carnivores that hunt them, but it also supports an extraordinary diversity of bird life, so can rank among the most exciting birdwatching destinations in Africa. More than 520 species of bird have been recorded in the reserve, including around 250 species that occur year-round, together with a similar number of migratory species or nomadic wanderers. The majority of the area's seasonal visitors arrive in summer (October to March) along with the rains. They include many long-distance migrants from Europe and Central Asia, such as the Barn Swallow, European Roller, and Willow Warbler. Several European and Asian birds of prey also migrate to Kruger, such as the Eurasian Hobby and Red-footed Falcon.

A host of open-country African birds are found in Kruger all year, from the Secretarybird, which stamps on snakes and other prey with its extremely long legs, to a wide range of bee-eaters, shrikes, pipits, larks, and francolins. The wooded areas are home to species such as wood hoopoes, mousebirds, starlings, and the massive-beaked Southern Ground Hornbill. However, one of the main highlights of the reserve is its impressive variety of birds of prey.

During the winter dry season (April to September), birds concentrate at waterholes, rivers, and artificial dams. But in summer, birds are spread throughout the reserve and many species raise young.

MARTIAL COMBAT

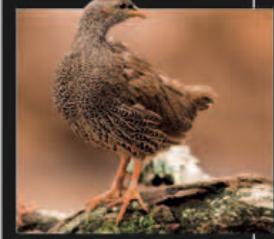
A female Warthog defends its piglet from an attacking Martial Eagle. Kruger has one of the highest breeding densities of this powerful bird of prey anywhere in Africa.

WHAT TO SPOT

WHITE-FRONTED BEE-EATER
Merops bullockoides



PURPLE-CRESTED TURACO
Tauraco porphyreolophus
(see p.273)



NATAL SPURFOWL
Pternistis natalensis



SADDLE-BILLED STORK
Ephippiorhynchus senegalensis
(see p.159)

CRANES AND RELATIVES

ORDER Gruiformes
FAMILY 11
SPECIES 199

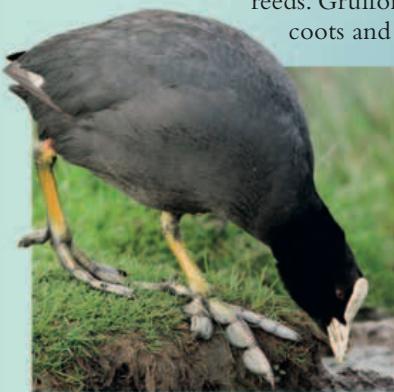
STATUESQUE AND ELEGANT, the 15 species of cranes are by far the most charismatic species in this varied order of birds. Many cranes are threatened, and confined to scattered locations across the world. The gruiform order also contains 10 other families, including about 140 species of rails and crakes, as well as

bustards, trumpeters, and several smaller groups. Externally, these birds look very different, with an enormous variation in size. Cranes themselves include a number of long-distance migrants, but some rails on remote islands have lost the ability to fly.

ANATOMY

In general, gruiform birds have short tails and rounded wings, and a relatively long neck. Some species of crane stand as tall as an adult man, while the smallest member of this order – the Inaccessible Island Rail – is no bigger than a newly hatched farmyard chick. Cranes and bustards have broad bodies, which in cranes accommodates the trachea coiled around inside the chest. This creates a resonating chamber that amplifies their calls. In many rails, the body is twice as deep as it is wide, creating an extraordinarily thin shape that slips easily between reeds. Gruiforms do not have webbed feet, but

coots and finfoots have wide lobes on all of their toes. Not all species within this order can fly, but the ones that do keep their necks extended, and usually trail their legs behind them when in flight.



LOBED FEET

Coots have slender toes with broad lobes, which spread out as they kick against the water. They leave distinctive tracks in waterside mud.

BREEDING

Cranes and bustards are renowned for their elaborate courtship dances and displays. In crane species, entire flocks join in ritual dances, with birds leaping high into the air with their wings half-spread. These displays can take place at any time of the year, and young birds can be involved just as much as their parents. Bustards are more sedate, but the male's display can be bizarre. Parading in front of the female, the male Great Bustard suddenly seems to turn itself inside out, displaying white plumes that seem to transform it into a powder-puff on two legs. Among rails, courtship involves calls rather than dances: after dark, many of these birds produce strange wailing and grunting sounds from their hideaway among waterside plants. Almost all gruiform birds are ground-nesters, producing young that are well developed when they hatch. Birds of this order can be long-lived: the record lifespan for a crane is over 50 years.



DANCING ON ICE

Japan's Red-crowned Cranes often perform their ritual dances on the icy surface of frozen lakes.



FINAL APPROACH

With its wings spread and legs trailing, a Grey Crowned Crane comes in to land. Like most cranes, it often trumpets loudly as it flies.

BEHAVIOUR

Cranes and their relatives typically live in damp or wet habitats, but only a small number of them – including coots and moorhens – are fully aquatic birds. Cranes are highly social, and are usually seen in flocks, but rails and crakes are often solitary and secretive, hiding in dense vegetation by day, and emerging only at night. Cranes

themselves eat a wide variety of food, including seeds, plant roots, and small animals, which they find by probing into soft ground with their strong beaks. Rails and crakes are also omnivorous, and some of the largest species, such as the Purple Swamphen, eat the eggs and young of other water birds. Two families of gruiforms – the bustards and seriemas – are birds of open and often dry grassland. Most of them run for safety if threatened, but bustards include some far-ranging migrants, and also some of the heaviest flying birds in the world.

HUMAN IMPACT

THREATS AND CONSERVATION

Over 20 species in this order have become extinct within the past few hundred years, and today a quarter of the remainder are either endangered or vulnerable. They include 10 species of crane, several bustards, and a large number of rails and crakes that have evolved on remote islands. Habitat change is the main threat to cranes, while introduced species are responsible for the decline of endemic rails and crakes.

NOT YET OUT OF DANGER

In the 1940s, the population of Whooping Cranes, (one is pictured here) dropped to 23 birds. The species is recovering, but is still in danger.



Otis tarda

Great Bustard



LENGTH	75–100cm (30–39in)
WEIGHT	3.3–18kg (7½–40lb)
MIGRATION	Partial migrant

HABITAT Dry open grassland, crops, stubble.

RED LIST CATEGORY Vulnerable

Although largely terrestrial, the male of this impressive species is the heaviest of all flying birds. This distinction is sometimes claimed for both its relatives – the Kori Bustard (right) and the Trumpeter Swan (*Cygnus buccinator*), but the male Great Bustard probably has the greatest average weight. The adult male is brown above and white below, with a long grey neck and head. The breast and lower neck sides are chestnut. The female is smaller, with a buff neck and breast. With its powerful



COURTSHIP DISPLAY

During courtship, the male Great Bustard withdraws its head and transforms itself into a huge shimmering ball of white, brown, and rusty-coloured fluff. It raises and spreads its tail, showing a large amount of white, mainly on the undertail. As part of this flamboyant display, the male inflates its throat-sac, up-ends its tail, and turns its wings inside out to reveal the white feathers on its flanks.

*Chlamydotis undulata*

Houbara Bustard



LENGTH	55–75cm (21½–30in)
WEIGHT	1.2–3.2kg (2¼–6½lb)
MIGRATION	Non-migrant

HABITAT Semi-desert, open grassland, cultivation

RED LIST CATEGORY Vulnerable

There are three subspecies of Houbara Bustard that are all very similar in appearance. The one pictured here is *C. u. macqueenii* of western Asia, which is sometimes regarded as a separate species on the basis of its DNA, vocalizations, and courtship behaviour. In its display, the male erects the long thread-like

feathers on the top of its head and the sides of its neck.

ADULT HOUBARA BUSTARD



muscles, the Great Bustard is able to lift its bulk into the air. It has a stately slow walk, and tends to run when disturbed rather than fly. It is omnivorous, taking seeds, insects, and other small creatures, including frogs and beetles.

MALE GREAT BUSTARD

Ardeotis kori

Kori Bustard



LENGTH	0.9–1.2m (3–4ft)
WEIGHT	6–19kg (13–42lb)
MIGRATION	Non-migrant

HABITAT Dry open country with grass or scrub and adjacent crop fields

One of the largest of all flying birds, the Kori Bustard male performs a flamboyant display to attract a female. It tries to make itself look even bigger by inflating its neck to four times its usual size. If successful, pairing lasts only a brief few seconds, after which the female is left to lay the eggs, incubate, and care for the young alone, while the male returns to the display ground.



NECK RUFF INFLATED IN DISPLAY



ADULT AUSTRALIAN BUSTARD

Ardeotis australis

Australian Bustard



LENGTH	0.9–1.2m (3–4ft)
WEIGHT	2.8–8kg (6½–18lb)
MIGRATION	Non-migrant

HABITAT Grassland, savanna, open woodland, and among shrubs

The Australian Bustard has a long, white neck, a black cap on its head, and orange-brown wings, with mottled black and white markings. Its diet includes seeds, fruit, insects, molluscs, lizards, young birds, and small rodents. Once common throughout much of Australia, its population still exceeds 100,000, but is thinly distributed.

Afrotis afraoides

Northern Black Korhaan



LENGTH	50cm (19½in)
WEIGHT	700g (25oz)
MIGRATION	Non-migrant

HABITAT Dry coastal scrub, open grassland, sparse thornveld, and cropland

The Northern Black Korhaan has a black neck and underparts and a strikingly patterned back. It is adept at hiding in its scrubby habitat. When it spreads its wings, a white patch in the outer wing can be seen, which distinguishes it from the similar Southern Black Korhaan (*A. afra*).

*Tetrax tetrax*

Little Bustard



LENGTH	43cm (17in)
WEIGHT	675–975g (24–35oz)
MIGRATION	Partial migrant

HABITAT Steppes, open grassland, and crops



MALE LITTLE BUSTARD

In winter, the male Little Bustard loses its distinctive black and white neck and breast patterns and assumes a buff plumage with dark markings, similar to the protectively patterned female. The dull coloration makes it much more difficult to see in its preferred habitat, where the vegetation conceals it from predators. The species is sociable, feeding in large flocks.



MALE SUBDESERT MESITE

Monias benschi
Subdesert Mesite

LENGTH	32cm (12½in)
WEIGHT	125–150g (4–5oz)
MIGRATION	Non-migrant

HABITAT Lowland spiny forest and subdesert thickets**RED LIST CATEGORY** Vulnerable

Of the three species of mesite, all of which occur only in Madagascar, the Subdesert Mesite is the only one in which the plumage of the male and female differ. Compared to the male, the female has extensive rufous colouring on the throat and breast. A terrestrial bird, the Subdesert Mesite may be either polyandrous or polygynous, or both. The mesites are threatened, mainly due to forest loss.

Rhynochetos jubatus
Kagu

LENGTH	55cm (21½in)
WEIGHT	900g (32oz)
MIGRATION	Non-migrant

HABITAT Found only in forested areas, although occasionally ventures into tall shrubland**RED LIST CATEGORY** Endangered

Widespread across New Caledonia prior to the arrival of Europeans in the late 18th century, the Kagu is now restricted to humid forests in the south of the island, where fewer than 1,000 birds survive. Grey in colour, the Kagu has black, red, and white bars on its wings and a long crest. It feeds by probing the soil with its large bill.

GREAT SITES**RIVIÈRE BLEU**

Current conservation efforts to protect the Kagu revolve around the creation of reserves. By far the most important of these is Rivièvre Bleu, which is also the most frequently visited by birdwatchers. The aim is to control predators, such as dogs, cats, and pigs, and prevent habitat loss due to fires and mining.



ADULT KAGU

Cariama cristata
Red-legged Seriema

LENGTH	75–90cm (30–35in)
WEIGHT	1.5kg (3½lb)
MIGRATION	Non-migrant

HABITAT Open country, including sparsely wooded areas, fields, savanna, and ranchland

The Red-legged Seriema has a crest of stiff, raised feathers. As its name indicates, this bird has red legs. It is mainly grey-brown, with white underparts, and banded wings and tail. An omnivore, this species kills small birds, rodents, and snakes by beating them on the ground with its bill. An extremely vocal bird, its songs are often heard in the grasslands of southern South America. It is capable of running at a high speed in pursuit of prey and in response to danger. The Red-legged Seriema nests in trees.



ADULT BIRD

Eurypyga helias
Sunbittern

LENGTH	43–48cm (17–19in)
WEIGHT	175–225g (6–8oz)
MIGRATION	Non-migrant

HABITAT Humid forest in areas near water; either streams, ponds, rivers, or oxbow lakes

Like the Kagu (above), the Sunbittern has soft, lax flight feathers, which account for the species being almost silent in flight. At first glance, a Sunbittern may be taken for a heron, with its long straight pointed bill, slender neck, and long legs. When it spreads its wings and fans its tail, it reveals bright orange-chestnut on its wing feathers.

It is wary, but not shy, of humans, tending to freeze and melt into the background or slink off quietly if

disturbed. It flies with quick flicks of the wings if surprised at close quarters. The breeding behaviour has been closely studied in some areas.



ADULT SUNBITTERN

Nests are built on tree branches, using mud, grass, and leaves. The female lays two eggs, occasionally one, which are incubated by both sexes for about a month. The adult feeds its chicks a wide range of invertebrate and vertebrate prey, including crabs, cockroaches, lizards, spiders, frogs, beetles, and fish. Remarkably, the young moult directly into adult plumage while still in the nest, which is extremely unusual in any bird species. They leave the nest three to four weeks after hatching.

*Crex crex***Corncrake**

HABITAT Breeds in dry to moist meadows and among cereal crops; winters in dry grassland

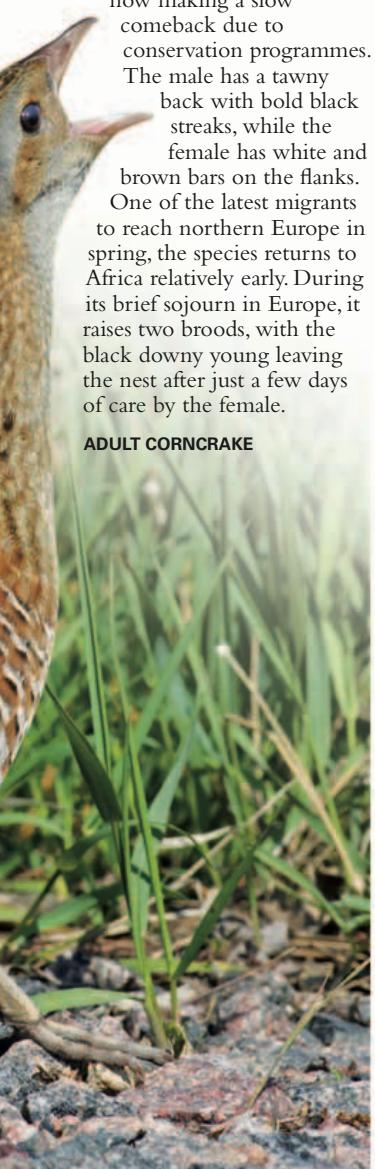
LENGTH	27–30cm (10½–12in)
WEIGHT	125–200g (4–7oz)
MIGRATION	Migrant

The rasping, double-note calls of this bird were once a familiar sound throughout the night in its breeding range. The Corncrake has declined dramatically in recent decades, but is now making a slow comeback due to conservation programmes.

The male has a tawny back with bold black streaks, while the female has white and brown bars on the flanks.

One of the latest migrants to reach northern Europe in spring, the species returns to Africa relatively early. During its brief sojourn in Europe, it raises two broods, with the black downy young leaving the nest after just a few days of care by the female.

ADULT CORNCRAKE

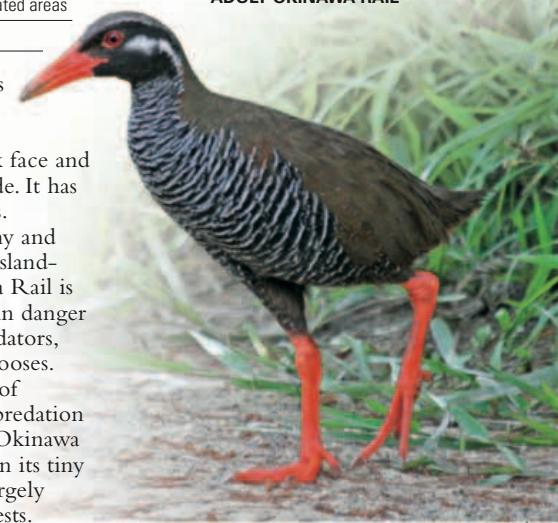
*Gallirallus okinawae***Okinawa Rail**

HABITAT Evergreen forest with dense undergrowth and water nearby; also scrub and cultivated areas

RED LIST CATEGORY Endangered

The striking red bill and legs of the Okinawa Rail contrast deeply with its dark plumage, especially the black face and heavily dark-barred underside. It has dark olive-brown upperparts. However, like all rails, it is shy and difficult to spot. Like many island-inhabiting rails, the Okinawa Rail is almost flightless and is now in danger of attacks by introduced predators, such as cats, dogs, and mongooses. It has also learned the habit of roosting in trees to combat predation by snakes. Nonetheless, the Okinawa Rail remains common within its tiny range in Japan, where it is largely confined to uninhabited forests.

ADULT OKINAWA RAIL

*Rallus limicola***Virginia Rail**

LENGTH	20–25cm (8–10in)
WEIGHT	60–125g (2⅓–4oz)
MIGRATION	Partial migrant

HABITAT Freshwater, brackish, and salt marshes; prefers shallow water and flooded grassland



ADULT WATER RAIL

*Rallus aquaticus***Water Rail**

HABITAT Dense wetlands of all types, from fresh to salt water; occasionally in other habitats in winter

Largely grey below, the Water Rail has black and white barred flanks and brown upperparts, which are streaked in black, and bright red legs. Its long, decurved bill is also red, with a black tip. A widespread species, it is able to tolerate a range of conditions and is omnivorous in its eating habits, feeding on plants, seeds, and fruit, as well as a variety of aquatic insects and other invertebrates, amphibians, fish, and birds.



ADULT VIRGINIA RAIL

*Gallirallus philippensis***Buff-banded Rail**

LENGTH	25–33cm (10–13in)
WEIGHT	125–300g (4–11oz)
MIGRATION	Partial migrant

HABITAT All types of wetland but also grassland, wooded areas, crops, heaths, and even golf courses

Over its wide range, the Buff-banded Rail is quite a variably marked species; some forms, for example, that found on the Indonesian island of Flores, even lack the buff breast-band, from which the species takes its name. The white eyebrow and chestnut eye-stripe of this rail make up its striking head pattern. Some populations, especially those on small islands, are threatened by habitat loss, hunting, and predators such as cats and rats. However, the bird's wide range means that the species is not threatened.



ADULT BUFF-BANDED RAIL



ADULT BAILLON'S CRAKE

Porzana pusilla

Baillon's Crake



LENGTH 17–19cm (6½–7½in)

WEIGHT 35g (1¼oz)

MIGRATION Partial migrant

HABITAT Densely vegetated freshwater and saltwater wetlands

Baillon's Crake is a small, typically elusive, crake. The adult is a rich mix of colours: a bright red eye, chocolate-brown upperparts streaked with black and white flecks, and grey underparts. The juvenile is duller and browner below. Found in Europe, Asia, Africa, and Australasia, the species has a wide global distribution. However, it is not easy to observe.

Porzana carolina

Sora



LENGTH 19–25cm (7½–10in)

WEIGHT 75g (2½oz)

MIGRATION Migrant

HABITAT Freshwater wetlands, but also brackish and saltwater marshes

A compact rail found only in the Americas, the Sora can be distinguished from other rails and crakes by its black face and throat and contrasting bright yellow bill. The juvenile is browner below and does not have any black on the face. The Sora eats mainly plant life such as seeds, wild rice, and algae, but also feeds on insects, spiders, snails, and



ADULT SORA

small crustaceans. It breeds in Canada and northern USA, before migrating to spend its winters in the southern USA, the Caribbean, and Central and northern South America.

Porphyrio porphyrio

Purple Swamphen

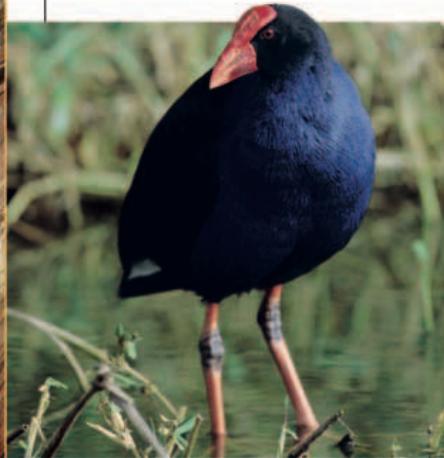


LENGTH 38–50cm (15–19½in)

WEIGHT 550–1100g (20–39oz)

MIGRATION Non-migrant

HABITAT Sheltered fresh or brackish wetlands



ADULT (AUSTRALIAN FORM)

With a wide global distribution, the Purple Swamphen has a variety of distinctive subspecies. As a result, the species has different common names. These include the Purple Gallinule in Europe and the Maori "Pukeko" in New Zealand. However, there is considerable variation among the different geographical forms, with some subspecies appearing more brown or green above. Purple Swamphens are predominantly vegetarian, preferring the shoots, stems, and leaves of aquatic plants, although they also eat small numbers of insects, molluscs, fish, and sometimes even small birds, rodents, and lizards. Pairs nest in swamps, clumps of rushes in paddocks, or long, unkempt grass. Several females lay eggs in one nest and share the incubation duties. Each bird can lay 3–6 speckled eggs and a communal nest may contain up to 12 eggs.

Porphyrio hochstetteri

Takahe



LENGTH 63cm (25in)

WEIGHT 2–3kg (4½–6½lb)

MIGRATION Non-migrant

HABITAT Alpine tussock grassland; also translocated to predator-free offshore islands

RED LIST CATEGORY Endangered

New Zealand's Takahe is remarkable in many ways: it is the world's largest living rail, standing half a metre high, like an inflated blue and green football, with a huge prehistoric-looking red bill. It is flightless with tiny stumpy wings. The species was thought to be extinct until it was rediscovered in 1948, when a small population of 250–300 birds was found in the mountainous Fiordland of New Zealand's South Island. The numbers, however, declined rapidly soon after their rediscovery, possibly partly due to predation by stoats and possums.

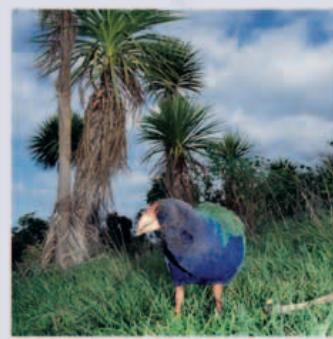
ADULT TAKAHE



HUMAN IMPACT

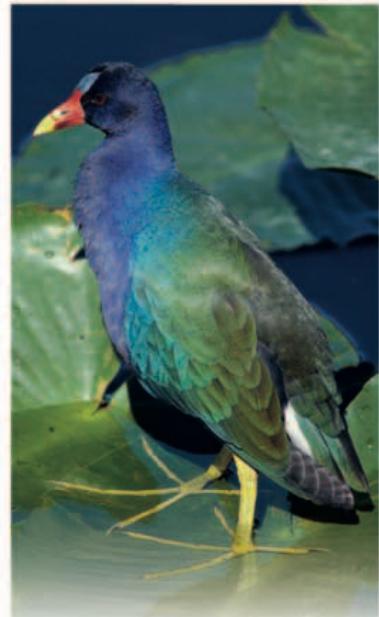
CAPTIVE BREEDING

A number of Takahes were taken from the wild in the 1980s and a captive-breeding programme was started. Today, new populations have been established on predator-free offshore islands and a special conservation area has also been set up in New Zealand's Murchison Mountains.



LIFE ON THE EDGE

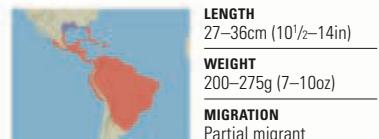
The survival of the Takahe is still threatened from grazing of their main food – tussock grass – by red deer.



ADULT PURPLE GALLINULE

Porphyrio martinica

Purple Gallinule



LENGTH 27–36cm (10½–14in)

WEIGHT 200–275g (7–10oz)

MIGRATION Partial migrant

HABITAT Lush marshes, swamps, and grassy wetlands

The Purple Gallinule is an American species, not to be confused with the larger Purple Swamphen (left), confusingly given the same name sometimes. The adult Purple Gallinule is just over half the size of the Purple Swamphen, with a yellow-tipped red bill, a pale blue facial shield, and bright yellow legs and feet. Its wings are green, contrasting with its blue head and underparts. An omnivore, the Purple Gallinule feeds on a variety of plant and animal matter, including seeds, leaves, and the fruit of both aquatic and terrestrial plants, as well as insects, frogs, snails, spiders, earthworms, and fish.



ADULT EURASIAN COOT

Fulica atra

Eurasian Coot



HABITAT Wetlands, but prefers large, open freshwater areas

Yet another species that appears all black from a distance, the Eurasian Coot is actually black only on the head and breast, with the rest of its plumage being a dark slate-grey. The species has a bone-white bill and large white facial shield that extends up to the forehead. The Eurasian Coot has lobed feet, which are large and partially webbed, reflecting the amount of time the coot

Gallinula chloropus

Common Moorhen



LENGTH
30–38cm (12–15in)

WEIGHT
175–325g (6–12oz)

MIGRATION
Partial migrant

HABITAT All freshwater wetlands

This medium-sized gallinule has a wide global distribution and is found on all inhabited continents, except Australia, where it is replaced by the similar Dusky Moorhen (*G. tenebrosa*). As a result, a number of different subspecies occur, all very similar in plumage, but varying in size. The adult Common Moorhen appears black from a distance, with a broken

white line along the flanks and a white undertail. Its head and underparts are black, with dark brown plumage above. It has a small red frontal shield extending just onto the forehead and a yellow-tipped red bill. Its legs and feet are a dull greenish yellow. Juvenile and immature birds are paler and browner, lacking the bright red bill and facial shield; the chicks are fluffy and black, with tiny red and yellow bills.

The Common Moorhen is a noisy bird, with a wide variety of clucks and harsh chattering calls, the most familiar being a crowing, two-syllable “kurrr-ikk”, usually uttered during the breeding season to advertise the bird’s presence. It is a sociable bird with intricate courtship rituals, as well as frequent displays of aggression that help to establish hierarchy. Unusually, the females compete for males, rather than the other way round. The heaviest female tends to win and prefers small males with large fat reserves, as they can incubate eggs for longer. The Common Moorhen is also aggressive towards other species that infringe on its territory. The species is normally resident, but movements take place in many parts of its range, particularly in response to harsh weather.

PAIR OF FIGHTING MOORHEN

spends swimming in the water. It builds a nest of reeds and grasses near the water’s edge or on underwater vegetation protruding from the water, laying up to 10 eggs. The Eurasian Coot is an omnivore, and will take a variety of small live prey, as well as the eggs of

other waterbirds. It is a noisy species, with a wide repertoire of crackling, explosive or trumpeting calls, often given at night. It is found throughout most of Europe, Asia, Australia, and New Zealand, as well as parts of North Africa and the Middle East.

AGGRESSION

During the breeding season, the Eurasian Coot is notoriously aggressive. Even the slightest violation of a boundary by another coot or waterbird will provoke a tremendous show of strength and aggression. It displays its white frontal shield and splashes water, the fights involving violent striking and clawing with the feet and stabbing with the bill. These fights can result in injury and even death.





ADULT AFRICAN FINFOOT

Podica senegalensis

African Finfoot



LENGTH
35–59cm (14–23in)

WEIGHT
350–875g (13–31oz)

MIGRATION
Non-migrant

HABITAT Still or slow-moving water in overgrown mangroves, forest, and savanna

Elusive, but not uncommon, the African Finfoot is thinly distributed over its wide range. The plumage of this aquatic bird varies according to the subspecies, generally being dark brown above and paler below. It has a sharp bill, a long neck with white streaks, and legs and feet that are bright orange or red. A claw on its wing helps it to climb scrub or trees, making it agile on land.



MALE SUNGREBE

Helornis fulica

Sungrebe



LENGTH
26–33cm (10–13in)

WEIGHT
125–150g (4–5oz)

MIGRATION
Non-migrant

HABITAT Forest rivers and streams, lakes and ponds, with overhanging vegetation

In an adaptation that is unique, the male Sungrebe carries its young in skin pockets under its wings in flight. Its bill is black above and buff below and it has yellow eyelids, while the female has red eyelids and a red bill. Both the male and female are mainly brown in colour, with yellow and black stripes on the legs and feet. The smallest of the finfoots, the Sungrebe feeds, like its larger relatives, on aquatic insects and their larvae, crustaceans, frogs, and small fish. Although a non-migrant, it is occasionally seen in places outside its normal range, such as Trinidad.

Heliopais personatus

Masked Finfoot



LENGTH
43–55cm (17–21½in)

WEIGHT
Not recorded

MIGRATION
Partial migrant

HABITAT Coastal and inland wetlands, including mangroves, flooded forest, swamps, and lakes

RED LIST CATEGORY Vulnerable

The Masked Finfoot's feet are a distinctive pea-green. It has a black mask and eyebrows that contrast with its white eye-ring and throat stripe. Its back and wings are brown. The male grows a small fleshy knob over its bill during breeding. The diet of the species consists of aquatic invertebrates, frogs, and small fish. A very shy bird, little is known about its breeding habits, although it probably breeds in areas where it was thought to be only a winter visitor. The species has disappeared from many parts of its range, including Myanmar (Burma), where large numbers once bred. It is intolerant of human disturbance and has also suffered from changes to its wetland habitat.

Psophia leucoptera

Pale-winged Trumpeter



LENGTH
45–52cm (17½–20½in)

WEIGHT
1075g (38oz)

MIGRATION
Non-migrant

HABITAT Dense lowland tropical rainforest

Pale in colour, with a green patch on its back and green-tipped wings, the Pale-winged Trumpeter has long, strong legs and feet that are well adapted to a life spent mostly on the ground; it prefers walking and running to flying. It is a sociable species, travelling in small groups of 3–12 birds. Although it eats carrion, insects, and small vertebrates, the Pale-winged Trumpeter is largely a fruit-eater, often feeding on dropped fruit below trees where monkeys are active. As a result, it may be indirectly affected by a decline in the number of monkeys. Although not yet considered threatened, it is declining because of deforestation and the spread of human settlement.

GREAT SITES

TAMBOPATA RESERVE

Tambopata Reserve is home to over 575 bird species. Here you can see the Pale-winged Trumpeter and visit the world's largest mineral clay lick, where more than a dozen species of macaw and parrot can be seen every day. BirdLife International has designated the park as an Important Bird Area, harbouring the globally threatened Black Tinamou and Southern Helmeted Curassow.

*Aramus guarauna*

Limpkin



LENGTH
56–71cm (22–28in)

WEIGHT
1–1.5kg (2¼–3½lb)

MIGRATION
Partial migrant

HABITAT Shallow water with plentiful supplies of molluscs, especially apple snails

Brown in colour, with a spangled grey head and neck, the Limpkin gets its common name from its limping walk. The amount of white speckling on its oily plumage varies: the North American subspecies is heavily spotted, while birds from South America have little or no white markings. It has a slender, sharp, yellow bill that is twisted at the tip, enabling it to extract apple snails from their shells with ease.

The Limpkin has a range of calls, including rattles and shrieks. The male's windpipe has loops to extend its length, which amplifies its call. While trying to attract a mate, it calls throughout the day and night. This species is unaggressive, except when the male defends its breeding territory. It charges at intruders, fighting with its feet and uttering mournful calls. The nest is a platform of reeds and grass and 4–8 eggs are usually laid. Breeding pairs often stay together year after year. Once almost hunted to extinction in parts of its range, the Limpkin now faces a threat from invading alien plants, which oust the native aquatic plants that sustain apple snails, its main food item.



LIMPKIN (NORTH AMERICAN SUBSPECIES)

Turnix tanki

Yellow-legged Buttonquail



LENGTH
17cm (6½in)

WEIGHT
35–125g (1¼–4oz)

MIGRATION
Partial migrant

HABITAT Grassland, scrub, and cropland

Mainly grey in colour, the Yellow-legged Buttonquail has a yellow bill, barred back, spotted underparts, and yellow legs. The female Yellow-legged Buttonquail has a red collar and, like other buttonquails, is much larger than the male and more brightly coloured.

The female leaves hatching and bringing up chicks to the male – when several males are about, it may practise “serial polyandry”, moving on to a new mate as soon as its eggs are laid. This species superficially resembles a true quail, but lacks a hind toe – a feature it shares with other birds that spend their time walking or running. Buttonquails are found singly, in pairs, or small family groups, which roost together. Relying on its camouflage, they will freeze rather than fly when threatened.

ADULT YELLOW-LEGGED BUTTONQUAIL

*Ortyxelos meiffrenii*

Quail-plover



LENGTH
10–13cm (4–5in)

WEIGHT
16–20g (⁹/₁₆–¹¹/₁₆oz)

MIGRATION
Partial migrant

HABITAT Dry, semi-arid, and coastal grassland, savanna, and scrub

A small bird, the Quail-plover has pale yellow cheeks and mottled brown markings on the back and chest. In flight, it shows a black and white pattern on the wings. It skulks on the ground in tall grass and if flushed, flies up with a jerky movement. Its nest is a shallow scrape in the ground lined with grass, in which two eggs are laid.

Grus japonensis

Red-crowned Crane



LENGTH
1.5m (5ft)

WEIGHT
7–12kg (15–26lb)

MIGRATION
Migrant

HABITAT Reed and sedge marshes, bogs, and wet meadows; rivers and coastal marshes in winter

RED LIST CATEGORY Endangered

The heaviest of all crane species, the Red-crowned Crane is the second rarest after the Siberian Crane. Named for its red crown, it has snow-white plumage and a grey neck and tail. It prefers deeper water than other cranes and nests

among standing reeds in water. A generalist feeder, like other cranes, it tends to have more animal than plant food in its diet – insects, fish, frogs, and small mammals, as well as aquatic invertebrates. In winter, the Red-crowned Crane forages for waste grain on cropland, and in Japan, the birds will also come to feeding stations, where rice is put out for them. This is perhaps one reason why the Japanese population of Red-crowned Cranes has increased from just 33 in 1954 to around 800 today. Elsewhere, the species faces many threats. China's huge dam projects threaten water levels that might flood or dry out its wetland habitats. In Russia and China, reed and grass fires in spring destroy nesting grounds. Another threat is pollution from oil fields.

DANCING ON ICE

The courtship dance of the Red-crowned Crane starts with the trumpeting calls of the birds as they stand side-by-side. The dance is a series of bows, head bobbing, leaps, and various other gestures. Both sexes leap into the air and display, raising their wings and tail feathers. Sometimes, these cranes pick up grasses, sticks, or feathers and toss them in the air.



JUVENILE (LEFT) AND ADULT (RIGHT) RED-CROWNED CRANE



 *Balearica regulorum*

Grey Crowned Crane

**LENGTH**

1m (3 1/4ft)

WEIGHT

3.5kg (7 3/4lb)

MIGRATION

Non-migrant

HABITAT Mixed wetland and grassland habitats and cultivated land with irrigation

The Grey Crowned Crane and the closely related Black Crowned Crane (*B. pavonina*) differ from all other cranes in two striking respects. They lack the long, coiled windpipe that other cranes have and, therefore, cannot produce their far-carrying “bugling” calls, and, unlike other cranes who stand on the ground or in water, these species are able to perch in trees due to their long hind toes.

With its short bill, crown of golden bristles, red wattles, and predominantly grey plumage, the Grey Crowned Crane is a familiar sight in cultivated fields. It is considered sacred in Kenya, and is the national bird of Uganda.

This crane has adapted well to landscapes modified by humans. Outside the rainy season, when it breeds, it generally moves about in search of standing water, but where dams and irrigation systems provide permanent sources, it moves less. However, the intensification of agriculture, greater use of pesticides, fewer fallow periods, and heavy grazing have caused a decline in its population. Conservationists are working with communities to restore its numbers.

**ADULT WITH CHICK****ADULT SIBERIAN CRANES** *Grus leucogeranus*

Siberian Crane

**LENGTH**

1.4m (4 1/2ft)

WEIGHT

6.5kg (14lb)

MIGRATION

Migrant

HABITAT Wide shallow wetlands with good visibility**RED LIST CATEGORY** Critically endangered

The Siberian Crane has a red face and pure white plumage, with black wing-tips. It is also the most specialized of the cranes in its habitat requirements for breeding, feeding, and roosting; it eats cranberries, insects, and fish in its breeding grounds, but is vegetarian during migration and while wintering.

Numbers of Siberian Cranes are dwindling rapidly, and it is now one of the rarest cranes – the large population in its wintering site in China is threatened by hydrological changes caused by the Three Gorges Dam, built on the Yangtze river. Oil exploration is a further threat to its breeding grounds.

HUMAN IMPACT

MIGRATION TRAINING

Experimental conservation techniques are now being applied to save the Siberian Crane, including the use of microlight aircraft to show young captive-bred cranes the traditional migratory route from Russia to Central Asia. The aircraft lead the young birds on their journey.

**READY TO FLY**

Young Siberian Cranes reared in captivity undergo training to follow microlight aircraft on migratory routes.

**ADULT SIBERIAN CRANES** *Grus antigone*

Sarus Crane

**LENGTH**

1.5m (5ft)

WEIGHT

6.5kg (14lb)

MIGRATION

Partial migrant

HABITAT Marshes, floodplains, high altitude wetlands, paddy fields, and other cultivated land**RED LIST CATEGORY** Vulnerable

The tallest of the cranes, the Sarus Crane is found in three separate populations in the Indian subcontinent, southeast Asia, and Australia, but has disappeared from Thailand, Malaysia, and the Philippines. The species has mainly grey plumage with a bare red head and upper neck, a powerful grey bill, and pink legs. It prefers a combination of flooded and dry ground for nesting and feeding, and moves seasonally with the monsoon and droughts. The bond between a pair is particularly strong – a crane stays with its dead or injured mate for a long time.

**PAIR OF SARUS CRANES** *Grus rubicunda*

Brolga

**LENGTH**

1.6m (5 1/4ft)

WEIGHT

7kg (15lb)

MIGRATION

Non-migrant

HABITAT Brackish and freshwater wetlands and irrigated land**ADULT BROLGA**

The Brolga is a mainly grey bird with a broad red band from its bill to the back of the head, a grey-green crown, and red throat pouch. The juvenile lacks the red band. In the dry season, the staple food of the Brolga consists of the tubers of the bulkuru sedge, but it also eats plants, snails, molluscs, insects, frogs, lizards, and small mammals. Although non-migratory, it makes extensive seasonal movements because of Australia's extreme climate.

Grus canadensis

Sandhill Crane

LENGTH	88–95cm (35–37in)
WEIGHT	3.3–6kg (7½–13lb)
MIGRATION	Partial migrant

HABITAT Marshes, lake margins, and river deltas, from the Arctic to the tropics

One of the longest-surviving bird species (bones identical to those of the modern Sandhill Crane have been found in fossil deposits up to nine million years old), the Sandhill Crane is the most abundant of the world's cranes. The six subspecies vary greatly in size, the smallest being the Lesser Sandhill Crane (*G. c. canadensis*), while the largest, the Greater Sandhill Crane (*G. c. rowani*), can be almost twice as heavy.

The Sandhill Crane is a grey bird with a red forehead and a relatively short bill. In parts of its range, iron-rich

mud gets plastered on its feathers and turns them a rusty red.

The Sandhill Crane can live more than 20 years in the wild, and twice as long in captivity. Omnivorous like other cranes, it eats insects, frogs and other aquatic animals, seeds, and berries. Outside the breeding season, it forages in large flocks.

"DANCING" SANDHILL CRANES

broad white patch behind eye

long grey neck

Grus grus

Common Crane

LENGTH	1.1–1.3m (3½–4¼ft)
WEIGHT	5.5kg (12lb)
MIGRATION	Migrant

HABITAT Breeds in large wetlands; winters in open country, including cultivated land

A large and stately bird that moves with slow, dignified footsteps, the Common Crane is easily distinguished from the Grey Heron (see p.166), with which it shares much of its range. The Common Crane has a black head and

neck, with a white stripe running down the nape and a red spot on the crown. Its plumage is slate-grey in colour.

Outside the breeding season when pairs defend their territories, this crane is very gregarious and can gather in thousands where food is abundant. It feeds on crops, eating large quantities of grain, acorns, and even olives. During breeding, it is more carnivorous, eating insects, frogs, rodents, snakes, and small birds. In the breeding season, the courtship display involves dancing with the wings uplifted. The nest is built by both male and female, who remain a pair throughout the year.

ADULT COMMON CRANE

ADULT FEEDING

Grus americana

Whooping Crane

LENGTH	1.3m (4⅓ft)
WEIGHT	6kg (13lb)
MIGRATION	Migrant

HABITAT Breeds in prairie wetlands, marshes, and mudflats; winters in brackish coastal wetlands

RED LIST CATEGORY Endangered

The tallest bird in North America, the Whooping Crane has red bare skin on its crown, a black moustache, a heavy yellow bill, and long black legs. In flight, the adult shows black outer flight feathers that contrast with its otherwise snow-white plumage. It is an opportunist feeder, taking in a variety of plant and animal food. The courtship ceremony involves elaborate dances by pairs of breeding adults.

By the middle of the 20th century, the population of Whooping Cranes in the USA had declined to a tiny number, but by the early 21st century, there were more than 200 birds in the wild.

BIRD SPECIES





GREY CROWNED CRANES

A fan of stiff golden feathers makes up the crown of this beautifully coloured crane. The bright red throat pouch is inflated when the bird calls.

WADERS, GULLS, AND AUKS

ORDER Charadriiformes

FAMILY 16

SPECIES 344

THIS LARGE AND VARIED ORDER includes some of the commonest birds of coasts and fresh water, as well as some species that feed far inland. Waders (or shorebirds) – which make up nearly two-thirds of the total number of species in the order – typically have long legs and

beaks, and feed by probing in sand or mud. Gulls and their relatives generally search for food on the wing, while auks chase fish under water, using their wings to swim. Many birds in this order nest in groups, and many are long-distance migrants.

ANATOMY

Birds within this order vary a great deal in shape, and also in size. The Great Black-backed Gull has the largest wingspan, measuring up to 1.7m (5½ft), while the smallest auks are only 16cm (6in) long. Waders usually have lightly built bodies, carried on long legs with slender toes, but their most distinctive feature is often their beak, which can be straight or curved – upwards, downwards, or – uniquely in the case of the Wrybill – even sideways. Gulls and auks have similarly compact bodies, but their wings are of quite different types.

A gull's wings are long and slender, designed for gliding and soaring, while an auk's are short and stubby – a shape that allows them to propel the bird under water as well as in the air. With a few notable exceptions, such as the Ruff and Eurasian Dotterel, males and females of species in this order have plumage of very similar coloration.



WADER

With its thin legs and lightweight body, the White-tailed Plover is a typical wader. This species breeds on damp ground in the Middle East and around the Caspian Sea.



GULL

Compared to most waders, gulls have shorter legs, and longer, narrower wings. This Slender-billed Gull, from North Africa, Europe, and Asia, often breeds far inland.



AUK

The Razorbill is a typical member of the auk family, with its black and white plumage. Unlike waders and gulls, auks are restricted to the North Atlantic, North Pacific, and Arctic Ocean.



FLIGHT AND MIGRATION

Waders, gulls, and auks include some fast and agile fliers. Among them are some record-breaking migrants, such as the Arctic Tern, which makes a return trip between both polar regions every year. In general, waders spend a large amount of their lives on their feet, but they fly strongly and well. Many species breed in the northern tundra, dispersing along coasts farther south during the rest of the year. Gulls are renowned for their skill at soaring, and they can be surprisingly agile when fighting over a catch. Skuas – their close relatives – take this even further, chasing other birds through the air, and often tugging at their tails until they disgorge their food. For controlled flight, few birds can rival skimmers, which zig-zag across calm water, slicing through the surface with their bills. Auks also fly well, despite having much smaller wings in relation to their bodies. Their flight is usually fast and direct, but their wings also double up as flippers, powering them under water when they dive after fish.

SPEED AND AGILITY

By far the most elegant species in the skua family, the Long-tailed Skua is both a predator and a parasite. In summer, it feeds mainly on lemmings in its breeding grounds in the Arctic tundra. After breeding, it migrates as far south as the Southern Ocean, and gets much of its food by stealing from other seabirds.

HABITATS

Most waders live either on coasts, by shallow bodies of fresh water, or in marshy ground. However, some winter out at sea, and at the other extreme, a number of species – including stone curlews and dikkops, coursers, and seedsnipes – have completely terrestrial lifestyles, and rarely if ever wade in water. Gulls are much more aquatic, but they are not always tied to the sea. Many roam far inland, and an increasing number make a good living on farmland and by scavenging in urban areas. By contrast, auks are truly marine birds. They get all their food from the sea, and once they have finished breeding, they move offshore, often staying far beyond sight of land.



FAVoured SHALLOWS

Like many waders, Pied Avocets feed in shallow water. Slender toes help to spread their weight on soft muddy sediment.

FEEDING

When similar birds share the same habitat, evolution often makes them diverge so that they exploit different types of food. This is exactly the case with coastal waders: with their different beaks and feeding methods, up to a dozen species can live close together without engaging in direct competition. Avocets feed in the water itself, while many other waders extract small animals from soft mud.

Turnstones search for food along the tideline, while sanderlings repeatedly scuttle down the shore, picking up food revealed behind each retreating wave. The charadriiform order includes two main groups of fish eaters: terns, which dive onto fish from the air, and auks, which pursue them under water. Gulls typically live as much by scavenging as by catching their own food. Many of them will eat anything they can swallow, including dead fish along the tideline or waste at landfill sites. However,

large gulls are aggressive predators. They attack other seabirds and their young, and will also eat mammals as big as rabbits. Skuas have similar feeding habits, and also indulge in aerial piracy.



LONG-BILLED LIFESTYLE

With a beak up to 22cm (8½in) long, the North American Long-billed Curlew can probe far into tidal mud to find molluscs and worms.



SHORELINE SCAVENGER

This Lava Gull from the Galapagos Islands has a wide-ranging diet that includes dead remains on the shore, small lizards, and the young of other birds.



UNDERWATER HUNTERS

Groups of guillemots often dive in pursuit of fish. Their feeding method is remarkably similar to that of penguins, although guillemots can fly.

HUMAN IMPACT

COMPETITION ON THE SEAS

Gulls often benefit from human activities, but as a group, waders and their allies are easily harmed by habitat change. Inland species, such as lapwings, have difficulty raising their young in intensive farmland, while auks face stiff competition for small fish at sea. Sand-eel fishing, in particular, has had a damaging effect on Atlantic Puffins, Razorbills, and guillemots, all of which feed sand-eels to their chicks.



SHIP FOLLOWERS

Gulls often follow fishing boats inshore, but auks are not natural scavengers, and will feed only on fish that they have caught themselves.

NESTING AND PARENTING

Few birds in this order make elaborate nests, most laying their eggs directly on rocky ledges or on the ground. Waders usually nest on their own, but gulls and auks often gather in nesting colonies, returning to the same sites year after year. The biggest of these, formed by Least Auklets in the Aleutian Islands, off Alaska, can contain over a million birds. Waders typically lay four eggs, so well camouflaged that they can be difficult to see against the ground. Terns also use camouflage for protection, laying their eggs directly on shingle or sand. Many of these ground-nesters guard their nests vigorously, either attacking intruders, or luring them away with distraction displays. In the auk family, the number of eggs is usually just one, or more rarely two. Young Atlantic Puffins typically leave the nest when around six weeks old, but Guillemots and Razorbills leave at the age of just two weeks. At this age, their wings are still tiny, so they leap off their cliff ledges as darkness falls, to avoid being caught by gulls.

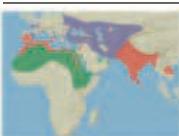


GUILLEMOT COLONY

Guillemots nest on narrow cliff ledges, laying a single egg directly on the bare rock. Even if there is spare space, the adults are often tightly packed – a way of preventing predatory gulls finding enough space to land.

 *Burhinus oedicnemus*

Eurasian Stone-curlew



LENGTH
40–44cm (15½–17½in)
WEIGHT
450–500g (16–18oz)

MIGRATION
Migrant

HABITAT Areas of low or sparse vegetation, including heaths, pastures, bare sand, and dry mudflats

A typical member of its family of “thick-knees”, named after their distinctive swollen knee joints, the Eurasian Stone-curlew has a dull plumage, large head, and big, bulging eyes. It is largely nocturnal, foraging actively from dusk till dawn. It has a far-carrying call.



NESTING EURASIAN STONE-CURLEW

 *Esacus magnirostris*

Beach Stone-curlew



LENGTH
53–57cm (21–22½in)
WEIGHT
1kg (2½lb)

MIGRATION
Non-migrant

HABITAT Sandy beaches, especially those with a mangrove or reef exposed to tides

A large bird, the Beach Stone-curlew has a prominent white eyebrow, grey-brown upperparts, with black and brown streaks, and creamy white underparts. Like other “thick-knees”, it feeds at night, searching for crabs and small marine invertebrates in sand or on reefs. It can be seen on tropical beaches from Malaysia to northern Australia, but a decline in its numbers has been noted in parts of its range.

 *Chionis albus*

Snowy Sheathbill



LENGTH
40cm (15½in)
WEIGHT
625–725g (22–26oz)

MIGRATION
Partial migrant

HABITAT Coastal areas

The Snowy Sheathbill is a snow-white bird found in the dense breeding colonies of birds and seals in the Antarctic. Agile and quick on the ground on its unwebbed feet – the only Antarctic species that does not have webbed feet – it is a scavenger, stalking about in penguin rookeries and cormorant and seal colonies in search of food. It eats anything it can find, such as scraps, faeces, carrion,

 *Chionis albus* *Pluvianellus socialis*

Magellanic Plover



LENGTH
19–22cm (7½–8½in)
WEIGHT

MIGRATION
Partial migrant

HABITAT Freshwater or brackish water; winters in coastal areas

Mainly dove-grey in colour, the Magellanic Plover has a black bill, white throat and underparts, and pink legs. A rare bird, perhaps numbering only 1,000 birds in all, it inhabits a small range at the very southern tip of South America. It is unusual in several ways, such as its habit of scratching or digging for food with its powerful legs, in the manner of a domestic chicken. It also feeds its young by regurgitating food, which is unknown in other shorebirds.

ADULT MAGELLANIC PLOVER *Haematopus ostralegus*

Eurasian Oystercatcher



LENGTH
40–45cm (15½–17½in)
WEIGHT

MIGRATION
Migrant

HABITAT Inter-tidal zones and a variety of freshwater wetlands and adjacent habitats

Black and white in colour, the Eurasian Oystercatcher is a typical member of a widespread family. The 11 species of oystercatcher are either pied or black and all have the trademark strong, blunt, laterally flattened orange bill, which they use to feed on molluscs. In flight, the white

ADULTS FEEDING

patches on the wings and tail of the Eurasian Oystercatcher are clearly visible. The juvenile is browner than the adults, with a white neck collar and a duller bill. The call of the species is a distinctive loud piping.

It is the most widely distributed member of the family, breeding from

chicks, seal afterbirth, and the occasional stolen egg. It even harasses penguins into regurgitating the food they bring for their young. Typically for a bird with such eating habits, its facial skin is largely featherless. In the breeding season, both the male and female incubate the 2–4 eggs.



*Haematopus bachmani***Black Oystercatcher**

LENGTH	43–45cm (17–17½in)
WEIGHT	550g (20oz)
MIGRATION	Non-migrant

HABITAT Exposed rocky coasts, reefs, and islands**ADULT BLACK OYSTERCATCHER**

Predominantly black, with a slightly brown cast to its upperparts, the Black Oystercatcher has a blood-red bill, a glowing yellow eye, an orange-red eyering, and pink legs and feet. When it is feeding quietly, its coloration can make it difficult to pick out against dark rocks. It is found only along the Pacific coast of North America, where it frequents tide-line rocky outcrops, reefs, and beaches.

ADULT CRAB-PLOVER*Dromas ardeola***Crab-plover**

LENGTH	38–41cm (15–16in)
WEIGHT	325g (12oz)
MIGRATION	Partial migrant

HABITAT Sandy shores and inter-tidal mud

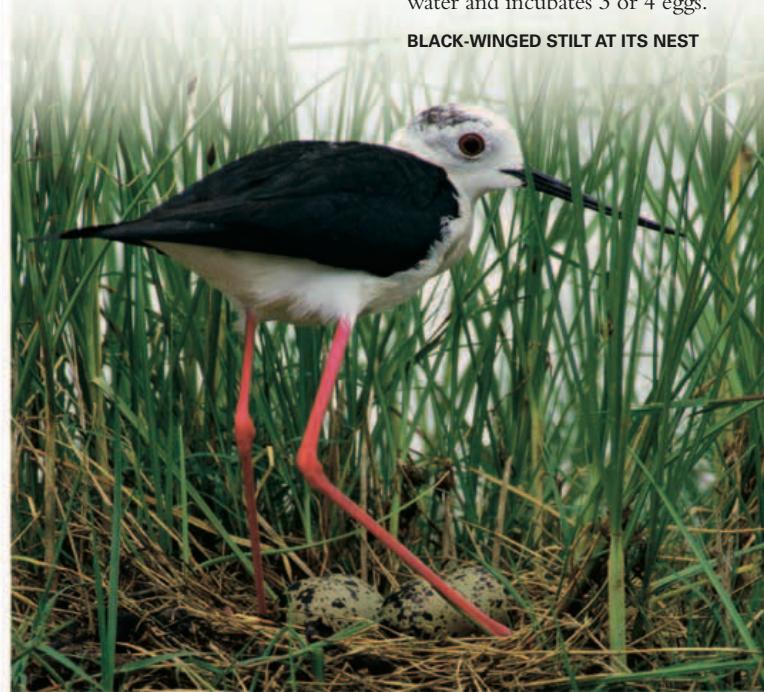
Easy to distinguish from other shorebirds, the Crab-plover has a heavy, dagger-like black bill (specially adapted to eating crabs), black and white plumage, and long grey legs. The only member of its family, it has a number of characteristics that are different from other wading birds, such as its habit of nesting in underground chambers and laying only a single, pure white, unmarked egg. It is a noisy bird, calling frequently while at its breeding sites and on its wintering grounds.

*Himantopus himantopus***Black-winged Stilt**

LENGTH	35–40cm (14–15½in)
WEIGHT	150–200g (5–7oz)
MIGRATION	Migrant

HABITAT Variety of wetland habitats in mostly subtropical and tropical regions

Distinctive for its extremely long, wax-pink legs, which enable it to wade knee-deep in water in search of prey, the Black-winged Stilt is black and white in colour, with red eyes and a straight, black bill. It is found throughout the subtropical and tropical regions of the world. It hunts by sight or touch, using its bill to detect prey, mainly aquatic insects, in water. This social species breeds in loose colonies in marshy ground or mudflats near water and incubates 3 or 4 eggs.

BLACK-WINGED STILT AT ITS NEST**FEEDING TECHNIQUES**

Ensuring survival on the heavily populated winter mudflats, the Eurasian Oystercatcher uses its strong bill to feed on molluscs, especially cockles. It opens shells using two techniques – “hammering” or “stabbing”. Hammering involves breaking one of the mollusc shells with a series of short, powerful blows of the bill and then inserting it to cut the muscle holding the shells together. Stabbing is subtler and involves the careful insertion of the bill between the two shells, cutting the muscle, and then prising the flesh out.

**ADULT IBISBILL***Ibidorhyncha struthersii***Ibisbill**

LENGTH	38–41cm (15–16in)
WEIGHT	300g (11oz)
MIGRATION	Partial migrant

HABITAT High-altitude rivers with flat, stony alluvial floodplains; some winter in rocky lowland rivers

With its grey plumage that provides a surprising degree of camouflage, the Ibisbill can be very difficult to spot when it is feeding quietly in mid-stream or resting among rocks. It has a long, thin, decurved bill, a black face, and a black breast-band. The sole member of its family, the Ibisbill breeds in the high mountain river valleys of central Asia and the Himalayas, at heights of up to 4,400m (14,500ft) above sea level.

LONG LEGS

The Black-winged Stilt has the longest legs in relation to its body size of any bird in the world. The long legs allow it to feed in deeper water than most other waders. The potential length of the legs is obvious as soon as the chicks hatch. Before their bills and legs reach the extraordinarily long adult size, the young are dependent on their parents, who provide a large proportion of their food.

*Cladorhynchus leucocephalus***Banded Stilt**

LENGTH	36–45cm (14–17½in)
WEIGHT	200–225g (7–8oz)
MIGRATION	Partial migrant

HABITAT Saline wetlands and commercial saltponds; occasionally on estuaries

Named for the red-chestnut band that is prominent across its breast in the breeding season (usually fading or disappearing after breeding), the Banded Stilt has a slender black bill

ADULT BANDED STILT

and a white head, back, and underparts. In flight, a white trailing edge is visible on its black wings. Its long legs are pink or orange.

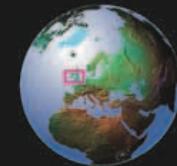
Native to Australia, the species follows an unusual breeding strategy. It waits until the huge temporary salt lakes in the arid interior are filled up during the rains. Flocks then quickly move in and huge colonies develop along the shorelines, feeding almost exclusively on brine shrimps, which are abundant in the lakes.





GREAT SITES

MORECAMBE BAY



LOCATION A wide bay on the Irish Sea coast of northwest England, UK.



Set against the magnificent backdrop of windswept salt marshes and the rolling hills of the southern Lake District, Morecambe Bay is one of the largest and most important estuarine areas for birds in Europe. The intertidal mudflats and sandflats of this vast shallow bay teem with abundant invertebrate life such as lugworms, cockles, mussels, and shrimps, attracting enormous numbers of waders, ducks, and geese to feed. During peak migration periods, thousands of shorebirds pause here to rest and feed when moving up and down the UK's west coast in spring and autumn, and the bay is also a vital overwintering or breeding location for a wide variety of species.

INTERTIDAL BIRD LIFE

Morecambe Bay is fed by five main rivers – the Leven, Kent, Keer, Lune, and Wyre – and their estuaries merge into a single, funnel-shaped tidal system. At extreme low tides in spring the sea may drain up to 12km (7 miles) away from the high-water mark and the exposed mud and sand stretch to the horizon – the biggest continuous intertidal area in Britain, covering around 305 square km (118 square miles). On the bay's north and east sides, the tidal flats are bordered by low-lying salt marshes.

Morecambe Bay hosts globally significant numbers of 11 species of bird, including ducks such as Northern Pintail and Common Shelduck and waders such as Red Knot, Dunlin, Eurasian Curlew, Eurasian Oystercatcher, and Common Redshank. Some of these waders use the bay as a stop-over during their migrations; others remain throughout the winter. The bay regularly supports 65,000–70,000 Red Knots in winter – over 15 per cent of the species' entire wintering population in Europe and North Africa.

At high tide, when the mudflats are flooded by the incoming sea, the salt marshes and raised shingle beaches that fringe the bay offer a temporary refuge to masses of waders. Occasionally a Peregrine Falcon or Merlin triggers alarm among the wader flocks.

The fast-moving waters and treacherous quicksands of Morecambe Bay have caused many fatalities; crossing the bay is safe only at low tide and with a professional guide.

RISING WATERS

When the bay's mudflats and shallow winding creeks are submerged by the incoming tide, waders, such as these Eurasian Oystercatchers, gather in tightly packed flocks.

WHAT TO SPOT



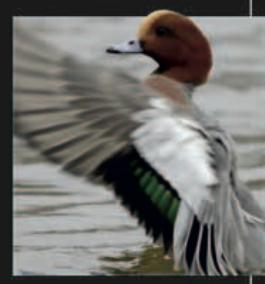
MERLIN
Falco columbarius
(see p.185)



DUNLIN
Calidris alpina
(see p.230)



COMMON RINGED PLOVER
Charadrius hiaticula
(see p.225)



EURASIAN WIGEON
Anas penelope

*Recurvirostra avosetta*

Pied Avocet



LENGTH	42–45cm (16½–17½in)
WEIGHT	250–300g (9–11oz)
MIGRATION	Migrant

HABITAT Brackish and saline wetlands

ADULT PIED AVOCET

Recurvirostra novaehollandiae

Red-necked Avocet



LENGTH	43–46cm (17–18in)
WEIGHT	325g (12oz)
MIGRATION	Partial migrant

HABITAT Shallow brackish or saline lakes and lagoons; occasionally on estuaries

Also called the Australian Avocet, the Red-necked Avocet breeds in Australia, where it is widespread. The dark chestnut-red head and neck, white-ringed eyes, pied upperparts, white underparts, and bright blue legs make this avocet a colourful and easily recognizable bird.

A sociable species, it feeds in large flocks – foraging for crustaceans, aquatic insects, molluscs, and worms – and nests in loose colonies. Its nest is a shallow scrape lined with vegetation found near water. Like other avocets, it frequents shallow freshwater or saltwater lagoons and lakes, which are found in the arid interior of Australia, especially in wet years. Red-necked Avocets make full use of these temporary interior salt lakes, often moving in and out of inland areas.



ADULT RED-NECKED AVOCET

FEEDING TECHNIQUE

A long, upcurved bill is common to all the avocets and is used to good effect when they forage for food. An avocet mainly feeds by sweeping its bill and head from side to side in shallow water and loose mud, holding it slightly open and locating its prey by touch. It lunges forwards to catch its food, usually small crustaceans, aquatic insects, worms, and molluscs.

*Vanellus armatus*

Blacksmith Plover

LENGTH	28–31cm (11–12in)
WEIGHT	150g (5oz)
MIGRATION	Non-migrant

HABITAT Wetlands and open grassy areas

ADULT NORTHERN LAPWING

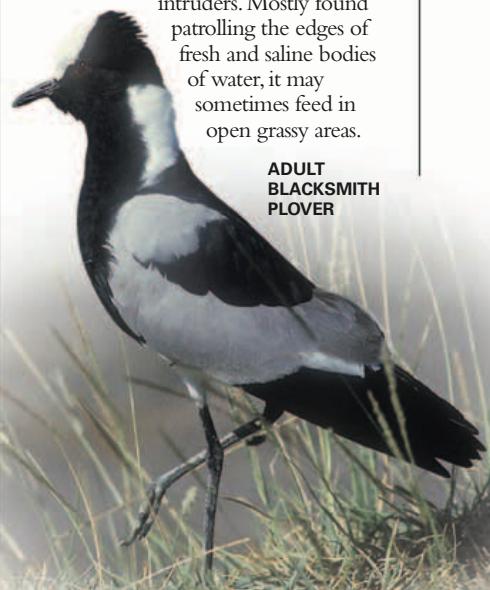
Vanellus vanellus

Northern Lapwing

LENGTH	28–31cm (11–12in)
WEIGHT	200–225g (7–8oz)
MIGRATION	Migrant

HABITAT Open areas of wet or damp grassland, arable farmland, and steppes

Its raised, pointed crest, along with its black and white breast and iridescent green and purple back, make the Northern Lapwing easy to identify. It feeds by walking about and probing the soil surface, while practising “foot-trembling”, in which one foot is vibrated up and down on the ground to attract prey to the surface. In the breeding season, it is highly vocal, especially the territorial male, which is known for its enthusiastic and noisy aerial display.



ADULT BLACKSMITH PLOVER

Vanellus miles

Masked Lapwing



LENGTH	33–37cm (13–14½in)
WEIGHT	400g (14oz)
MIGRATION	Partial migrant

HABITAT Open habitats with low vegetation

ADULT MASKED LAPWING

Notable for the huge yellow wattles in front of its eyes and the curious long, yellow spurs protruding from the bend in both wings, the Masked Lapwing is a large black-headed bird. Native to Australia, it has benefited from scrub clearance for agriculture and has colonized both Papua New Guinea and New Zealand in recent times.

Vanellus chilensis

Southern Lapwing

LENGTH
31–38cm (12–15in)WEIGHT
325g (12oz)MIGRATION
Partial migrant**HABITAT** Tropical and temperate lowland grassland and wetlands

The only South American shorebird with a crest, the Southern Lapwing has a grey head, black throat and breast, and an iridescent bronze wing patch. It has red spurs at the bend of its wing, which it displays in a show of aggression. When nesting, the Southern Lapwing greets intruders with strident alarm calls and may even attempt to lure away potential predators from nests by feigning injury. It is resident in tropical regions, but those breeding in cooler latitudes migrate north in the winter.



ADULT SOUTHERN LAPWING

Pluvialis dominica

American Golden Plover

LENGTH
24–25cm (9½–10in)WEIGHT
150g (5oz)MIGRATION
Migrant**HABITAT** Arctic and subarctic tundra; winters in grassland, mudflats, rivers, and lakeshores

ADULT AMERICAN GOLDEN PLOVER

Named for the golden hue of its brown upperparts, the American Golden Plover has a broad white stripe above its eyes. It is similar to the European Golden Plover (above right). The species is a long-distance migrant, breeding at high latitudes in the tundra of North America and wintering as far south as the grasslands of Patagonia.

Vanellus spinosus

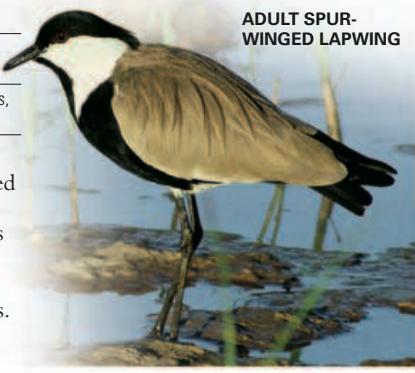
Spur-winged Lapwing

LENGTH
25–28cm (10–11in)WEIGHT
175–200g (6–7oz)MIGRATION
Partial migrant**HABITAT** Wide variety of fresh and saline wetlands, mostly inland

As its name suggests, the Spur-winged Lapwing, or Plover, has a sharp spur on the bend of its wing. It shares this feature with a number of other lapwings, including the Masked (p.224) and Southern (left) Lapwings. Both its striking black, white, and brown plumage and its sharp spurs

are used for display during breeding. Typically hunch-backed in posture, this lapwing can be seen throughout its fragmented range in Africa. Curiously, in recent times, the species has expanded its range into Turkey and Greece and these populations, unlike those resident in Africa, are migratory.

ADULT SPUR-WINGED LAPWING

*Pluvialis squatarola*

Grey Plover

LENGTH
27–30cm (10½–12in)WEIGHT
200–350g (7–13oz)MIGRATION
Migrant**HABITAT** Breeds in high Arctic tundra; winters on inter-tidal marine areas

Easily distinguished from the other “golden” plovers by its much stouter black bill, black “armpits” (seen only when in flight), grey plumage, and white rump, the Grey Plover is the largest of the *Pluvialis* genus of plovers.

ADULT IN NON-BREEDING PLUMAGE



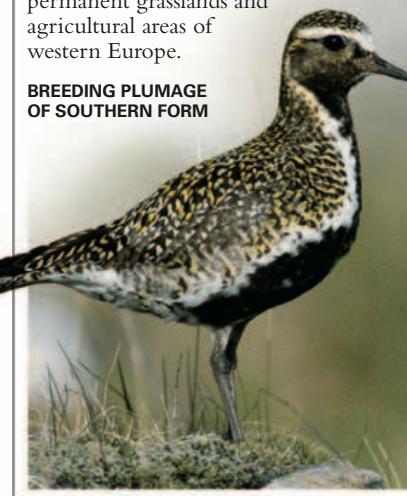
This plover is a truly cosmopolitan species, being highly migratory. It breeds throughout the high Arctic tundra zone, where it chooses dry grassy or lichen-covered tundra, preferring broken terrain and rocky slopes to nest in. After the breeding season, it migrates to areas such as southern Australia and South Africa and is a common sight on beaches and tidal mudflats around the world in winter. Some birds defend their winter territories vigorously and return to them year after year. The male Grey Plover defends its territory by performing a beautiful song display while in flight.

Pluvialis apricaria

European Golden Plover

LENGTH
26–29cm (10–11½in)WEIGHT
225g (8oz)MIGRATION
Migrant**HABITAT** Breeds in moorland and tundra; winters in wet lowland grassland and agricultural fields

A bulky, gold-spangled plover, the European Golden Plover has a variable breeding plumage. Some southerly breeding birds show less black in their plumage. European Golden Plovers breed in a variety of upland, Arctic, and tundra habitats and migrate southwest to winter in large flocks in permanent grasslands and agricultural areas of western Europe.

BREEDING PLUMAGE
OF SOUTHERN FORM*Charadrius hiaticula*

Common Ringed Plover

LENGTH
18–20cm (7–8in)WEIGHT
55–75g (2–2½oz)MIGRATION
Migrant**HABITAT** Coastal in Arctic, subarctic, and temperate zones; also breeds in tundra areas and along rivers

The Common Ringed Plover has pronounced head markings, a white collar, and a broad black band on its breast. The male has a larger band than the female. This bird is a classic “leap-frog” migrant – the most northerly breeding populations winter the farthest south, and the birds that breed further south undertake progressively shorter migrations.



ADULT COMMON RINGED PLOVER

*Charadrius vociferus***Killdeer**

LENGTH	23–26cm (9–10in)
WEIGHT	90–100g (3 1/4–3 5/8oz)
MIGRATION	Partial migrant

HABITAT Inland pools, grassland, fields, car parks, and other open areas

Easily distinguished from all other American plovers by its two black breast-bands, the Killdeer gets its common name from its call – a two-syllabled “kill-dee”. It has adapted well to living in close proximity to humans and can often be seen on farmland, and in airports, car parks, and other such man-modified open areas. It even nests on flat, gravelled rooftops. It is found singly or in pairs, but small flocks may gather outside the breeding season.

ADULT KILLDEER**DISTRACTION PLOY**

Like many other birds, when its eggs or young are threatened by a predator, the Killdeer performs a distracting display to draw the intruder away from the nest. It acts like a crippled bird with one or both wings dragging and often limps, rapidly calling out constantly while remaining just out of reach.

*Anarhynchus frontalis***Wrybill**

LENGTH	20cm (8in)
WEIGHT	60g (2 1/8oz)
MIGRATION	Migrant

HABITAT Breeds on stony riverbeds; winters on seashores

The Wrybill is unique among birds in that it has a bill that is bent to one side. In all individuals of this species, the tip of the bill is twisted to the right at an angle of about 12 degrees. This is considered to be an adaptation that helps the Wrybill find food in its breeding ground, where it walks in clockwise circles, turning over stones to hunt for the insects and worms that live under them.

**ADULT WRYBILL***Rostratula benghalensis***Greater Painted Snipe**

LENGTH	23–26cm (9–10in)
WEIGHT	125g (4oz)
MIGRATION	Non-migrant

HABITAT Overgrown shallow wetlands, marshes, and paddy fields



the breast. In the breeding season, this patch becomes a well-defined black bar on the male. This partial band and the bird's forecrown and eye-stripe become black during the breeding season. The female has a dusky eye patch with a brown chest patch. The legs of this plover are relatively long and dark and the bill is fine and black.

The Kentish Plover prefers sandy beaches along the sea coast, although it will also nest inland on the shores of saline or brackish wetlands. Most inland breeding birds move to the coast in winter. It nests in shallow hollows in sand, lined with pebbles or shell fragments.

*Charadrius alexandrinus***Kentish Plover**

LENGTH	15–18cm (6–7in)
WEIGHT	40g (1 1/8oz)
MIGRATION	Partial migrant

HABITAT Mainly coastal areas: beaches and saline or brackish wetlands.

One of the smaller members of its genus, the Kentish Plover has an incomplete breast-band, which appears as a dark elongated patch at the side of

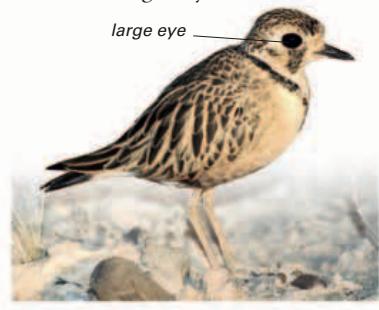
*Charadrius australis***Inland Plover**

LENGTH	19–23cm (7 1/2–9in)
WEIGHT	85g (3oz)
MIGRATION	Partial migrant

HABITAT Deserts and semi-deserts

This long-legged plover is unusual in that it is a nomadic bird of the arid Australian outback, where it lives on the sparsely vegetated plains. Compared with most other birds, its eyes are relatively large, which helps it to see well in the dark. The Inland Plover is mainly active when darkness

falls, searching for and feeding on nocturnal insects and spiders. It is most often seen on dirt roads at night. A tame bird that tends to rely on its dull plumage for protection, it will allow the observer to approach closely before running away.

**INLAND PLOVER**

A small, plump, and colourful wading bird, the Greater Painted Snipe inhabits muddy marshy areas. Its long bill is used to probe deep into soft mud in search of the molluscs, crustaceans, and worms that form the greater part of its prey. It also feeds by swishing its bill from side to side in shallow water to pick up small animals and vegetable matter. It is most active at dawn and dusk, when it forages singly, in pairs, or in small, loose groups.

Although similar in appearance to snipes, in some ways this species is more

MALE GREATER PAINTED SNIPE

closely related to the jacanas. Both, the Greater Painted Snipe and the jacanas are unusual in that the female is larger and more brightly coloured than the male. This is a consequence of the fact that the rusty-chested female is more dominant of the pair and fights with other females for territory and mates, the biggest and most brightly coloured female emerging as the winner. The female mates with more than one male and then lays several clutches of eggs.

Actophilornis africanus

African Jacana



LENGTH	30cm (12in)
WEIGHT	150–250g (5–9oz)
MIGRATION	Non-migrant

HABITAT Both large and small wetlands with floating vegetation

A denizen of shallow sub-Saharan wetlands with emergent vegetation, this lanky-legged bird is equipped with exceptionally long toes and claws. These spread the bird's weight across a larger surface area, enabling it to walk on floating aquatic vegetation, such as the pads of water-lilies (which is why it is also known as the Lily Trotter). When seen from a distance, the bird can appear to be "miraculously" walking along the surface of the water.

The upperparts of the adult African Jacana are a rich chestnut colour, often with a green sheen. Its neck and face are white with a black stripe through the eye, which joins up with the black of the crown, nape, and hindneck. A band of gold adorns the breast, while the bill and frontal shield glow in a vivid pale blue. The olive-green of the long legs completes the splendid colour scheme of this bird's plumage. Never a strong flier, it moults all of its flight feathers at once and cannot fly at all until new feathers grow. The African Jacana breeds in sub-Saharan Africa and lays four brown eggs that have black markings.

ADULT AFRICAN JACANA



CARRYING CHICKS

The adult male African Jacana protects its chicks and keeps them warm and dry by pressing them closely between its wings and body. Its bone structure is adapted for this purpose, and it can also walk about while carrying up to two chicks under each wing. The male bird can even manage to move eggs, one at a time, to a new nest if this becomes necessary.



UNDER FATHER'S WING

A close look at this photograph will reveal the leg of a chick protruding from beneath the shielding wing of its parent.

*Hydrophasianus chirurgus*

Pheasant-tailed Jacana

MAP	Length 31–58cm (12–23in) Weight 125–200g (4–7oz) Migration Partial migrant
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HABITAT Shallow wetlands with plenty of vegetation, particularly water-lilies

With its long, gracefully curved tail, the Pheasant-tailed Jacana is unmistakable.

The sexes look alike, although the female is somewhat larger than the male, as befits the dominant partner. Unlike other jacanas, it has a different non-breeding plumage – its tail becomes much shorter, and its colours

ADULT IN BREEDING PLUMAGE

become subdued. The Pheasant-tailed Jacana spends most of its time walking on the floating vegetation of its aquatic habitat, only occasionally coming on to dry land or swimming in the water. At such times it remains remarkably inconspicuous, but when it takes flight, the dazzling white of the outstretched wings makes the bird stand out sharply from its surroundings. When it is at rest, this whiteness may be visible as a panel down the flank, although it is often partly hidden by the brown feathers of the wing coverts, which protect the wings as the bird walks through grass and reeds. Another feature that usually remains hidden beneath the wings is the sharp spur at the bend of the wing, which it uses during fights with rivals in the breeding season.

Attagis malouinus

White-bellied Seedsnipe

MAP	Length 26–29cm (10–11½in) Weight 350g (13oz) Migration Non-migrant
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HABITAT High mountain steppes, moorland, and peat-bogs

A bird of open windswept moorland and montane scree slopes at the southernmost tip of South America, the White-bellied Seedsnipe survives by foraging on the sparse small berries and plants growing in its inhospitable mountain habitat. Its belly is a bright white, but the muted mottled brown, black, and buff plumage of the upperparts allows the bird to blend in beautifully with its surroundings, especially when it crouches down and becomes immobile when a potential predator appears. Although its total population is not large, the species is not regarded as endangered since it inhabits inaccessible regions that are relatively free from human interference.



WHITE-BELLIED SEEDSNIPE

*Scolopax minor***American Woodcock**

LENGTH	26–30cm (10–12in)
WEIGHT	175–225g (6–8oz)
MIGRATION	Migrant

HABITAT Mixed or deciduous woodland, damp fields, and marshes

Well camouflaged by its dull plumage, marked by black and brown barring, the small American Woodcock has a long, thin, pinkish brown bill. The species breeds throughout the eastern half of North America in spring, when each male carries out a complex courtship display. On bare ground in a clearing, it calls repeatedly and, at short intervals, rises up to 100m (330ft) in the air on noisy wings as it circles, hovers, twitters, and chirps before spiralling to the ground.

**ADULT AMERICAN WOODCOCK****ADULT JACK SNIPE**

aerial song-flight display, its rhythmic song, also uttered from the ground, sounding like a distant galloping horse. In winter, the Jack Snipe is difficult to observe as it seldom flies during the day, is very well camouflaged by the pale markings on its upperparts, and keeps to dense vegetation in wet, muddy areas. Often, the only way to see it is to try and flush it out.

*Lymnocryptes minimus***Jack Snipe**

LENGTH	17–19cm (6½–7½in)
WEIGHT	45–55g (1½–2oz)
MIGRATION	Migrant

HABITAT Breeds in open boreal marshes, such as floating bogs; winters on inland freshwater marshes

Differing significantly from the other snipes, such as the Common Snipe (below), the diminutive Jack Snipe is placed in its own genus, *Lymnocryptes*. It is much smaller and has a shorter bill and wings than its near relatives. Unusually for snipes, it has a purple and green sheen on its upperparts.

The breeding grounds of the Jack Snipe stretch from Norway to the east, up to Siberia. The male advertises and defends its large territory with an

*Gallinago gallinago***Common Snipe**

LENGTH	25–27cm (10–10½in)
WEIGHT	95–125g (3½–4oz)
MIGRATION	Migrant

HABITAT Tussocky, fresh, and brackish marshes; also damp farmland and other wetlands in winter**COMMON SNIPE INCUBATING ITS EGGS**

Like other snipes, the unobtrusive Common Snipe has a long bill and plumage that helps to camouflage it well. It has stripes on its head, a mottled brown back, and barring on the flanks. In the breeding season, this species frequents tussocky marshes, where the male utters its monotonous “chip-per” call from a perch. It also performs a diving display flight, during which the outer tail feathers are held at right angles to the body. The air rushing by these feathers produces a low, pulsing whistle.

*Limnodromus griseus***Short-billed Dowitcher**

LENGTH	25–29cm (10–11½in)
WEIGHT	100–125g (3½–4oz)
MIGRATION	Migrant

HABITAT Open marshes and bogs; winters in coastal inter-tidal areas

Until the 1950s, the two North American dowitcher species – the Long-billed Dowitcher (*L. scolopaceus*) and the Short-billed Dowitcher – were considered to be a single species and are confusingly similar in their breeding plumage. Both have long, straight bills, but the Short-billed Dowitcher differs from its long-billed cousin in its mellow “tu-tu-tu” call (the Long-billed Dowitcher utters a single “keek”), its paler plumage, and its paler tail with wider white bars. The Short-billed Dowitcher feeds with a rapid, snipe-like probing action. It usually stands in water to feed or swims, often submerging its head entirely.

Breeding takes place in subarctic Canada, from northern Quebec through the centre to the northwest, and southern Alaska. There are three distinct subspecies in these areas.

*Limosa haemastica***Hudsonian Godwit**

LENGTH	37–39cm (14½–15½in)
WEIGHT	225–450g (8–16oz)
MIGRATION	Migrant

HABITAT Arctic and subarctic coastal and riverine marshes; winters on coastal mudflats**ADULT IN BREEDING PLUMAGE**

The Hudsonian Godwit has a showy, chestnut-red breeding plumage, a long, pointed bill, and long legs. When not in its breeding plumage, it is superficially similar to other godwits, but can easily be identified in flight when its black and grey underwing is visible. The Hudsonian Godwit breeds at scattered locations across northern North America and gathers in large flocks to migrate in August.



ADULT IN BREEDING PLUMAGE

Numenius arquata

Eurasian Curlew

LENGTH
50–60cm (19½–23½in)WEIGHT
750–875g (27–31oz)MIGRATION
Migrant**HABITAT** Damp and wet open areas of short vegetation; winters in marine coastal habitats

With its very long, thick, and decurved bill, the Eurasian Curlew is well equipped to search for and feed on its prey in mud or sand (see panel, above right). The brown-streaked plumage of this curlew is dull, but its white back and rump are clearly visible when it is in flight. It gets its common name from its call, a repeated loud, rich, ringing “courli”, which is heard throughout the year. A variation of this call, extending into a bubbling trill, is part of its breeding display song-flight, sometimes also heard on its wintering grounds on the coast.

The winter range of the species stretches from western Europe and West Africa across Asia to Japan and the Philippines, where Eurasian curlews can be found along coasts on tidal mudflats and sandy beaches in the north of its range and on rocky shores and mangroves in the tropics.

ADULT PROBING FOR PREY

FEEDING ON THE SHORELINE

The Eurasian Curlew uses three feeding techniques: pecking the soil surface; jabbing deeper with its bill; and prolonged probing with its entire bill immersed in mud, sand, or shallow water. The extremely long bill allows it to extract insects, worms, shellfish, and crustaceans (especially shrimps and crabs) buried so deep that other shorebirds cannot reach them.

*Limosa lapponica*

Bar-tailed Godwit

LENGTH
37–39cm (14½–15½in)WEIGHT
225–450g (8–16oz)MIGRATION
Migrant**HABITAT** Low-lying coastal tundra; winters in muddy and sandy inter-tidal areas

Easily recognizable for its beautiful brick-red breeding plumage, the Bar-tailed Godwit can be distinguished from other godwits by its tapering, upcurved bill, uniform wing pattern, barred tail, and short legs. Outside the breeding season, it has a pale, mottled brown plumage. The female is larger than the male, with streaked, pale chestnut underparts and a longer bill, but both sexes are grey in winter.

The species nests in the Arctic from Scandinavia to Alaska. Wintering birds favour estuarine habitats and feed along the water's edge, probing the mud with a side-to-side action.



ADULT IN WINTER PLUMAGE

Numenius phaeopus

Whimbrel

LENGTH
40–42cm (15½–16½in)WEIGHT
325–375g (12–13oz)MIGRATION
Migrant**HABITAT** Poorly vegetated and exposed boreal and low Arctic habitats; winters in coastal areas

It is the splendid decurved bill of the Whimbrel that clearly identifies it as one of the curlews. It is smaller than the Eurasian Curlew (above), is more slender, and has a noticeably shorter bill and legs. The Whimbrel can be recognized by its distinctive head stripes and a grey back mottled in white and buff. Its call is a characteristic far-carrying, rippling series of seven “pu” notes, an easily identified sound that is often heard when the birds first start migrating in spring and autumn.

Despite having a long bill, the Whimbrel rarely probes deeply into mud and sand. Instead, it gleans seeds from plants and picks up insects, worms, molluscs, and crustaceans from the soil surface. In winter, it mainly feeds on crabs along the seashore.

Numenius americanus

Long-billed Curlew

LENGTH
50–65cm (19½–26in)WEIGHT
525–650g (19–23oz)MIGRATION
Migrant**HABITAT** North American prairies, winters in estuaries; occasionally inland farmland

Aptly named, the Long-billed Curlew has a delicate cinnamon tint to its brown head, neck, breast, and mottled upperparts. The population levels of this species are declining due to widespread loss of its natural prairie breeding habitat. Globally, curlews are a fragile group, with three of the eight species considered to be under threat of extinction.

ADULT LONG-BILLED CURLEW





ADULT GREATER YELLOWLEGS

*Tringa melanoleuca***Greater Yellowlegs**

LENGTH	29–33cm (11½–13in)
WEIGHT	150g (5oz)
MIGRATION	Migrant

HABITAT Breeds in open areas with ponds and scattered trees; winters in varied wetland habitats

A tall, graceful bird with long, brightly coloured legs, the Greater Yellowlegs is ideally suited to a life of wading in shallow water, where it searches for small creatures such as fish, frogs, and insects. It may hunt its prey by sight, picking it from the surface of the water, or by feel, sweeping its submerged bill from side to side. It is distinguished from the Lesser Yellowlegs (*T. flavipes*) by its bill, which is thicker, slightly paler-based, and faintly upturned.

*Tringa totanus***Common Redshank**

LENGTH	27–29cm (10½–11½in)
WEIGHT	125g (4oz)
MIGRATION	Migrant

HABITAT Wide variety of wetland habitats

This is a common and widespread wading bird of Europe, Africa, and Asia, named for its distinctive bright orange-red legs. In flight, it shows a distinguishing broad white trailing edge to the wing. Being a noisy bird by nature, it is often the first in a gathering of birds to give the alarm at the appearance of an intruder, its ringing “tew-yew-yew” call and variants being familiar sounds in many wetlands. When displaying, the bird performs a rising and falling flight on quivering, downcurved wings while calling out a slow “tyoo tyoo tyoo”, which turns into a yodelling “tu-lud!” on landing.

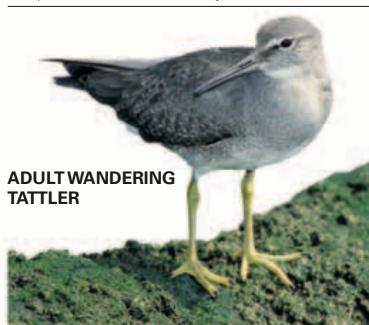


ADULT COMMON REDSHANK

*Heteroscelus incanus***Wandering Tattler**

LENGTH	26–29cm (10–11½in)
WEIGHT	100g (3½oz)
MIGRATION	Migrant

HABITAT Breeds along mountain streams; winters on rocky seashores, reefs, and adjacent habitats



ADULT WANDERING TATTLER

*Calidris alpina***Dunlin**

LENGTH	16–22cm (6½–8½in)
WEIGHT	45–60g (1½–2½oz)
MIGRATION	Migrant

HABITAT Breeds on tundra, moors and marshes; winters mainly on muddy coastal habitats

One of the most familiar shorebirds, the Dunlin’s breeding plumage is characterized by a conspicuous black patch on its white belly. At this time of year, in common with many other waders, its upperpart feathers are dark brown, scalloped with broad rufous and white fringes. Its long, decurved bill is black, as are its short legs. The juvenile has black and cream stripes on its back and black streaks on its buff underparts.

In summer, the Dunlin is a truly circumpolar species, breeding in the northernmost parts of Alaska, Scandinavia, and Russia. With the approach of autumn, it migrates south to winter chiefly on coastal wetlands in temperate parts of the northern hemisphere.

Outside the breeding season, it often gathers in enormous flocks on favoured feeding grounds. In flight, such flocks are often compact and seem to wheel and circle as one entity, with the birds executing sudden changes of direction in perfect unison. The Dunlin’s cry is a thin, reedy, vibrant “shree” or rasping “treerr”. It usually lays about four eggs.

DUNLIN IN BREEDING PLUMAGE

*Actitis macularius***Spotted Sandpiper**

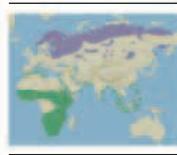
LENGTH	18–20cm (7–8in)
WEIGHT	40g (1⅞oz)
MIGRATION	Migrant

HABITAT Riverbanks, shorelines of lakes, and ponds, and adjoining habitats

In summer, this species has a black-spotted breast and belly, turning a pale grey in autumn and winter. It is a very common, widespread bird and can be found along the shores of rivers, lakes, pools, and ponds – almost anywhere from the middle of a suburban sprawl to the farthest wilderness of the Alaskan tundra.



ADULT IN SUMMER PLUMAGE

*Philomachus pugnax***Ruff**

LENGTH	20–32cm (8–12½in)
WEIGHT	100–175g (3½–6oz)
MIGRATION	Migrant

HABITAT Breeds on freshwater swamps, damp meadows; winters mainly on inland muddy areas

The male Ruff undergoes one of the most spectacular avian transformations each year; from a winter bird in subdued greys to a colourful summer garb. Each Ruff has differently coloured head plumes and broad, feathery neck collars, which it puffs up on the lek, a traditional display ground, where it tries to outdo the other Ruffs in attracting the reeves (females). The Ruff lays four eggs in a grass-lined scrape, well hidden in deep vegetation at marsh edges.

NON-BREEDING PLUMAGE

During winter, the male Ruff is very subdued in appearance.

**BREEDING MALE RUFF**

In breeding plumage, the male Ruff, with its collar of long showy feathers, is the most spectacular of all waders.

*Calidris canutus*

Red Knot



LENGTH	23–25cm (9–10in)
WEIGHT	150g (5oz)
MIGRATION	Migrant

HABITAT Breeds on high Arctic tundra and stony areas; winters along coasts

A relative of the Dunlin (above), this stout, medium-sized shorebird is very much a maritime coastal species in winter. One of the largest of all sandpipers of the genus *Calidris*, the Red Knot has grey plumage in winter, with a pale stripe

BREEDING ADULT



over the eye, a pale grey back, and white underparts. During the breeding season, its face and underparts turn brick-red, while the upperparts are dark and spotted with pale chestnut. The juvenile's plumage is patterned in pale grey and white, with orange-tinged underparts.

Sociable at all times, these shorebirds form enormous flocks, especially during migration (see panel, right). They typically swarm over mudflats or estuaries, slowly and steadily picking their way across feeding grounds, with their heads down. They take insects and plant material, obtained from surface

peckings, in summer and molluscs and worms in winter.

LONG MIGRATION



The Red Knot undertakes one of the longest migrations of any bird; all the way from northernmost Alaska to the southern tip of Tierra del Fuego, a round trip each year of over 30,000km (18,600 miles). At staging posts these birds gather in huge flocks, numbering up to 50,000 birds.

Eurynorhynchus pygmeus

Spoon-billed Sandpiper

LENGTH	14–16cm (5½–6½in)
WEIGHT	30–35g (1½–1¼oz)
MIGRATION	Migrant

HABITAT Breeds on coastal tundra; winters on coastal mudflats and saltpans

RED LIST CATEGORY Endangered

The distinctive spoon-shaped bill of this rare and endangered species distinguishes it from other waders. Mainly pale brownish grey in colour, with white underparts, its plumage turns rufous in the breeding season. It breeds in remote areas near the coast of northeastern Russia, where there are estimated to be fewer than 1,000 breeding pairs spread over an extensive area.



ADULT SPOON-BILLED SANDPIPER

Phalaropus lobatus

Red-necked Phalarope

LENGTH	18–19cm (7–7½in)
WEIGHT	35–40g (1¼–1½oz)
MIGRATION	Migrant

HABITAT Breeds on freshwater bogs and marshes; winters mainly at sea



MALE ON NEST

Also known as the Northern Phalarope, this bird breeds throughout much of the Arctic region wherever there are marshy areas. The female is similar in appearance to the male, with a white chin, red neck, and dark grey back, but is more brightly coloured. She mates with different males, leaving each one to incubate the eggs and care for the young.





SPOTTED SANDPIPER

This Spotted Sandpiper chick is nestling among dead leaves in the Yukon valley. The species is found near fresh water throughout North and South America.

Pluvianus aegyptius

Egyptian Plover



LENGTH	19–21cm (7½–8½in)
WEIGHT	75–90g (2⁵/₈–3¹/₄oz)
MIGRATION	Partial migrant

HABITAT Wide lowland tropical rivers, with sand or gravel bars

Unlike any other wader, the Egyptian Plover has a striped head, prominent black breast-band, grey back, and yellow underparts. In flight, its black

ADULT EGYPTIAN PLOVER

*Glareola pratincola*

Collared Pratincole



LENGTH	22–25cm (8½–10in)
WEIGHT	85g (3oz)
MIGRATION	Migrant

HABITAT Open areas such as ploughed fields, steppes, plains, grassland; usually near water

With its brown head, back, and wings, the Collared Pratincole is very similar to the Black-winged Pratincole (*G. nordmanni*), which has a black, rather than chestnut underwing, and the Oriental Pratincole (*G. maldivarum*), which has a much shorter tail. The Collared Pratincole also has a noticeable white trailing edge to the wing, which is absent in the other

crown and band contrast vividly with its grey wings, and the black wing-bar is clearly visible. When nesting, the adult buries its eggs under sand.

The name of this species is a misnomer because it is not a plover, but is usually placed with the coursers (although some scientists regard it as the only member of its genus). It has been extinct in Egypt from the early 20th century, although it is common in a wide band across central Africa. It is also known as the “crocodile-bird”, as it is supposed to pick pieces of food from between the teeth of crocodiles (though this behaviour has never been documented).

ADULT IN BREEDING PLUMAGE



species. They also have a distinct black-lined “bib” when in breeding plumage. In flight, all three are long-winged and rather hawk-like and all gather in large flocks during migration to feed on swarms of flying ants and other insects.

ADULT IN BREEDING PLUMAGE



ADULT CREAM-COLOURED COURSER



LENGTH	19–22cm (7½–8½in)
WEIGHT	100–150g (3½–5oz)
MIGRATION	Migrant

HABITAT Arid, flat open areas of semi-desert and desert

Stiltia isabella

Australian Pratincole



LENGTH	22cm (8½in)
WEIGHT	65g (2³/₄oz)
MIGRATION	Partial migrant

HABITAT Breeds on arid plains; winters on grassy and flooded plains, mudflats, and beaches

The elegantly postured Australian Pratincole has a very slim, attenuated body shape and long legs. It is sandy-brown with very long, pointed black wings, and a white belly and vent with a chestnut and black patch at the side. The legs are grey to red. When breeding, the bill is bright red at the base. Non-breeding birds are duller, with a mostly black bill, black spotting on the throat, and smaller flank markings. When feeding, this bird dashes after insects, such as spiders and centipedes, often bobbing its head as it goes. It has special glands, which enable it to drink fresh or saline water. The female lays its eggs on bare ground, sometimes lining the nest with pebbles, dry vegetation, or rabbit dung.



ADULT AUSTRALIAN PRATINCOLE

Larus modestus

Grey Gull



LENGTH	45cm (17½in)
WEIGHT	350–400g (13–14oz)
MIGRATION	Non-migrant

HABITAT Nests up to 50km (32 miles) from the coast in barren desert; feeds along sandy beaches

Identifiable by its dark grey body that contrasts with its white head and black bill, wing-tips, and legs, the Grey Gull is abundant in Chile and is also found further north in Peru and Ecuador. It breeds in large, dense colonies of about 60,000 pairs in upland deserts near the coast. One of the pair tends the nest during the day, providing shade to the clutch of 1 or 2 eggs by standing over them.

Larus canus

Mew Gull



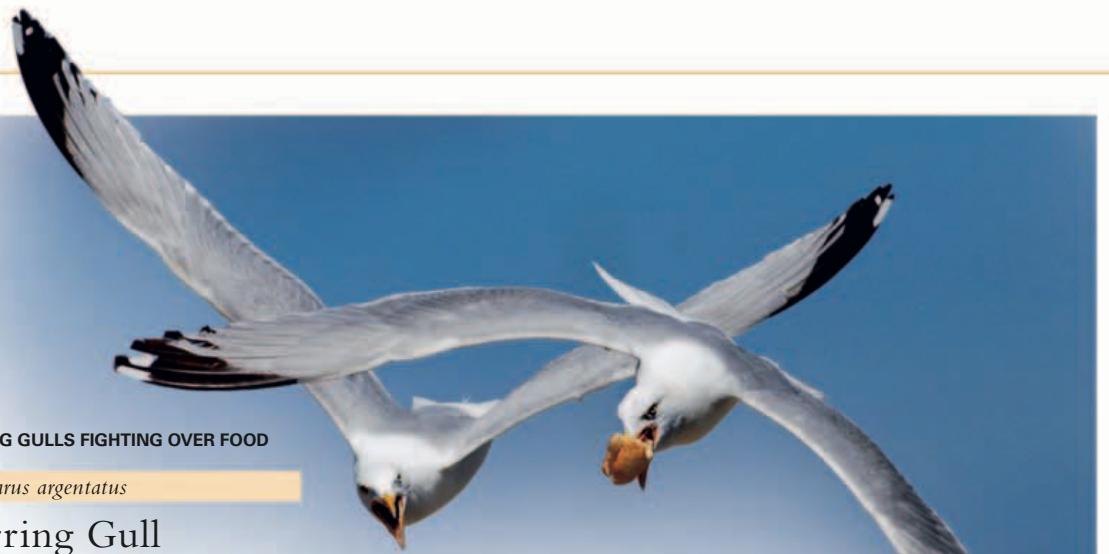
LENGTH	40–46cm (15½–18in)
WEIGHT	350–500g (13–17oz)
MIGRATION	Partial migrant

HABITAT Coasts, estuaries, farmland, lakes, and reservoirs

Its nasal call has given the Mew Gull its name. In Europe, the species is also known as the Common Gull, but it is by no means the most commonly occurring member of its family. The adult in breeding plumage has a clean, white appearance with a yellow bill, dark eyes, grey black-tipped wings with small white spots, and yellow legs. The juvenile Mew Gull has dark brown plumage.



ADULT MEW GULLS IN FLIGHT



HERRING GULLS FIGHTING OVER FOOD

Larus argentatus

Herring Gull

**LENGTH**
55–67cm (21½–26in)**WEIGHT**
1–1.5kg (2¼–3¼lb)**MIGRATION**
Partial migrant**HABITAT** Mainly coastal; also inland on large lakes or reservoirs, farmland, and rubbish tips

A large, noisy bird, the Herring Gull is known for its honking or bugling call, a familiar sound around coastal towns in Europe and eastern North America,

where it is now one of the most common coastal birds. The species takes four years to acquire its adult plumage, which consists of a white head and underparts, a pale grey back and wings, and black wing-tips with white spots ("mirrors"). The Herring Gull has pale yellow eyes, a broad yellow bill with a red spot on its tip, and pink legs. It will eat anything from rubbish and carrion to earthworms, although fish, molluscs, and algae form the bulk of its diet along the sea coast. Like other gulls, it carries hard-

shelled molluscs into the air, then drops them on land to break open shells. Inland, it eats insects, rodents, and the eggs and young of other birds.

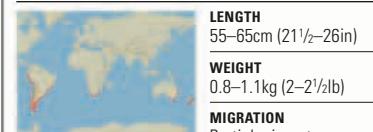
During the breeding season, these gulls usually nest in colonies on cliffs. The adults build untidy nests made up of vegetation and scraps of refuse and both the male and female incubate the eggs for 23–27 days.



FEMALE AND CHICK

Larus dominicanus

Kelp Gull

**LENGTH**
55–65cm (21½–26in)**WEIGHT**
0.8–1.1kg (2–2½lb)**MIGRATION**
Partial migrant**HABITAT** Mainly coastal

This large gull is found exclusively in the southern hemisphere, around the coasts of South America, Africa, Antarctica, and Australia. It has a heavy yellow bill, a white head and underparts, a dark, slate-grey back, and yellow legs. The Kelp Gull is a skilled scavenger and has increased markedly throughout its range as a result of more farming and fisheries.



PREDATORY BEHAVIOUR

Although the Great Black-backed Gull can often be seen scavenging around rubbish tips, it is highly predatory and will frequently pursue and take live prey as large as adult seabirds (including puffins, shearwaters, and cormorants) and rabbits. It also steals food from other birds and often makes a meal of their eggs and young.

Larus marinus

Great Black-backed Gull

**LENGTH**
68–79cm (27–31in)**WEIGHT**
1.4–2.2kg (3¼–4½lb)**MIGRATION**
Partial migrant**HABITAT** Coasts, estuaries, large inland waters, and agricultural fields

adult plumage and becomes gradually less streaked as it ages. With its large wingspan of 1.5m (5ft), the flight of the Great Black-backed Gull is heavy and powerful, with slow, deep wingbeats. This gull has a very varied diet, which includes fish, shellfish, and carrion (see panel, right).

The species breeds on the east coast of North America from Labrador to New York. Farther east, it also breeds in Greenland and Iceland, and from Britain to Norway and neighbouring parts of Russia. Although very aggressive towards other birds, it often nests together with other gulls in loose colonies or may occasionally build solitary nests. The nest is a large pile of feathers, debris, sticks, seaweed, and grasses, often sheltered in cliff ridges, and is built by both the male and female.

The world's largest gull, the Great Black-backed Gull has a bulky appearance. It has a massive white head, a huge red-spotted yellow bill, a slaty black back and wings, and pink legs. Like many other large gull species, it takes four years to acquire

ADULT GREAT BLACK-BACKED GULLS

*Larus ridibundus*

Common Black-headed Gull

LENGTH
37–43cm (14½–17in)WEIGHT
275g (10oz)MIGRATION
Partial migrant

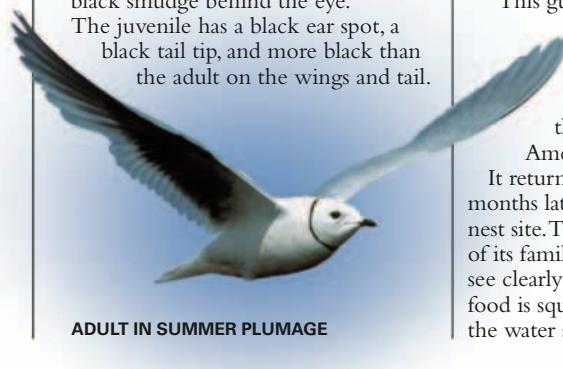
HABITAT Coasts, inland wetlands, marshes, agricultural land, and open areas in towns

Named somewhat misleadingly, the Common Black-headed Gull is never truly black-headed – it has a dark brown hood in summer (appearing black from a distance). As well as the brown hood, the summer plumage of

ADULT IN SUMMER PLUMAGE

the adult includes a white crescent around the eye, a dark red bill and legs, a very pale grey back, and grey wings. In winter, the Common Black-headed Gull has a pale head, a distinct dark spot behind the eye, and black on the trailing edge of its wings.

A small, highly adaptable species of gull, it is common around urban areas in much of its range. It breeds in May and June, building its nest on the ground, hidden in vegetation. A number of very similar species (sometimes considered races of the Common Black-headed Gull) occur elsewhere in the world, including the Brown-hooded Gull (*L. maculipennis*) in South America and the Brown-headed Gull (*L. brunnicephalus*) in Asia.

*Rhodostethia rosea*

Ross's Gull

LENGTH
29–32cm (11½–12½in)WEIGHT
175–200g (6–7oz)MIGRATION
Partial migrant

HABITAT Breeds on river deltas in tundra and taiga; winters in open seas around pack ice

Small and delicate, Ross's Gull has a distinctive summer plumage. The adult has a black collar that sweeps over the forehead and around the neck (as if marking out a hood). It usually has a pink wash to the breast and bright red legs. In flight, its long, pointed wings with white trailing edges and its wedge-shaped tail are clearly visible. In winter, the adult lacks the black collar, with just a small black smudge behind the eye. The juvenile has a black ear spot, a black tail tip, and more black than the adult on the wings and tail.

Creagrus furcatus

Swallow-tailed Gull

LENGTH
51–57cm (20–22½in)WEIGHT
610–780g (21–28oz)MIGRATION
Migrant

HABITAT Breeds on cliffs and steep slopes in Galapagos Islands; winters on coast or open sea

The Swallow-tailed Gull has a black hood, red eye-ring, and pale-tipped black bill (with a white spot at its base) during the breeding season. It has two white lines along its shoulders that show out against the dark grey plumage on its back. In flight, a distinct two-colour pattern can be seen on its wings – black at the tips, with a broad triangular white patch in the centre, contrasting with its grey back.

This gull nests on the Galapagos Islands, usually on cliffs or steep slopes. After breeding, the adult leaves its colony to winter along the coast of mainland South America, or to spend time at sea. It returns to the islands about five months later, usually to its previous nest site. The most nocturnal member of its family, it has large eyes adapted to see clearly in the dark. Its favoured food is squid, which is plentiful near the water surface at night.

Larus atricilla

Laughing Gull

LENGTH
39–46cm (15½–18in)WEIGHT
275–325g (10–12oz)MIGRATION
Partial migrant

HABITAT Coasts; also visits nearby habitats such as rubbish tips and parks

In summer, the adult Laughing Gull has a black hood, a powerful dark brown bill, a dark grey back, and dark red legs. Non-breeding adults have a white head, smudged with dark markings, and a dark red bill. The species is named after its call, a long drawn-out strident laugh. It forms large colonies with thousands of nests, breeding in the USA, the Caribbean, and Central America and wintering as far south as Peru.



ADULT IN BREEDING PLUMAGE



ADULT IVORY GULL

Pagophila eburnea

Ivory Gull

LENGTH
44–48cm (17½–19in)WEIGHT
550g (20oz)MIGRATION
Partial migrant

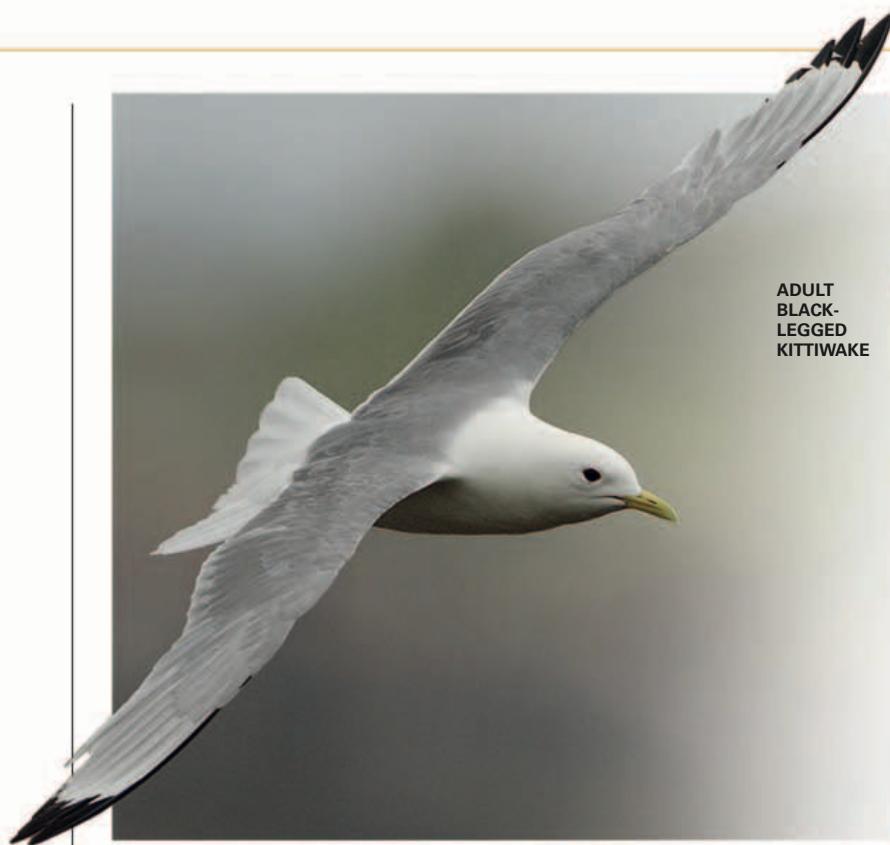
HABITAT Breeds mainly on sea cliffs; winters on the edge of drifting and pack ice

With its overall pure white plumage, black eyes, and yellow-tipped dark bill, the adult Ivory Gull is easily identified. The juvenile has dark markings around the face, as well as some dark spotting on the back and wings and acquires the all-white plumage only in its second year. This Arctic species is declining in numbers, probably due to shrinking areas of pack ice and is now globally classified as near-threatened.

ADULT IN BREEDING PLUMAGE



ADULT IN SUMMER PLUMAGE



ADULT
BLACK-
LEGGED
KITTIWAKE

Rissa tridactyla

Black-legged Kittiwake

	LENGTH 38–40cm (15–15½ in)
	WEIGHT 400–425g (14–15oz)
	MIGRATION Migrant

HABITAT Breeds mainly on steep cliffs (and, increasingly, on buildings); winters at sea

With an estimated global population of 6–7 million pairs, which is continuing to increase, the Black-legged Kittiwake is the world's most abundant species of gull. It is a clean-looking gull with a plain face, unmarked yellow bill, and a grey mantle and wings. In winter, the adult has a dark smudge across the nape. The juvenile shows a distinct black "M" pattern across its upperwing in flight and has a black-tipped tail. The name "Kittiwake" is onomatopoeic, referring to the ever-present screeching call heard at its nesting colonies.



SEABIRD CITIES

As the world's most numerous gull species, it is no surprise that the Black-legged Kittiwake nests in huge colonies, usually on cliffs, many of which exceed 10,000 pairs, some numbering up to 100,000. They build nests of seaweed, which sticks to the rock surface when it dries. The Black-legged Kittiwake is also expanding its range by nesting on buildings and structures such as piers.

Sterna nilotica

Gull-billed Tern



LENGTH
33–43cm (13–17in)

WEIGHT
170–240g (6–9oz)

MIGRATION
Migrant

HABITAT Mainly coastal, including beaches, marshes, estuaries, and lagoons



ADULT GULL-BILLED TERN

A rather squat tern, with a short black bill, the Gull-billed Tern has a black crown and nape, pale grey upperparts, white underparts, and long black legs and feet. Its wings are broad and rounded and its short tail is forked. In summer, the adult has a black cap that extends below the eyes, while in winter, the head is white with faint dark streaks.

The Gull-billed Tern has a varied diet and is more insectivorous than other tern species. Small fish form part of its diet, together with small reptiles, frogs, and even small voles. Its most favoured food includes dragonflies and grasshoppers. The species has a wide, but patchy, near-global distribution.

ADULT CASPIAN TERN

Sterna caspia

Caspian Tern

	LENGTH 48–56cm (19–22in)
	WEIGHT 650g (23oz)
	MIGRATION Migrant

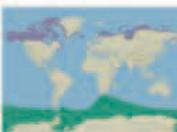
HABITAT Coastal areas as well as larger inland wetlands

The Caspian Tern is the world's largest species of tern – its wingspan of almost 1.5m (5ft) is similar to that of the Herring Gull (see p.235). The species has a thick, bright red bill, with a small black tip, and a black cap that covers its head from bill to nape. In flight, it shows bold black markings on the tips of its underwing. It is not as sociable as other tern species, although it sometimes breeds in large colonies. Usually, however, it is seen singly or in pairs.

The Caspian Tern is found in all continents, except South America (where only a few birds winter) and Antarctica. It is likely to be confused with the Royal Tern (*S. maxima*) from Africa and the Americas; however, the Royal Tern is smaller and has a more orange bill, without a black tip.

Sterna paradisaea

Arctic Tern



LENGTH	33–36cm (13–14in)
WEIGHT	85–125g (3–4oz)
MIGRATION	Migrant

HABITAT Nests on shingle beaches, tundra, lakes, and coastal lagoons; usually winters at sea

Mainly grey and white in colour, the Arctic Tern has a black cap and nape. Non-breeding birds have a white forehead and a red bill and feet. Its deeply forked tail is white, with grey outer margins. It feeds on small fish and marine crustaceans. The Arctic Tern is the world's most long-distance migratory bird. The species breeds around the

ADULT ARCTIC TERN WITH CHICKS



Arctic Circle from Siberia to Greenland, and Iceland to Norway. It leaves its breeding grounds each year to embark on a 40,000km (25,000 mile) round trip that involves a journey to the Antarctic. As a result, the species experiences two summers each year and more daylight than any other creature on the planet. During its lifetime, the average Arctic Tern will travel a distance equivalent to that from the Earth to the Moon and back.

Sterna dougallii

Roseate Tern



LENGTH	33–43cm (13–17in)
WEIGHT	90–125g (3½–4oz)
MIGRATION	Migrant

HABITAT Breeds on rocky, sandy, or coral islands, sometimes densely vegetated; winters at sea



ADULT ROSEATE TERN

It is the pink flush to its underparts, which can only be seen early in the breeding season, that gives the Roseate Tern its name. Apart from this feature, the species is a typical *Sterna* tern, with pale grey plumage and long tail streamers. Individuals usually have an all-dark bill, with varying amounts of red at the base, depending on the subspecies and the time of year. The Roseate Tern feeds by plunge-diving for fish.



ANTARCTIC TERN IN SUMMER PLUMAGE

Sterna vittata

Antarctic Tern



LENGTH	35–40cm (14–15½in)
WEIGHT	150–175g (5–6oz)
MIGRATION	Migrant

HABITAT Breeds on rocky islets, otherwise favours edges of ice, rocky coasts, and beaches

Before migrating to the tip of South America and Africa, the Antarctic Tern breeds on islands in the Southern Ocean. In its breeding plumage, this bird is very similar to the Arctic Tern (left), although it is larger and bulkier. A non-breeding Antarctic Tern is distinguished from its close relative by its grizzled crown, white forehead, and a red bill and legs. The plumage of the juvenile is white, with a black bill and legs.

Sterna fuscata

Sooty Tern



LENGTH	36–45cm (14–17½in)
WEIGHT	150–250g (5–9oz)
MIGRATION	Migrant

HABITAT Tropical and subtropical waters; breeds on islands

With its striking black and white coloration, the Sooty Tern is one of the world's most abundant seabirds. Several colonies contain more than a million pairs. Once the chicks have fledged, these terns leave the colony, spending the next two or three months at sea, before returning for the next breeding season. During this time at sea, it is believed that the species sleeps on the wing.

COURTING PAIR



NESTING PAIR OF BLACK TERNS

Chlidonias niger

Black Tern



LENGTH	23–28cm (9–11in)
WEIGHT	60–75g (2¼–2½oz)
MIGRATION	Migrant

HABITAT Breeds on inland marshes, lakes, and pools; found in coastal areas and on marshes during winter

The Black Tern is one of three species referred to collectively as the "Marsh Terns", the other two being the White-winged Black Tern

(*C. leucopterus*) and the Whiskered Tern (*C. hybrida*). All three have a wide global range and favour marshy inland locations. They are smaller than *Sterna* terns (above) and have short forked tails that lack streamers. In its breeding plumage, the Black Tern is distinctively dark, with a jet-black head and breast, dark grey wings, and a small patch of white on the undertail. In winter, it has a black crown and ear-patch and a white collar.

It mainly eats insects and fish, but unlike the *Sterna* terns, this bird does not dive for fish, but forages on the wing, picking up items at or near the water's surface or catching insects on the wing.

Anous stolidus

Brown Noddy



LENGTH	38–45cm (15–17½in)
WEIGHT	150–275g (5–10oz)
MIGRATION	Migrant

HABITAT Breeds on tropical and subtropical islands and coral reefs; disperses to sea after breeding



ADULT BROWN NODDY

One of three similar-looking representatives of the genus *Anous*, the Brown Noddy's name is derived from its habit of nodding to its mate during courtship. These dark-coloured terns are usually found far out to sea, often in large flocks. They hover over the water's surface before swooping and snatching small fish and squid.

Gygis alba

Angel Tern



LENGTH	25–30cm (10–12in)
WEIGHT	95–125g (3⅓–4oz)
MIGRATION	Partial migrant

HABITAT Usually nests in trees or bushes on islands; sometimes also cliffs and rocky slopes

Also known as the Fairy Tern, the Angel Tern is a graceful, almost ethereal species, with a stunning snow-white plumage, which is only punctuated by its large black eyes and delicate, slightly upturned black bill. In flight, its wings look almost translucent. Away from its tropical island nesting sites, where it is a solitary nester, the Angel Tern lives out at sea. It feeds mainly on small fish.



ADULT ANGEL TERN



PAIR OF ADULT INCA TERNS

Larosterna inca

Inca Tern



LENGTH	39–42cm (15½–16½in)
WEIGHT	175–200g (6–7oz)
MIGRATION	Non-migrant

HABITAT Pacific coast of South America; usually rocky shores and sandy beaches

With its dark grey plumage and bright red bill and legs, the Inca Tern is very noticeable. It has a distinctive white stripe that curls down from the bill to the side of the neck, adjacent to

a small area of bare yellow facial skin. In flight, the species displays a paler area on the underwing and a prominent white trailing edge to the wing. The juvenile is dark all over, lacking the adult's facial characteristics. The size of a small gull, the species often flies near fishing boats, where it forages for scraps and offal. However, its natural diet consists of small fish and plankton and it feeds by plunge-diving for fish. The call of an Inca Tern is a cat-like mew. It breeds on rocky cliffs and nests in a hollow or burrow and lays one or two eggs, which it incubates for about four weeks.

Rynchops niger

Black Skimmer



LENGTH	41–46cm (16–18in)
WEIGHT	300–375g (11–13oz)
MIGRATION	Migrant

HABITAT Coastal wetlands in North America; also found inland, for example, by rivers in South America

The Black Skimmer is the American representative of the skimmer family, the other two being the African Skimmer and the Indian Skimmer. All three have a front-heavy appearance, with a massive bill and heavy head. They also have strikingly pied plumage with black upperparts and bright white underparts. The Black Skimmer has a two-coloured

bill, with a red base and a black tip. It is long-winged, but short-tailed – a feature that adds to its oddly proportioned appearance. The female is smaller and the juvenile has a brown mottled back.

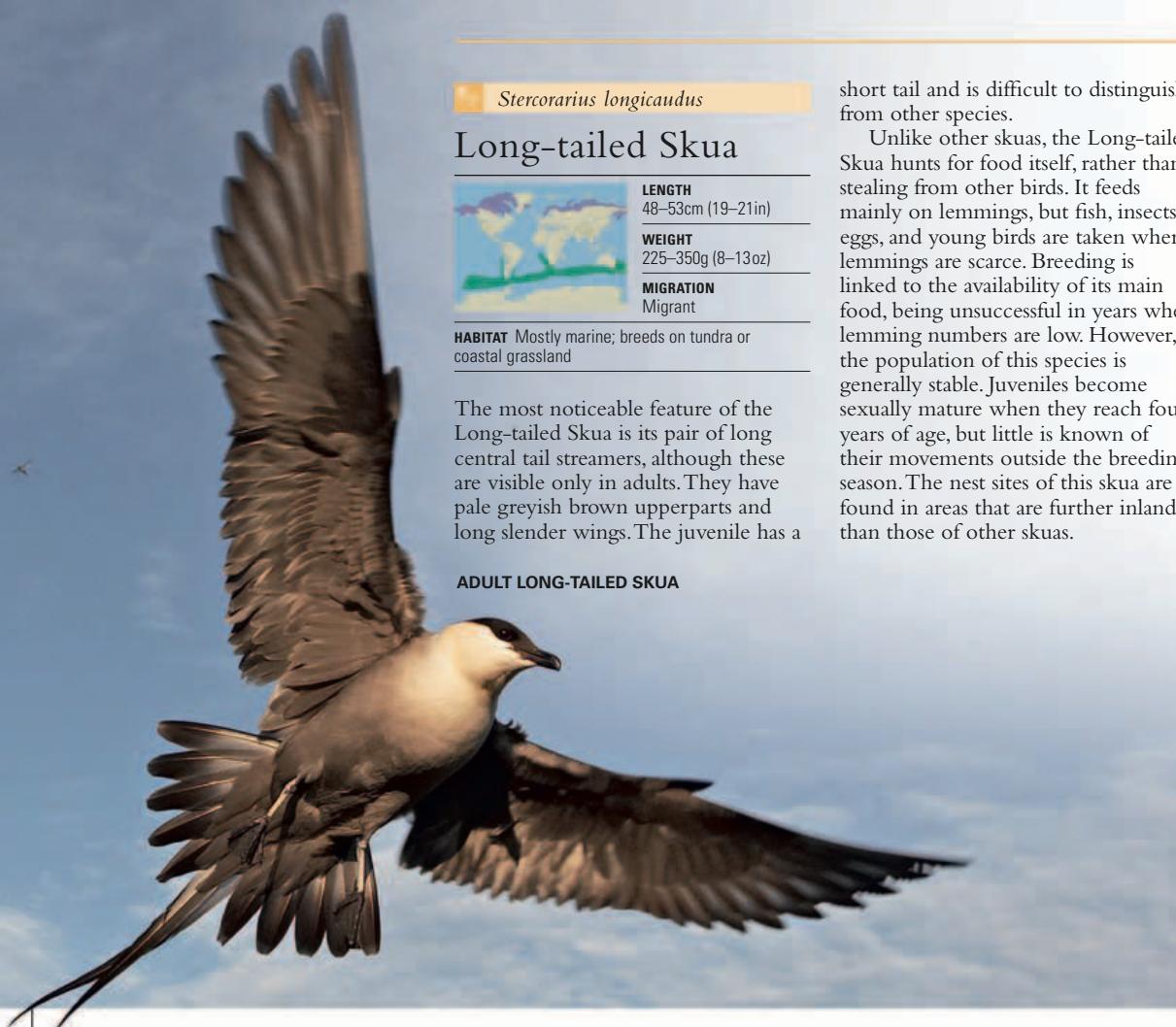
The Black Skimmer is found only in the Americas (including limited parts of the Caribbean), ranging from coastal areas of the USA to Argentina and Chile. All skimmers are sociable birds that breed in loose colonies and roost together. Unlike other gulls and terns, flocks of skimmers synchronize their movements in flight, twisting and circling together in a spiral of black and white wingbeats. Its call is a barking "yip". Although the Black Skimmer is active throughout the day, it is more so at dawn and dusk, and even during night.

BLACK SKIMMERS FEEDING

UNUSUAL BILL SHAPE

All three species of skimmer have distinctive bills, with the lower mandible longer than the upper one. This is an adaptation for their special feeding method. Skimmers fly low over the water with their bills held open, the lower mandible ploughing through the water until it strikes a fish. Then the upper part of the bill snaps shut, trapping the fish.





Stercorarius longicaudus

Long-tailed Skua



LENGTH	48–53cm (19–21in)
WEIGHT	225–350g (8–13oz)
MIGRATION	Migrant

HABITAT Mostly marine; breeds on tundra or coastal grassland

The most noticeable feature of the Long-tailed Skua is its pair of long central tail streamers, although these are visible only in adults. They have pale greyish brown upperparts and long slender wings. The juvenile has a

ADULT LONG-TAILED SKUA



PAIR OF PARASITIC SKUAS

Stercorarius parasiticus

Parasitic Skua



LENGTH	41–46cm (16–18in)
WEIGHT	325–600g (12–21oz)
MIGRATION	Migrant

HABITAT Mostly marine in winter; coastal in summer, close to sea bird colonies

Brown above, with white underparts, the Parasitic Skua has a dark crown and two pointed and extended central tail feathers. It is solitary off breeding grounds, but is well known for its spirited defence of its nest and has been known to chase away or even strike an intruder. Most of the nests are in coastal areas, but it also nests inland, where the bird is a predator, taking lemmings and insects.

short tail and is difficult to distinguish from other species.

Unlike other skuas, the Long-tailed Skua hunts for food itself, rather than stealing from other birds. It feeds mainly on lemmings, but fish, insects, eggs, and young birds are taken when lemmings are scarce. Breeding is linked to the availability of its main food, being unsuccessful in years when lemming numbers are low. However, the population of this species is generally stable. Juveniles become sexually mature when they reach four years of age, but little is known of their movements outside the breeding season. The nest sites of this skua are found in areas that are further inland than those of other skuas.

Stercorarius maccormicki

South Polar Skua



LENGTH	50–55cm (19½–21½in)
WEIGHT	0.9–1.6kg (2–3½lb)
MIGRATION	Migrant

HABITAT Mostly marine; breeds on snow-free areas; sometimes associated with penguin rookeries

SOUTH POLAR SKUA



A powerful bird, the South Polar Skua is dark brown to grey in colour and has broad, rounded wings. It preys on penguin chicks and eggs, although it mainly eats fish. The population is thought to be stable, but the breeding sites are limited and are vulnerable to human disturbance and pollution. This skua lays two eggs, but the older chick will often kill the younger one and breeding success is often low.



ADULT GREAT SKUA

Stercorarius skua

Great Skua



LENGTH	53–58cm (21–23in)
WEIGHT	1.1–1.7kg (2¼–3½lb)
MIGRATION	Migrant

HABITAT Mostly marine in winter; on islands close to sea bird colonies in summer



The Great Skua has streaked greyish brown plumage and broad wings. A large and aggressive bird, it will vigorously defend its nest site, often injuring human intruders. Most of its food is gathered by stealing from other birds and it has also been known to kill small gulls and auks. Scavenging around fishing vessels is also common, although Great Skuas avoid areas of human activity when inshore.

Fratercula arctica

Atlantic Puffin



LENGTH	26–36cm (10–14in)
WEIGHT	450g (16oz)
MIGRATION	Migrant

HABITAT Sea cliffs in summer, but in oceans and open seas outside the breeding season

Also known as the “parrot of the sea” for the extravagant red, yellow, and blue colours of its bill in summer, the Atlantic Puffin has a pale grey to white face and cheeks, black upperparts, white underparts, and red-orange legs and feet.

The Atlantic Puffin is ungainly on land and lacks agility in the air, but it is at home in the sea, “flying” through the water with ease. It can dive down to 20m (66ft) and can remain under water for up to 30 seconds.

In the nesting season, a single egg is laid and is incubated by both adults in turn, taking about 42 days to hatch. The development of the young to fledglings depends on food supplies and takes between 38 and 59 days with some fledglings leaving the nest before all the feathers have grown. The species feeds on crustaceans and small fish, breeding birds being heavily reliant on sand eels, which are captured within 100km (60 miles) of the nest.

HUMAN IMPACT

FACING THREATS

A combination of fishing pressures and changing sea temperatures through climatic shift have caused severe reduction in breeding success in some years. The Atlantic Puffin has a limited feeding range in summer and increases in water temperature have sometimes pushed the normal food beyond the reach of colonies. Some Atlantic Puffin colonies have witnessed close to 100 per cent failure rates in the more extreme years with the frequency increasing in recent decades.



*Alle alle*

Little Auk



LENGTH	22cm (8½in)
WEIGHT	175g (6oz)
MIGRATION	Migrant

HABITAT Open seas; breeds on scree-slopes of coastal cliffs

One of the smallest members of its family, but also one of the hardiest, the Little Auk or Dovekie breeds in huge colonies on islands in the high Arctic. The species moves south in winter, but storms regularly carry these birds south of their normal range. The black and white Little Auk has a short bill and stubby wings. Its flight is very fast and direct, low over the sea. Its diet consists of crustaceans, especially copepods, but also other small invertebrates and fish.



ADULT LITTLE AUK

Uria aalge

Guillemot



LENGTH	42cm (16½in)
WEIGHT	1kg (2½oz)
MIGRATION	Partial migrant

HABITAT Open seas; breeds on sea-cliffs

With its long, pointed bill, the Guillemot, or Murre, is the most familiar cliff-nesting auk in Europe. It is dark brown to black on the head and upperparts and has white underparts. Some birds have distinct white "spectacles". In winter, the neck and throat are white. It finds its food by swimming underwater, where it mainly catches small schooling fish under 20cm (8in) in length and crustaceans, marine worms, and squid, as it dives to depths of about 50m (160ft). The Guillemot is gregarious and breeds in tightly packed colonies, laying its eggs on bare rock ledges (see panel, right).



GUILLEMOT NESTING COLONY

POINTED EGGS

The eggs of the Guillemots have evolved a long shape, with one end broad and rounded and the other narrow and sharply pointed. This makes the eggs roll in a circle when disturbed, preventing them from falling off the steep cliff ledges.

MULTI-COLOURED EGGSHells

A variety of colours – such as blues, greens, and whites – and patterns, from spots to speckles, adorn the Guillemot's eggs.

*Alca torda*

Razorbill



LENGTH	43cm (17in)
WEIGHT	725g (26oz)
MIGRATION	Partial migrant

HABITAT Open seas; breeds on sea cliffs

The only member of the genus *Alca*, the Razorbill resembles the Common Guillemot (above), but is smaller and darker. There are pale bands on its short, thick, flattened bill, and a white line from the bill-base to the eye. In winter, the neck and throat are white rather than black. It swims underwater, catching fish and also crustaceans and marine worms.



ADULT RAZORBILL

Cephus grylle

Black Guillemot



LENGTH	33cm (13in)
WEIGHT	375g (30oz)
MIGRATION	Partial migrant

HABITAT Coastal waters, sea cliffs, and coastal boulder- and scree-slopes

With its sleek black breeding plumage, white shoulders, and distinctive bright red feet, the Black Guillemot (also known as Tystie) is one of the most attractive auks. In winter, it looks quite different, with much of the body being white. It dives for its food like other auks, and mainly eats fish and crustaceans, as well as some molluscs, insects, and plant material.

Compared to other auks, it is a relatively solitary nester and prefers to lay its eggs in rock-crevices, often not very high above the surface of the sea.

ADULT IN BREEDING PLUMAGE



BREEDING ADULT

Cerorhinca monocerata

Rhinoceros Auklet

LENGTH	37cm (14½in)
WEIGHT	450–500g (16–18oz)
MIGRATION	Partial migrant

HABITAT Open seas; breeds on maritime and inland grassy slopes, sometimes on forest floors

The Rhinoceros Auklet gets its name from the unusual horn-like protrusion on top of its bill. When breeding, the adult sports two white head-stripes and an orange-tinted eye and bill. In winter it looks duller and the horn shrinks. It feeds on fish, krill, and squid and nests in an excavated burrow or natural cavity, where it lays just a single egg.

SANDGROUSE

ORDER Columbiformes
FAMILY 1
SPECIES 298

BIRDS OF DRY, open habitats with plump bodies and pointed wings, sandgrouse are found in southern

Europe, Africa, and Asia. Gregarious and fast-flying, they nest and feed on the ground. Sandgrouse feed entirely on seeds, and in times of scarcity, they may be found far outside their normal range.

ANATOMY

Sandgrouse look like a cross between pigeons and gamebirds, with small heads and deep bodies. Their short legs are fully feathered. Females lay their eggs on the ground, and their young are well developed when they hatch. Adult males have absorbent breast feathers, which they use to collect water, delivering it to their chicks.

CRYPTIC PLUMAGE

Despite its conspicuous breast-band, the Namaqua Sandgrouse blends in well in its habitat of semi-desert and dry savanna.



SANDGROUSE IN FLIGHT
Startled by a sudden noise, a group of Burchell's Sandgrouse burst into the air, flying rapidly on fast-beating wings.

Pterocles coronatus

Crowned Sandgrouse



LENGTH
27–30cm (10½–12in)

WEIGHT
250–300g (9–11oz)

MIGRATION
Non-migrant

HABITAT Stony and sandy desert and semi-desert

Truly a desert bird, the Crowned Sandgrouse is found in some of the hottest and driest regions of north Africa and the Middle East, tolerating temperatures of over 50°C (122°F).

The male Crowned Sandgrouse is cream-spotted, and has a bright rufous head with a black and white face and



FLOCK GATHERED AT WATER HOLE

blue-grey stripe above the eye. The female lacks the black on the face, and is much more intricately patterned in black, brown, and buff. A short-legged bird, this sandgrouse forages on the ground for seeds and plant-shoots.

Pterocles lichensteinii

Lichtenstein's Sandgrouse



LENGTH
24–26cm (9½–10in)

WEIGHT
175–250g (6–9oz)

MIGRATION
Non-migrant

HABITAT Scrubby semi-desert and desert, semi-wooded dry ravines and hillsides



MALE LICHTENSTEIN'S SANDGROUSE

The distinctive plumage of Lichtenstein's Sandgrouse gives it camouflage protection in the exposed open habitat that it prefers. Both sexes are very heavily marked with black and brown, but the male has black and white bands on the forecrown and a buff breast with a double black band. During the heat of the day, it sits motionless on the ground and is difficult to see. In the early mornings and evening, these birds gather in flocks to visit the nearest water hole. The belly feathers are adapted to retain water, and in the breeding season, the chicks are able to drink from the wet feathers of the adults.

Pterocles alchata

Pin-tailed Sandgrouse



LENGTH
31–39cm (12–15½in)

WEIGHT
200–400g (7–14oz)

MIGRATION
Partial migrant

HABITAT Semi-desert, treeless steppes, dry mudflats, and arable farmland

This sandgrouse gets its common name from the male's long, narrow tail streamers. The female has a shorter tail than the male, is more heavily patterned above, lacks the dark throat, and shows two dark neck bands (the male has one). The flight of the species is fast and direct, and its wings are very long and pointed. It uses a simple depression in the ground for a nest, and lays three well-patterned eggs. Both sexes incubate them for about three weeks.

GREAT SITES

SPANISH STEPPES

A patchwork of dry scrub, rough grassland, and low-scale cultivation, the steppe grasslands of central and southern Spain are among the richest and least disturbed grassland habitats in Europe. The mosaic of vegetation, largely undisturbed, provides a hospitable environment for many

bird species and is home to a great number of Pin-tailed Sandgrouse.



MALE IN WATER



GREAT SITES

SAINT PAUL ISLAND



LOCATION The Bering Sea, about 450km (280 miles) off the coast of southwest Alaska and 800km (500 miles) east of Siberia.



Saint Paul Island is the largest of the Pribilofs, an isolated group of four islands, lying to the north of the Aleutians, a great arc of volcanic islands strung out across the Bering Sea. This rocky outpost in the heart of the Bering Sea hosts some of the most important seabird colonies in the northern hemisphere. Each year during the brief subarctic summer Saint Paul's rugged coastline comes to life as huge numbers of ocean-going birds return to land to breed. For three short months its sea cliffs reverberate with the cacophony created by tens of thousands of puffins, guillemots, auklets, murrelets, cormorants, and kittiwakes.

CLIFF-TOP BREEDING GROUNDS

Saint Paul Island has sandy beaches, coastal mudflats, craggy peaks of basalt rock, wet bogs, and treeless rolling hills covered with sparse tundra vegetation. Its 105 square km (40 square miles) remain a pristine, barely populated environment, but it is the surrounding ocean that makes the island so special for birds. The cold waters around the Pribilofs are extremely rich in nutrients and support one of the world's most productive fisheries, attracting several million seabirds from a dozen main species, as well as whales, fur seals, Walrus, and sea lions.

Throughout the winter, pack ice covers the Bering Sea as far south as Saint Paul Island. The trigger for seabirds to begin breeding is when rising temperatures force the ice front to retreat north. By the height of summer there are up to 19 hours of daylight, giving parent birds more time to forage for their offspring. The cliff-nesting species form a complex community, in which each species uses a particular nesting zone. Narrow cliff ledges are crowded with Black- and Red-legged Kittiwakes, Northern Fulmars, Red-faced Cormorants, Guillemots, and Thick-billed Murres; Crested and Least Auklets nest among rubble at the base of the cliffs; Horned Puffins occupy deep crevices on the cliff-face; and Tufted Puffins dig burrows on the cliff-top. More than 240 species of bird have been seen on Saint Paul Island, including migratory ducks, waders, and passerines.

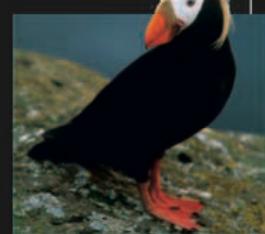
CROWDED CLIFF LEDGE

Thick-billed Murres, also known as Brunnich's Guillemots, are the most abundant seabird on the cliffs of Saint Paul Island, crowding the cliff ledges during the breeding season.

WHAT TO SPOT



RED-LEGGED KITTIWAKE
Rissa brevirostris



TUFTED PUFFIN
Fratercula cirrhata



RUDDY TURNSTONE
Arenaria interpres



PECTORAL SANDPIPER
Calidris melanotos

PIGEONS AND DOVES

ORDER Columbiformes

FAMILIES 1

SPECIES 298

make up a large, distinctive order of plant-feeding birds and, technically, there is no difference between them, the smaller species that tend to be known as doves. Their small heads bob backwards and forwards as they walk; they feed in trees, or on the ground; and escape danger with a noisy take-off, on fast-flapping wings. They build flimsy nests from sticks, in trees, on ledges, or on buildings.

ANATOMY

Pigeons and doves show wide variations in colour, from greys and browns, to rich and vivid mixtures of hues – oriental fruit-doves are particularly colourful. Despite these differences, pigeons and doves all have the same recognizable shape, with plump body, small head, and a fleshy base to the bill. Their flight muscles are exceptionally powerful, making them some of the fastest flying land birds. Most pigeons have small bills, often with a fleshy cere. A few are ornamented with feathery crests.

THROUGHOUT THE WORLD pigeons and doves are familiar, thanks to the spread of feral pigeons. They

BEHAVIOUR

Pigeons and doves are gregarious birds, and often feed in flocks. Left undisturbed, they may eat methodically, taking all food within reach before moving on. In dry regions, most species feed primarily on seeds; in the humid tropics, the majority eat fruit. They almost always swallow their food whole – even with fruit the size of a golfball. Unlike most birds, they drink by sucking up water, rather than tipping back their heads. Pigeons typically lay up to three eggs, and their young grow rapidly, some flying when just two weeks old. On the nest, parents feed the young on a secretion produced from the lining of the crop.



LIQUID MEAL

Reaching into its parent's throat, a young Woodpigeon feeds on pigeon "milk", a secretion stimulated by the hormone prolactin, which triggers milk-production in mammals.

HUMAN IMPACT

THREATS AND CONSERVATION

The world's most famous extinct bird – the Dodo – was a giant flightless pigeon, and the Passenger Pigeon became extinct in 1914. Now, 26 species of pigeon and dove are endangered; 11 are on the critical list. Most of these birds come from the tropics, particularly the western Pacific. The biggest threats are hunting, introduced predators, and deforestation.



MINDANAO BLEEDING-HEART

Found only in the Philippines, this fruit-eating dove has undergone a catastrophic decline as a result of trapping, and of forest clearance. Many other pigeons, especially island residents, face similar problems.



Columba guinea

Speckled Pigeon



LENGTH	32–35cm (12½–14in)
WEIGHT	225–400g (8–14oz)
MIGRATION	Non-migrant

HABITAT Open country, from savanna to gardens, including highland regions

Taking its name from its white-spotted wings, the Speckled Pigeon has a bifurcated neck collar and bare red or purple skin around the eye. It gathers in large flocks to feed on harvested grain and may also take snails. It mainly nests in the dry season, sometimes



ADULT AT WATER HOLE

building a robust stick nest, but occasionally just using a bare scrape. The Speckled Pigeon is generally common and appears to be increasing in many areas. It is expanding into towns and agricultural areas, from its traditional habitat of wild, rocky areas.

Columba janthina

Japanese Wood Pigeon

LENGTH	37–44cm (14½–17½in)
WEIGHT	400g (14oz)
MIGRATION	Non-migrant

HABITAT Heavily dependent on mature forest

The Japanese Wood Pigeon is sooty black, with green and purple iridescences on the head and neck, and has a long tail. It lives mainly on seeds, buds, and fruits, taken from trees or the ground. Unlike many pigeons, it is not

a sociable bird. It lays a single egg in a nest constructed in a tree-hole or rock crevice. The species is declining due to ongoing deforestation, which has already led to its extinction on some islands.

TYPICALLY SOLITARY ADULT



Columba livia

Common Pigeon



LENGTH	31–34cm (12–13½in)
WEIGHT	175–350g (6–13oz)
MIGRATION	Non-migrant

HABITAT Wild, rocky regions (wild populations); cities (domestic birds)

The Common Pigeon is familiar in urban areas throughout the world. The domestic form is one of the world's most successful birds. In contrast, pure-bred wild populations, which are



URBAN COMMON PIGEONS

restricted to Eurasia and Africa, are now increasingly rare due to interbreeding with feral birds. The wild form of the species is generally grey, with iridescent areas on the neck and upper breast, but urban Common Pigeons are variable. Urban birds may nest all year-round.

HUMAN IMPACT

URBAN PIGEON



The original homing pigeons, the Common Pigeon has adapted to life in towns and cities across the world. However, there are concerns that the species' sheer abundance and habit of roosting communally may create public health problems in some areas or drive out other bird species.

*Columba palumbus*

Common Wood Pigeon



LENGTH	41–45cm (16–17½in)
WEIGHT	275–700g (10–25oz)
MIGRATION	Partial migrant

HABITAT Woodland, especially in arable farmland; parks and gardens, including urban areas

The Common Wood Pigeon can be identified by its white neck patch, pink breast, grey back, and white bands in the wings. Its wing-clapping displays and hollow calls are familiar sights and sounds of the countryside in its range. In recent decades, the species has expanded its range northwards and into towns and cities.

Nesoenas mayeri

Pink Pigeon



LENGTH	40cm (15½in)
WEIGHT	300–325g (11–12oz)
MIGRATION	Non-migrant

HABITAT Native forest on the island of Mauritius

RED LIST CATEGORY Endangered

Once brought to the brink of extinction by deforestation, the population of the Pink Pigeon has recovered in recent years due to dedicated conservation efforts. This large pigeon has a white face and forehead, a strong bill with a hooked tip, and brown wings. It has a soft pink body, but the female and juvenile are a duller pink than the male.



ADULT MALE

Streptopelia decaocto

Eurasian Collared Dove



LENGTH	30–32cm (12–12½in)
WEIGHT	125–200g (4–7oz)
MIGRATION	Non-migrant

HABITAT Originally arid country, but now common in towns, villages, and even large cities

One of the most remarkable avian success stories, Eurasian Collared Doves have spread dramatically across Europe from its original Asian range within the last 100 years, and is now in the process of colonizing North America. The most conspicuous marking on this principally grey and buff bird is the dark partial neck ring. Its food is mainly seed-based, supplemented with beetles, flies, and molluscs. It constructs fragile stick nests and sometimes begins its nesting season in midwinter.



ADULT WITH FEATHERS FLUFFED-UP

Streptopelia turtur

European Turtle Dove



LENGTH	27–29cm (10½–11½in)
WEIGHT	100–175g (3½–6oz)
MIGRATION	Migrant

HABITAT Principally found in woodland, but also open country with some trees; avoids dense forest

ADULT EUROPEAN TURTLE DOVE



A summer visitor to Eurasia from sub-Saharan Africa, the European Turtle Dove's range

is declining in several European countries due to changing agricultural practices and hunting. Its head, neck, and rump are blue-grey, with a black and white striped patch on the sides of its neck, and its wings are beautifully patterned in cinnamon and black. It breeds in bushes or trees and feeds on seeds, fruit, insects, worms, and snails.

Oena capensis

Namaqua Dove

**LENGTH**

28cm (11in)

WEIGHT40g (1⁷/₁₆oz)**MIGRATION**

Partial migrant

HABITAT Open savanna and thorn-scrub, particularly in sandy areas; cultivated areas

ADULT MALE NAMAQUA DOVE

Phaps chalcoptera

Common Bronzewing

**LENGTH**

28–36cm (11–14in)

WEIGHT

325–350g (12–13oz)

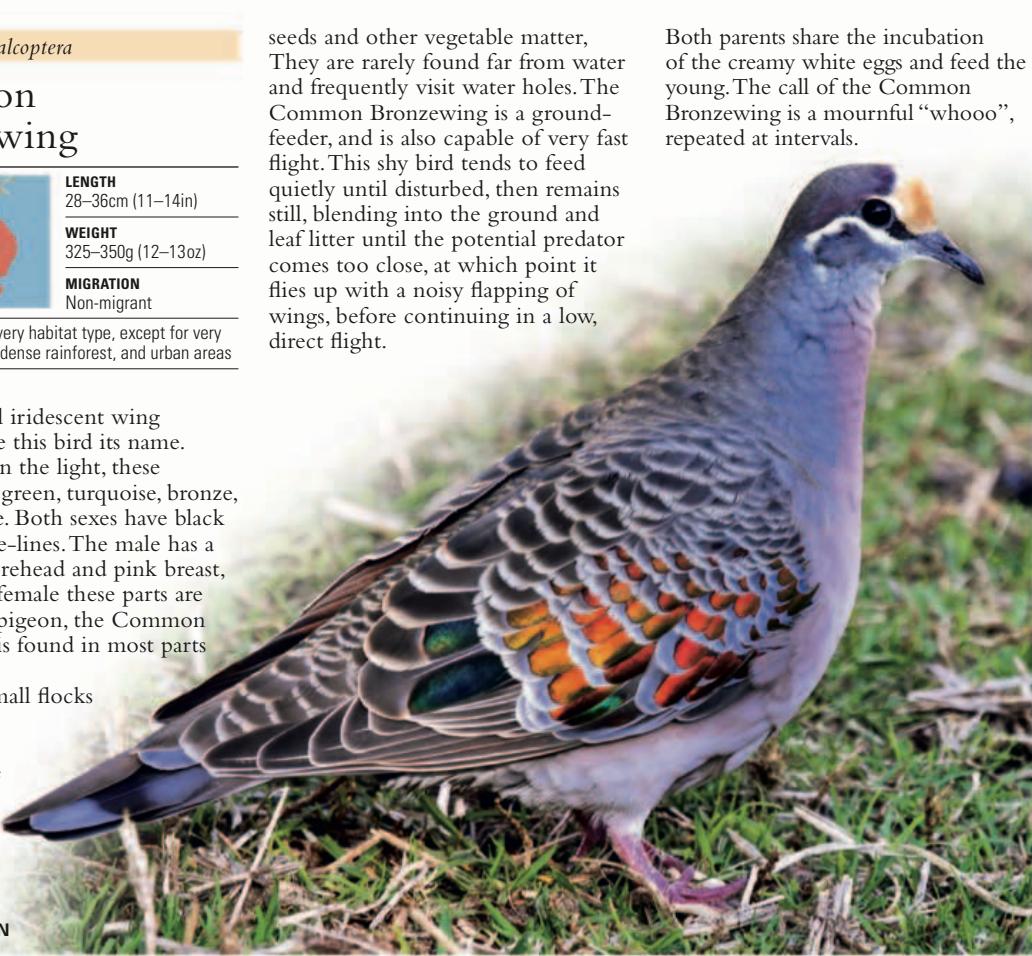
MIGRATION

Non-migrant

HABITAT Almost every habitat type, except for very barren areas, very dense rainforest, and urban areas

The small Namaqua Dove has a very long, tapered black tail, and its plumage is mostly grey, apart from a white belly and black wing spots. The male also has a black face, throat, and breast. Its song is a quiet, mournful “kuh-whooo”, which is frequently repeated. The Namaqua Dove usually forages on open ground and roadsides, seeking out small seeds. These doves are usually solitary or found in pairs, but form flocks at waterholes.

Pairs or small flocks of Common Bronzewings forage on the ground for



MALE COMMON BRONZEWING

seeds and other vegetable matter. They are rarely found far from water and frequently visit water holes. The Common Bronzewing is a ground-feeder, and is also capable of very fast flight. This shy bird tends to feed quietly until disturbed, then remains still, blending into the ground and leaf litter until the potential predator comes too close, at which point it flies up with a noisy flapping of wings, before continuing in a low, direct flight.

Both parents share the incubation of the creamy white eggs and feed the young. The call of the Common Bronzewing is a mournful “whooo”, repeated at intervals.

Geopaps plumifera

Spinifex Pigeon

**LENGTH**20–24cm (8–9¹/₂in)**WEIGHT**100g (3⁵/₁₆oz)**MIGRATION**

Non-migrant

HABITAT Dry grassland dominated by tussock-forming spinifex grasses; open woodland with rocky ridges

A very long wispy crest and its tiny size distinguish the Spinifex Pigeon. This pigeon is mainly rust in colour, blending with the red soil of the arid areas that it inhabits. It has bright red facial skin, a bold white chin-strap, and pale blue-

ADULT SPINIFEX PIGEON



grey and black markings on the head. Its upperparts are marked by black and pale blue-grey bands. The male and female are similar.

There are three different subspecies, each showing different amounts of rufous coloration on the underparts. The Spinifex Pigeon lives mainly on the ground and, when flushed, rises with a quail-like whirr of the wings. It is almost exclusively a seed-eater and is dependent on seasonal water holes for its survival. Its call is a high-pitched “coo” or a deep “coo-r-r-r”.

The nest is a simple scrape, sheltered by a spinifex clump, bush, or rock.



ADULT DIAMOND DOVE

Geopelia cuneata

Diamond Dove

**LENGTH**19–24cm (7¹/₂–9¹/₂in)**WEIGHT**30g (1⁷/₁₆oz)**MIGRATION**

Non-migrant

HABITAT Lightly wooded, semi-arid or arid grassland near water

This tiny, long-tailed dove is widespread across Australia. Its grey head and neck offset a red eye-ring and its wings are sprinkled with white spots. Flocks of 20–30 Diamond Doves can often be seen feeding on the ground on grass seeds, as well as other vegetable matter and even ants. Their calls are slow and mournful, and the flight style is strong and direct. The flimsy nest is built from interwoven grasses and twigs, and holds two white eggs. Chicks are usually fully feathered and are able to fly within two weeks after hatching.

Leucosarcia melanoleuca

Wonga Pigeon

**LENGTH**38–45cm (15–17¹/₂in)**WEIGHT**

400–450g (14–16oz)

MIGRATION

Non-migrant

HABITAT Dense forest and shrub in gullies or open woodland with a dense understorey

The large, plump Wonga Pigeon has a short neck, long tail, and boldly patterned grey and white plumage. There is a broken grey breast-band below an incomplete white V-shape on the neck and breast. It has black spots on the belly. The eyes are dark reddish-brown in colour, with pink eye-rings encircling them. A terrestrial bird, it is very elusive and more often heard than seen, producing a loud, high-pitched “coo”, as well as explosive wing-claps. When males display, they bow and coo.



ADULT WITH TYPICAL CHEST MARKINGS

Zenaidura macroura

Mourning Dove



LENGTH	23–34cm (9½–13½in)
WEIGHT	125g (4oz)
MIGRATION	Partial migrant

HABITAT Wide range of open and semi-open habitats, including urban areas

Common and widespread in North America, the Mourning Dove has grey-brown plumage, a black spot on the cheek, distinctive black spotting on the wings, and black and white markings on its long tail. It calls with a clear, mournful “woo-oo-oo-oo”, from which it gets its common name. Northern birds are migratory – those from Canada travel the furthest, probably wintering in Mexico or further south.



ADULT MOURNING DOVE



FRAGILE NEST

The Mourning Dove builds a very thin, twig nest typical of this family in the branches of a tree, shrub, or cactus. Sometimes, however, it makes its nest on the ground. The female usually lays two white eggs, which are incubated for about two weeks. After hatching, the chicks stay in the nest for 12–14 days. “Pigeon’s milk”, a fluid secreted from the crop lining of both parents is fed to the young.

Leptotila verreauxi

White-tipped Dove



LENGTH	24–30cm (9½–12in)
WEIGHT	150g (5oz)
MIGRATION	Non-migrant

HABITAT Arid or semi-arid forest edges, open woodland, and scrub, including cultivated areas

This widespread Neotropical dove has a specially shaped primary feather on its forewing, which enables it to quickly change speed and direction when faced with an obstacle. It is rather nondescript, apart from its pale underside and white-tipped tail, the adult White-tipped Dove

has a grey crown and a grey hindneck that glistens with a purple iridescence, while the wing linings are chestnut in colour. It has purple-red legs and feet. The eye-ring ranges from red to blue in the southernmost populations. Its song resembles a small deep-sounding foghorn, “oo-whooooo” or “hu’ woo wooooo”.

This species feeds mainly on the ground and eats fallen tree seeds and fruit, grasses, prickly pear cacti, some cultivated grains, and large insects such as grasshoppers and crickets. It is either solitary or found in pairs, never in flocks. Both parents incubate the eggs for 14 days and feed and rear the juveniles.

ADULT WHITE-TIPPED DOVE

*Scardafella inca*

Inca Dove



LENGTH	19–22cm (7½–8½in)
WEIGHT	50g (1¾oz)
MIGRATION	Non-migrant

HABITAT Open dry areas, brushy woodland, and cultivated areas

Small and slim, the Inca Dove has a grey-brown body covered in black scaly markings. The male is flushed with pink on the forehead and breast, but this colour is less obvious on the female’s plumage. The tail is quite long and square-ended, with white feather edges that show in flight. When it takes off, the

wings make a distinctive quiet, rattling noise. This is a terrestrial species that primarily eats seeds, grain, and some fruit and grit. This species may obtain much of the liquid it needs to survive from fruit. It is seldom seen in flocks. The song is a forceful cooing “cowl-coo” or “poo-pup”, usually from a tree, wire, or other open high perch such as a television aerial. The flimsy twig nest is built 1–8m (3¼–26ft) high in a tree, often a thorny one, and two white eggs are normally laid.

Despite being named after the Inca empire, this species does not occur in any of the areas that constituted it. The Inca Dove is found in Central America and southern USA, but is expanding its range to the north and south.

FEMALE INCA DOVE

*Starnoenas cyanocephala*

Blue-headed Quail-dove

LENGTH	29–35cm (11½–14in)
WEIGHT	225g (8oz)
MIGRATION	Non-migrant

HABITAT Understorey and floor of lowland forest, including wet swamps

RED LIST CATEGORY Endangered



ADULT KEY WEST QUAIL-DOVE

This stunning ground dove is an endangered species due to habitat loss and over-hunting. It sports a bright blue cap, bold black and white stripes on the face, black and blue stripes on the neck, and a black bib with a white fringe. The bill is red with a blue tip. These doves feed on seeds, berries, and snails and live on the ground in pairs.

ADULT BIRD



This small, short-tailed ground-dwelling dove was first discovered in Key West, hence its name. Although it no longer breeds in Florida, it still turns up there as a vagrant. It has a green iridescence on its crown and hindneck and purple iridescence on the mantle. The white facial stripe is a distinctive feature. This bird forages on the ground, eating seeds and fruit. It nests in a low shrub or on the ground, and lays two buff-coloured eggs.


Caloenas nicobarica
Nicobar Pigeon


LENGTH	32–35cm (12½–14in)
WEIGHT	500–600g (18–21oz)
MIGRATION	Non-migrant

HABITAT Various forested small tropical islands

Distinguished by its dark green-and copper-glossed plumage, long neck feathers (hakkles), and short white tail, this pigeon has a curious knob on top of its bill. With its strong legs, it is well adapted to its ground-dwelling existence, seeking out seeds, fruit, and insects. It lays a single faintly blue-tinged, white egg. Some DNA studies suggest that the Nicobar Pigeon is the closest living relative of the extinct Dodo.


ADULT NICOBAR PIGEON
Gallicolumba luzonica
Luzon Bleeding-heart


LENGTH	30cm (12in)
WEIGHT	200g (7oz)
MIGRATION	Non-migrant

HABITAT Primary and secondary broad-leaved evergreen forest

This secretive, ground-dwelling dove gets its name from the vivid blood-red patch at the centre of its white breast, which gives the impression of a bleeding wound. Its plumage is grey above and buff below. It walks on the forest floor in search of seeds, small fruit, and grubs, rarely leaving the ground, except when nesting. It usually lays two eggs.

ADULT LUZON BLEEDING-HEART

ADULT VICTORIA CROWNED PIGEON
Goura victoria
Victoria Crowned Pigeon

LENGTH	66–74cm (26–29in)
WEIGHT	2.5kg (5½lb)
MIGRATION	Non-migrant

HABITAT Swamp and sago palm forests and also drier forests

RED LIST CATEGORY Vulnerable

With its stunning crest, blue plumage, and pale tail spots, this enormous red-eyed pigeon is distinctive. It lives mainly on the ground, but noisily flies up to perch on a branch when disturbed. It is found in pairs or small groups, and feeds on insects and fallen fruit, figs, and seeds. The nest is relatively neat and solid for a pigeon, being constructed of leaves as well as twigs and stems. The single egg takes four weeks to hatch.


LACE-LIKE CREST

The spectacular crest of lacy feathers on the head of the Victoria Crowned Pigeon consists of laterally compressed white-tipped blue feathers in small individual fan-shaped clusters. When the crest is raised, it fans out, giving the appearance of an exquisite lacey crown, so large and beautiful that it has led to widespread hunting of the species.

Treron calvus
African Green Pigeon


LENGTH	25–30cm (10–12in)
WEIGHT	175–225g (6–8oz)
MIGRATION	Non-migrant

HABITAT Various types of forest and woodland, forest edges, and mangroves

ADULT AFRICAN GREEN PIGEON

With its bright red bill base and feet, combined with green upperparts, this African Green Pigeon is easily spotted. There are at least 17 subspecies, which differ in the amount of grey in the plumage and the colour of the feet. African Green Pigeons live in small flocks in dense foliage. Quiet, shy, and almost entirely arboreal, they rarely come to the ground. A fruit-loving species, they often gather in large numbers to feed on fruiting fig trees.

Ptilinopus magnificus
Wompo Fruit Dove


LENGTH	29–45cm (11½–18in)
WEIGHT	175–200g (6–7oz)
MIGRATION	Non-migrant

HABITAT Lowland tropical rainforest; also eucalyptus forest and farmland in winter

The impressive Wompo Fruit Dove is the largest of its family. In addition to its size, its yellow wing markings and a long tail also help to make it prominent. The head of this fruit dove is grey, the bill red and yellow, and the underparts purple with a yellow vent. The sexes look similar, but juveniles have a duller plumage compared to the adults. Despite all these bright colours, however, the bird can be very hard to see in the dense canopy foliage. The only signal revealing its presence is its call, a very human-sounding deep "wollack-wa-hoo".

Like other fruit doves, it feeds on fruit-bearing trees, such as figs. The Wompo Fruit Dove can eat large fruit whole, and is also able to collect fruit by acrobatically springing forward from trees and vines. The nest of twigs, a sturdy construction placed on leafy branches, is built by both the male and female. A single white egg is

ADULT WOMPOO FRUIT DOVE

laid, and the parents share the incubation and care of the chick. If the chick dies, the doves usually have time to try to breed again. Eight different subspecies are recognized, the largest birds being in the south of its range and lowland New Guinea.