BBC
JANUARY 2017
January 2017 Volume 35 Number 1

BUMPER SPECIAL!

ANIMALS ON SCREEN

14 pages of magic film & TV memories

Wildlife

INDIA'S LIONS

How villagers have clawed them back from the brink

WILD EUROPE

Good news for bears in Dracula country

UPPER TEESDALE

Wildlife without the crowds

TALKING POINT

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Sergey Uryadnikov/Alamy

Welcome...

A couple of our stories in this issue are from India and tell of how the efforts of ordinary people have made a difference to the fortunes of two quite different groups of endangered animals. In the case of the first, the black kites of Delhi (p20), it is the dedication of two brothers that has made a difference to injured birds' survival. In the second case (p82), it is the inhabitants of a large number of villages who have united to make room in their lives for lions.

Getting ordinary people involved in nature formed part of a speech I gave last month at the National Biodiversity Network conference. The NBN (nbn.org.uk) was set up to collate data being collected around Britain by individuals and groups recording sightings of a wide range of native wildlife. The aim is to make this data available to everyone so that appropriate steps can be taken to safeguard our natural heritage. And, just like in India, those steps have to involve ordinary people if they are to succeed.

Sheena Harvey Editor
sheena.harvey@immediate.co.uk

Contributors

KATIE STACEY "Known locally as the 'tigers of the sky', the black kites of Delhi, India, although seemingly flourishing, are coming into conflict with a very unique threat – flying toy kites," says writer Katie. **See p20**

MARK COCKER Mark explores conservation and landscape in Britain in his latest book *Our Place*. "In England," he says, "it's hard to think of a more important wildlife environment than Upper Teesdale." **See p36**

SARAH MCPHERSON is Section Editor of *BBC Wildlife*. She says, "India's Asiatic lion population has been put on the road to recovery with the wholehearted support of the local community." **See p82**

Get in touch

EDITORIAL

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abc Jan–Dec 15 total **35,934**
NRS Apr 14–Mar 15 **241,000**

ON THE COVER: Lion: Tapan Sheth; Attenborough: John Sparks/NPL: black kite: Luke Massey; moose: Nick Garbutt

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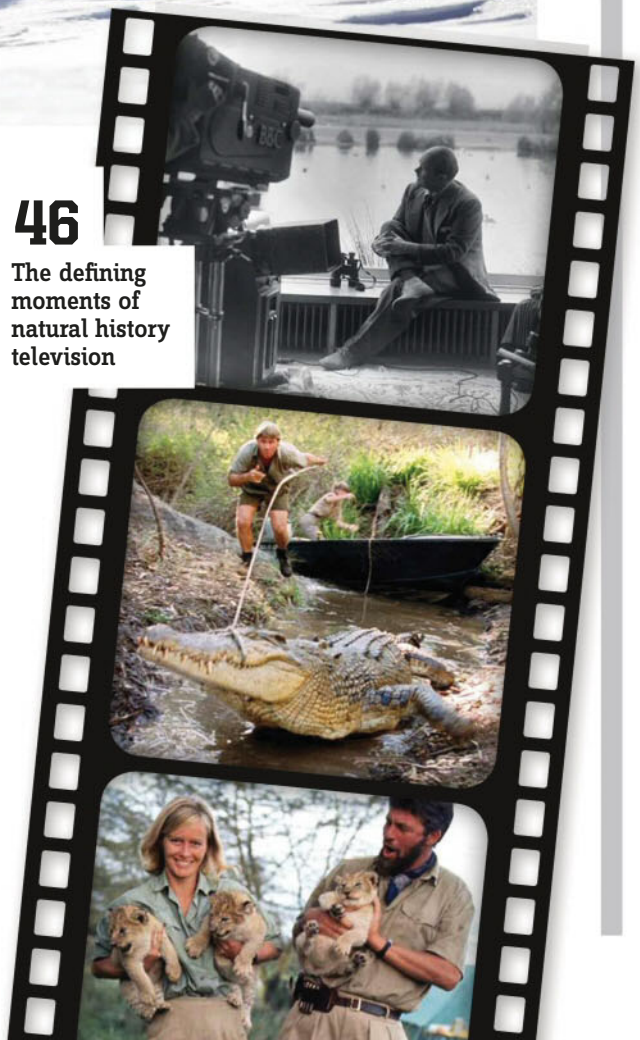

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L on: Tapan Sheth; ch ton: Peter Dav d Scott/The Art Agency; k te: Luke Massey; bear: Ange o Gando f /Getty; wolf: Nick Garbutt; Sir Peter Scott: BBC; Steve Irwin: LFI/Photoshot; Virginia & Bill: United Archives GmbH/Alamy

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WILD JANUARY

WHAT TO SEE » WHERE TO LOOK

Hibernation is equivalent to turning down the central heating to save on fuel when you go away. With its metabolic processes reduced to a minimum, it takes very little energy to keep a dormouse alive.

Colin Varndell

30

Weight (in grams) that some adult hazel dormice achieve when preparing for hibernation. According to mammal expert Pat Morris, an individual must put on at least 12–15g if it is to survive the winter.

CHRIS PACKHAM'S MUST-SEE

BEHAVIOUR

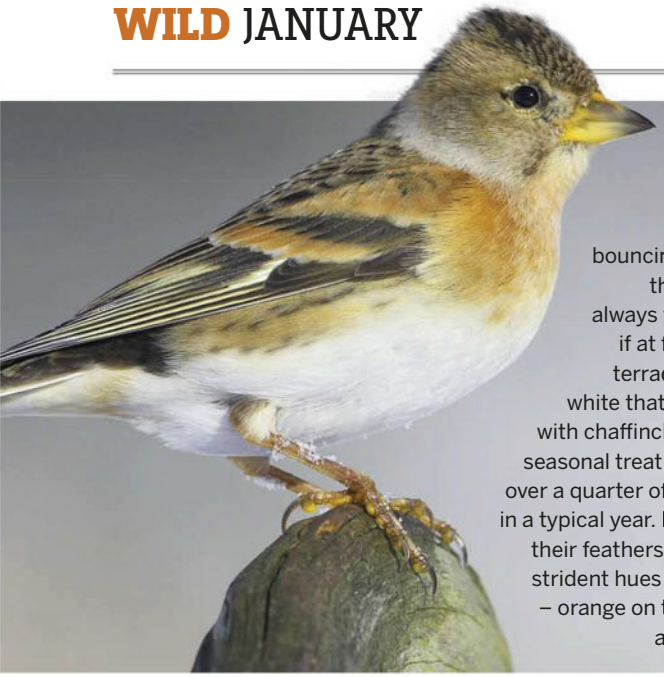
SLEEPING BEAUTY

By now, hazel dormice should be living up to their name and snoozing for all they are worth (*dormientes* is Latin for sleeping). This is not really sleep, but hibernation, a physiological state so profound that the body chills with ambient conditions to within a whisker of freezing. Hibernation is not a strategy to escape the cold, but an adaptation to food shortages in which low body temperature reduces energy consumption. Dormice rely on easily digestible foods such as fruits, seeds, flowers, insects and fungi, all of which are scarce in winter. So, rather than waste energy in fruitless searches, they weave a snug nest, often at the base of a tree or under leaf litter, and switch all metabolic functions into standby mode.

Hibernation can be disrupted by unseasonal warmth or changeable weather patterns, both of which may be contributing to the species' decline in the British Isles. "We can't do much about these weather patterns," admits Ian White of the People's Trust for Endangered Species (PTES). "But we're reintroducing dormice to suitable areas where they've gone extinct and making sure those sites are managed appropriately, by coppicing and restoring the hedgerows that the dormice use to disperse."

GET INVOLVED To find your nearest dormouse survey group, contact PTES at **https://ptes.org**

> HAZEL DORMICE REDUCE THEIR BODY TEMPERATURE AS LOW AS 1°C WHILE HIBERNATING.



BRAMBLING

WINTER FINCH

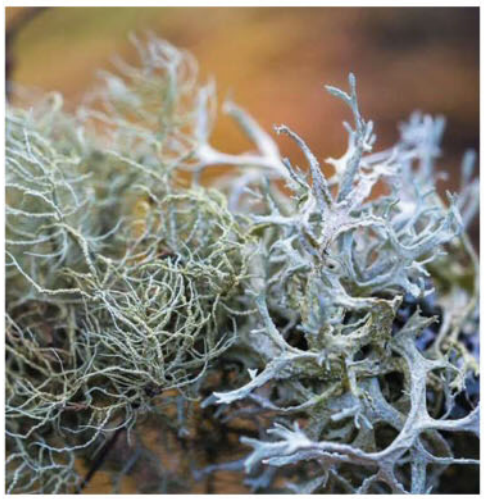
Flocks of finches at feeders, bouncing through hedges or scouring the ground for beech seeds, are always worth checking out, especially if at first glance you notice a mix of terracotta and flickering black-and-white that you might normally associate with chaffinches. A closer look may reveal a seasonal treat – hungry migrant bramblings, over a quarter of a million of which visit Britain in a typical year. By late January the buff tips of their feathers are fading, revealing the more strident hues of the male breeding plumage – orange on the chest and shoulders, black and grey on the head and neck.

USNEA SUBFLORIDANA

LICHEN PUZZLE

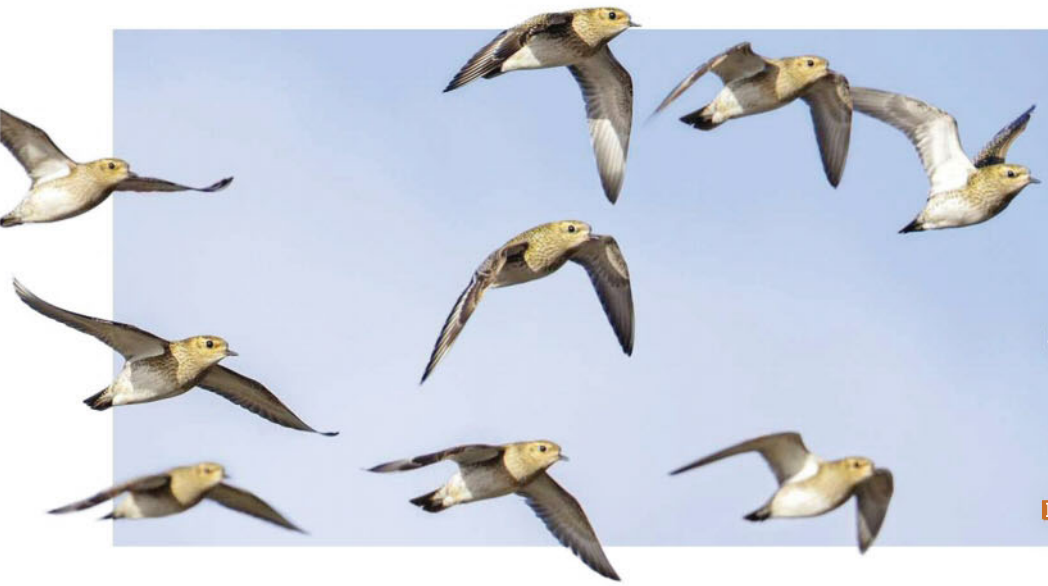
January sees beardy clumps of this common lichen become suddenly conspicuous on bare branches. In some areas it is occasionally replaced by the rarer *Usnea florida*. These species are separated by reproductive strategy: the former sheds tiny parts that sprout anew from bark fissures; its scarce relative produces sexually reproductive structures called apothecia that have a neater, 'flower-like' appearance.

FIND OUT MORE Learn about lichens at **www.britishlichensociety.org.uk**



UK HIGHLIGHTS

The essential wildlife events to enjoy this month, compiled by **Amy-Jane Beer**.



GOLDEN PLOVER

FLOCKS OF GOLD

Britain is the only place where you can see golden plovers year round. Elsewhere, these handsome waders are fully migratory, and winter visitors greatly boost numbers here. For resident birds it's a short hop from their upland breeding grounds to wintering areas on open farmland and coasts, where they abandon territorial behaviour and form large flocks, often with lapwings. Both species have white underwings, but golden plovers can be told apart by their narrow, more pointed wings.

FIND OUT MORE **www.bto.org/about-birds/bird-id**

MOUNTAIN HARE

WHITE OUT OF SIGHT

A winter white coat makes sense for Scottish mountain hares, which live mostly in areas that receive plenty of snow. But those living in the Peak District are often caught out, and are easy to spot against the brown of peat and dead heather. Moors For the Future, a partnership between the Government, NGOs and utility companies, is gathering data on mountain hares, brown hares and rabbits to examine how distributions might be shifting as a result of changes in climate and land management.

GET INVOLVED If you visit the Peak District, download a recording card at: **www.moorsforthefuture.org.uk**

VELVET SHANK

WINTER MUSHROOM

This fungus of dead and dying wood is one of very few species wholly resistant to frost, and one of relatively few edible fungi around at this time of year. The name velvet shank refers to the dark fuzziness that develops from the base of the stem in mature specimens. A pale cultivated version known as white straw mushroom or enokitake can be bought year-round, and there's good reason to buy rather than forage: velvet shank is similar in appearance and habit to the deadly funeral bell mushroom *Galerina marginata*.

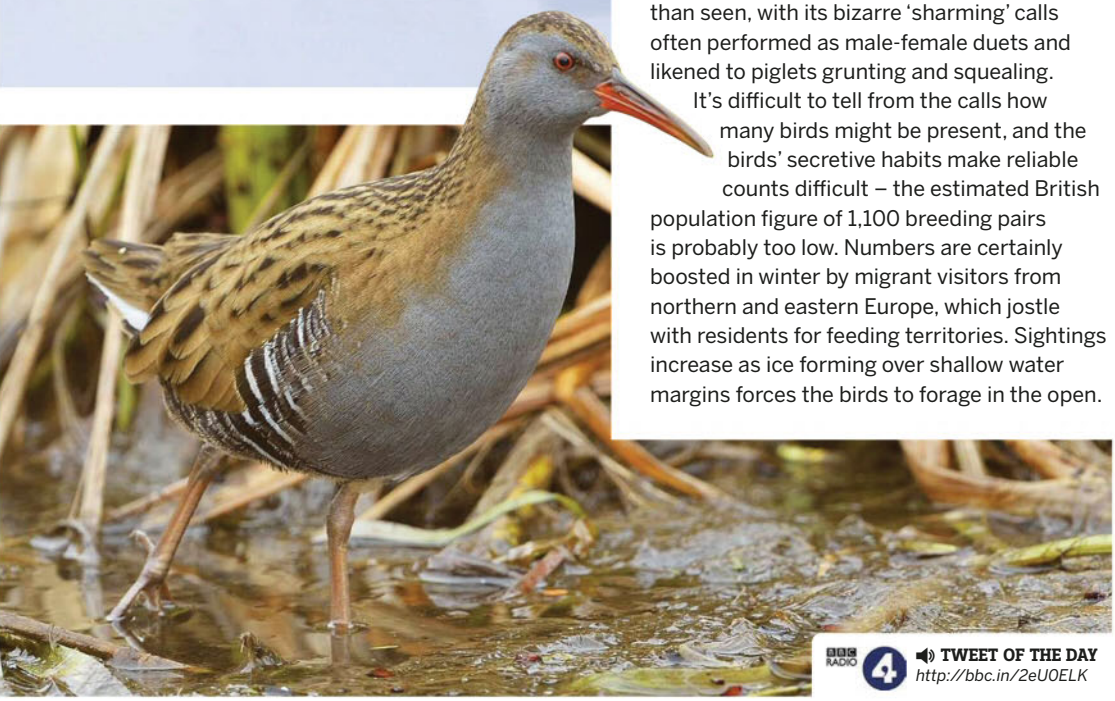
GET INVOLVED For tips on foraging, visit **www.woodlandtrust.org/visiting-woods/things-to-do**

WATER RAIL

SHY STAR

This slim, laterally compressed relative of the moorhen is much more often heard than seen, with its bizarre 'sharming' calls often performed as male-female duets and likened to piglets grunting and squealing.

It's difficult to tell from the calls how many birds might be present, and the birds' secretive habits make reliable counts difficult – the estimated British population figure of 1,100 breeding pairs is probably too low. Numbers are certainly boosted in winter by migrant visitors from northern and eastern Europe, which jostle with residents for feeding territories. Sightings increase as ice forming over shallow water margins forces the birds to forage in the open.



BBC RADIO 4 **TWEET OF THE DAY**
http://bbc.in/2eU0ELK

ALSO LOOK OUT FOR...

DADDY-LONG-LEGS SPIDERS

Not to be mistaken for craneflies, which are sometimes given the same nickname, these delicate arachnids are active all year in houses. Their flimsy webs snare other spiders and insects, including mosquitoes. Touch the web and you may see the spider vibrating violently to try and throw you off.

MAHONIA

While native planting schemes are often best for wildlife-friendly gardens, some introduced plants really earn their place. Himalayan mahonias are not only exceptionally hardy, they also bloom in midwinter, cheering the scene with clusters of sunny yellow flowers and providing vital fuel for early-emerging bumblebees.

GREY WAGTAIL

It's usually the zippy yellow belly rather than the grey cape on a grey wagtail that catches the eye, often prompting mistaken ID. But in winter there's no doubt. Grey 'wags' are often spotted close to water in parks, gardens and urban centres, while yellow wagtails are strictly summer visitors.

SMALL TORTOISESHELL

Garden sheds, garages and other unheated rooms often provide ideal cool, stable conditions for small tortoiseshell butterflies to hibernate. January is too early for them to survive outside – if you disturb one, leave it be. Individuals found elsewhere can be brought in to a suitable cool, dark place.

Bramblings: Mark Hamblin; hare: Andrew Parkinson; fungi & rail: Laurie Campbell; spider: Alex Hyde; Mahonia: imagebroker/Alamy; plover: David Kjaer; lichen: Matt Doogue

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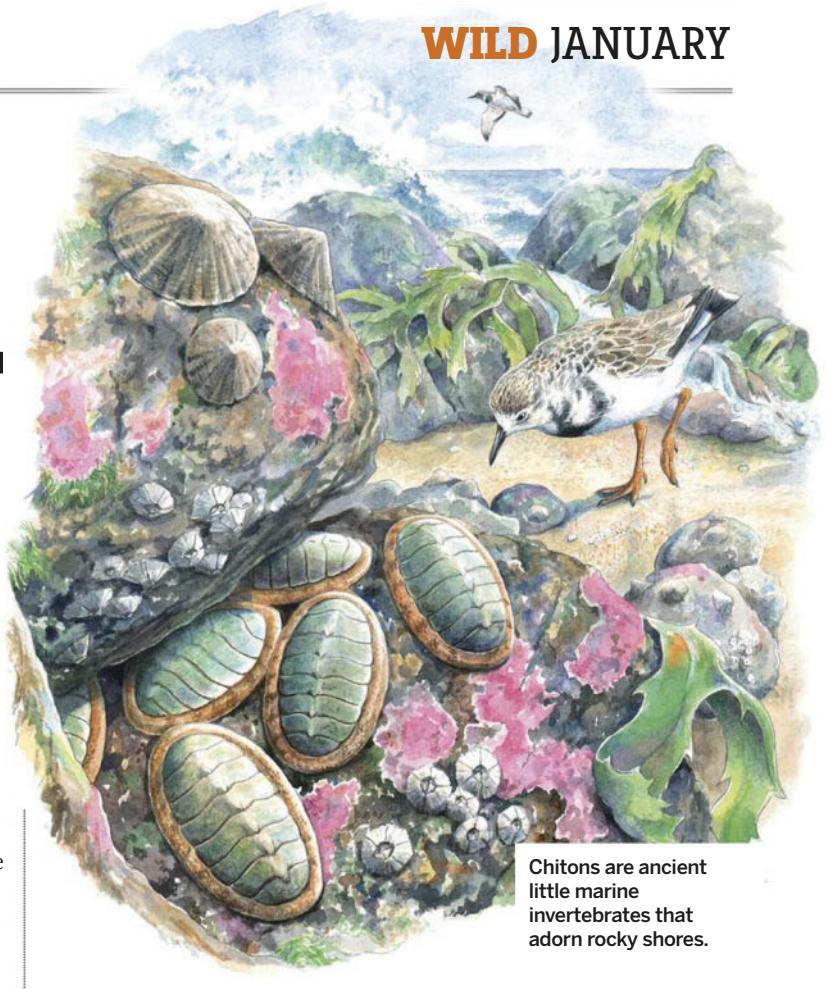
Hidden BRITAIN

REVEALING A FASCINATING WORLD OF WILDLIFE THAT WE OFTEN OVERLOOK.

CHITONS



Chitons are ancient little marine invertebrates that adorn rocky shores.

I have been leading guided Seashore Safaris on the Gower coast, South Wales, every summer for the past eight years. During that time, I have encountered an array of fascinating marine creatures hiding in rockpools and gulleys, clinging to overhangs and nestling under boulders.

Keen-eyed children and adults alike often enquire about the strange, tiny, woodlice-like 'fossils' they've spotted. These inconspicuous structures usually measure no more than 2cm in length and invariably turn out to be living animals called chitons.

Chitons (pronounced 'kite-ons') are enigmatic and fascinating marine invertebrates. They are known from fossils dating back at least 300 million years, and have changed little with the passing of time. Chitons belong to the phylum Mollusca (along with sea snails, sea slugs and bivalves), and are sometimes known as 'coat-of-mail shells', which alludes to their carapace of eight overlapping and interlocking plates that resemble the chain mail sported by knights of old. They have small heads, and a lack of tentacles and eyes means it's not always obvious which end is which.

A life by the sea

Chitons occur only in marine habitats. There are about 600 species worldwide, 15 of which have been recorded from British coasts. Head out on a rockpool ramble and you may encounter the grey chiton *Lepidochitona cinerea*, our most common species, or perhaps *Acanthochitona crinita*, easily recognised by the 18 bristly tufts sprouting around its shell.

Chitons usually live alone or in small clusters of 3–4 on the undersides of rocks on the lower shore, or on the sides of rockpools on moderately exposed rocky shores. They are not always easy to spot, camouflaged as they are against their rocky backgrounds or obscured by mud or silt.

These are well-adapted little molluscs, perfectly equipped for life on the seashore. Like limpets, they cling to rocks using a strong, well-developed, muscular 'foot'. The irregular surface of their rocky surroundings poses no problem, as their articulated bodies readily flex and bend, the foot contorting to the outline of even the most rugged surface.

If a chiton becomes detached from its habitat, it curls into a ball like a woodlouse – a manoeuvre enabled by its shell plates. This is a neat defensive strategy, protecting the animal from harm if it finds itself swept away by rough waves and dashed against the shore.

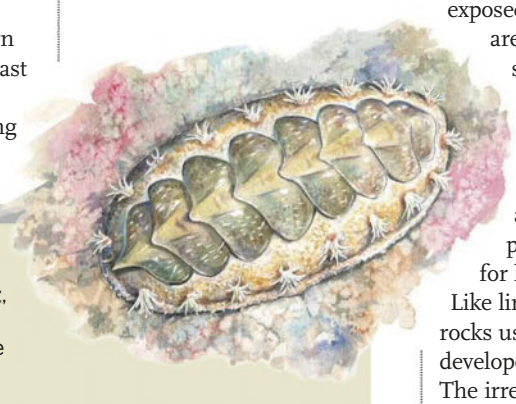
Fish supper

These molluscs are herbivores, using their hard, rasping radular teeth to graze on small algae and micro-organisms. Some of these teeth are reinforced with iron and silicate compounds, enabling them to feed on tougher algae, including encrusting calcareous forms. In turn, they are preyed on by crabs, gulls and fish.

Chitons are only active at high tide, and return to their original position when the tide recedes, possibly guided by a mucous secretion deposited on the outgoing trail. Their pace is slow – look closely and you'll just about discern movement as they gently glide along the rocks.

So, next time you make it down to the seashore, take a moment to turn over a stone or peer among the anemones and fronds of brightly coloured seaweed, and see if you can spot these ancient, fascinating denizens of the rockpool.

By **JUDITH OAKLEY**
Author of *Seashore Safaris* (Graffeg, £11.99)



CHITON FACTS

- **Chitons possess a heart**, an open blood system, a pair of kidneys and a simple nervous system.
- **Chitons have no eyes** in their head, but they can 'see' through their shells using minute sensory organs called aesthetes, not found in any other group of animals.
- **The sexes are** usually separate and gametes are released into the sea.
- **The dictionary definition** of a 'chiton' is a long woollen tunic worn in ancient Greece (from the Greek *chiton*), or any primitive marine mollusc of the genus *Chiton* that has an overall flattened body with a shell of overlapping plates.
- **Report sightings** of rocky shore species to your local biological records centre or to the Sealife Survey: www.mba.ac.uk/recording/

Illustrations by Peter David Scott/The Art Agency

NATURE RESERVE SPOTLIGHT

STRANGFORD LOUGH

WHERE
Strangford Lough, County Down, Northern Ireland

MANAGER
Andrew Upton

WHY YOU SHOULD VISIT

This National Trust reserve is the largest inlet in the British Isles. Up to 75,000 water birds make it their home in winter and their numbers peak in January.

WHAT CAN YOU SEE

The reserve is one of the most important sites in Britain and Ireland for wintering water birds. Around nine-tenths of the world's population of pale-bellied brent geese – up to 38,000 birds – migrate to Strangford Lough from Canada every year.

The lough is also internationally important for knot and redshank.

TOP WILDLIFE SPOT

Both Mount Stewart and Castleward are great places to spot birds. Look out for teal, wigeon, oystercatchers, lapwings, dunlins, bar-tailed godwits, redshanks and curlews.

HOW TO VOLUNTEER

There are lots of opportunities to volunteer with the ranger team, including practical habitat management and bird monitoring. In January, we will be counting all the wintering birds on the lough – not an easy task! Call 02842 787769 for more information.

There are over 2,000 different marine creatures living in the lough.

JANUARY WILDLIFE EVENTS

Until 10 Sep

WILDLIFE PHOTOGRAPHER OF THE YEAR 2016
The awe-inspiring collection of 100 images from the prestigious photography competition are exhibited at the Natural History Museum, London, showcasing the beauty and diversity of life on our planet. Tickets from £10.50.
http://bit.ly/2e0HSDu

28-30 Jan

BIG GARDEN BIRDWATCH
Take part in the world's largest garden wildlife survey – 8,260,623 birds were counted last year – and provide valuable information about nature in the UK. The RSPB will use your data to identify population trends.
http://bit.ly/1RZxmM6

Until 20 Apr

EXTINCTION OR SURVIVAL?
By looking at species such as the dodo and giant earwig, this free exhibition at Manchester Museum examines why species go extinct, and addresses the role of humans in the future of surviving species.
http://bit.ly/2cKEV7b

EVENT CHOICE

10 Jan

CSI OF THE SEA
This live post mortem from ZSL will be broadcast via video link. Viewers will hear from experts and have the opportunity to ask questions about the impact of pollutants on wildlife. Tickets cost £5, or £4 for ZSL members.
http://bit.ly/2fexYQV

Strangford Lough: Joe Cornish/Nat ona Trust Images; two-spot red snappers: Tony Wu/W d fe Photographer of the Year 2016; dodo: Manchester Museum; great tit: Graham Madge/RSPB; harbour porpoise: Florian Graner/naturepl.com

SPEAKERS' CORNER
KATRINA VAN GROUW

WHAT The Unfeathered Bird
WHEN 7:45pm on Thursday 12 January
WHERE Sandhills School, Oxford

Ornithology specialist, and author of *The Unfeathered Bird*, Katrina van Grouw will share her knowledge of what goes on beneath birds' feathers, using her detailed anatomical illustrations drawn from actual specimens. "I'm fascinated by how superbly birds are adapted to their way of life," she says. "Take herons whose neck conceals a rapid trigger mechanism for lunging forward at lightning speed. Or woodpeckers whose entire body acts as a shock-absorber when drumming against tree trunks." Her talk will discuss the challenging, and sometimes bizarre journey to creating her book. Tickets cost £3, and £2 for full-time students.

This event is run by the RSPB Oxford Local Group. Visit http://bit.ly/2ehpyDQ for more details.

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DISCOVERIES

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Written by STUART BLACKMAN

Behaviour picks up where biology left off for Macaroni penguins in the Falklands.

Steven J. Kazlowski/A amy

BIRDS

WHY TWO WHEN ONE WILL DO?

NEW STUDY ON PENGUIN REPRODUCTION REMINDS US THAT EVOLUTION SOMETIMES GETS THINGS WRONG.

Evolution can produce exquisite adaptations but it doesn't always get everything right. And the apparent blunders can be just as revealing as the triumphs, as demonstrated by new research on the strange egg-laying behaviour of certain penguins.

Most penguins lay two eggs and raise two chicks. In six species, though – members of the genus *Eudyptes*, which includes macaroni, rockhopper and royal penguins – those two eggs are very different sizes. The first egg laid may be half the mass of the second, and only the second egg is hatched.

Various attempts have been made to explain the phenomenon in functional terms. But according to Glenn Crossin of Canada's Dalhousie University, they're not supported by the evidence.

One explanation is that the small egg serves as insurance against the failure of the large one. "Often they'll reject the first egg even before the second is laid," said Crossin. "So they're clearly not laying this smaller egg just in case the larger one is lost."

DID YOU KNOW?

Emperor and king penguins are the only members of the group to lay a single egg, which the parents brood on their feet to keep it off the freezing ground. In emperors, all the brooding is done by the male.

Neither is there evidence that two chicks are raised in bountiful years, he added. Instead, Crossin believes that these penguins are the victims of an evolutionary mistake.

Eudyptes penguins are migratory. They spend the non-breeding season far out to sea and must make a long trip back to their colonies in time for the breeding season.

Migration is exhausting and physiologically expensive, which means that *Eudyptes* are left with few resources to make the first egg. The ideal solution would be to cease production of the first egg, but for some reason they don't. "It probably boils down to the fact that it's easier to get rid of the egg behaviourally than it is to modify their reproductive physiology," said Crossin.

"It's sort of intuitive and logically appealing for us to be able to ascribe an adaptive function for strange things we see in nature," he told *BBC Wildlife Magazine*. "But that's not necessarily the case."

SOURCE: *Proceedings of the Royal Society B*
LINK: bit.ly/2ffIEj1

PLANTS

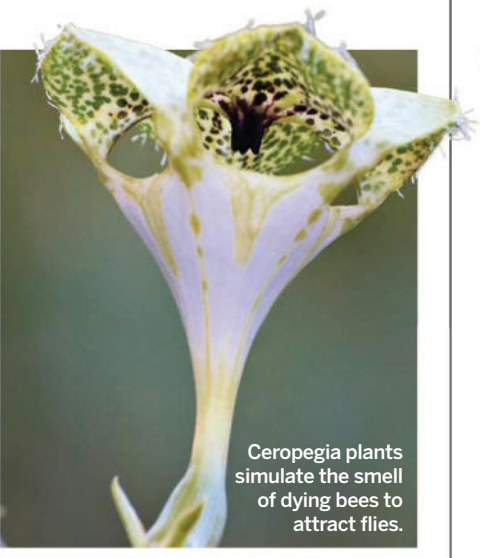
A WHIFF OF BEE

Plants employ all sorts of elaborate means to lure pollinators to their flowers. But few are as sophisticated as South Africa's giant ceropegia.

"These flowers have a complex morphology, including trapping structures to catch pollinators, temporarily trap, and finally release them," said Stefan Dötterl of the University of Salzburg. But Dötterl's research has revealed that giant ceropegia don't trap just any pollinator. They target Desmometopa flies, a group that specialises in feeding on the carcasses of insects caught in spiders' webs.

To attract the flies, ceropegia flowers emit a chemical that mimics the pheromones released by honeybees in trouble. These are intended as an SOS to other bees, but hungry *Desmometopa* flies also home in on the signal on the promise of dinner.

"Flies are attracted to the flowers, expecting a meal, but instead of finding an attacked honeybee, they're temporarily trapped in the non-rewarding flowers and misused as pollinators," said Dötterl.



Ceropegia plants simulate the smell of dying bees to attract flies.

SOURCE: *Current Biology*
LINK: bit.ly/2eDoXg4

Sperm whale vocalisations are specific to their territories.

CETACEANS

NEW VOCAL DIALECT AS CLANS MOVE ON

If the Liverpudlian accent was replaced by Geordie over the course of just a couple of decades, it might raise a few eyebrows. But something similar has happened to the vocal dialect of sperm whales around the Galápagos Islands in the Pacific, according to new research.

Sperm whales spend their lives in small groups of families. These social units interact with many others that share the same vocal dialect, producing cultural 'clans' consisting of hundreds of the mammals.

During the 1980s and '90s, two clans, known as 'Regular' and 'Plus One', dominated Galápagos waters. But new surveys reveal that these two clans have been replaced by whales using dialects from further out in the Pacific.

One possible explanation for this is that the 'Regular' and 'Plus One' clans departed for more productive waters nearer the South American mainland, where intense whaling had devastated sperm whale populations. This allowed the Pacific clans to fill the area they left.

SOURCE: *Royal Society Open Science* LINK: bit.ly/2esyQ0m

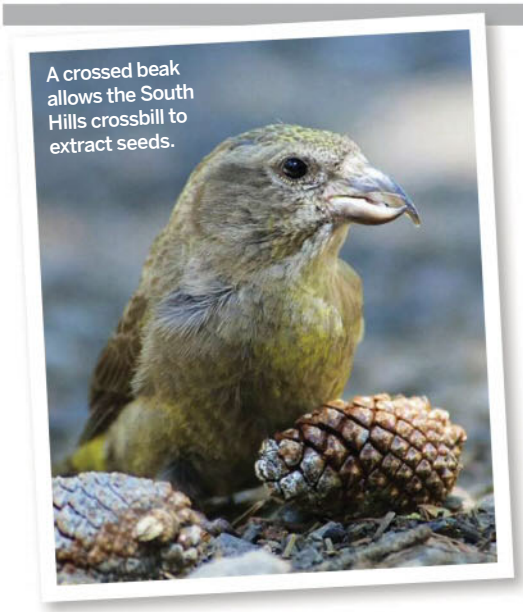
The EXPLAINER

Scientific terms put into plain English for the rest of us.

ECOLOGICAL TRAP

As humans alter the planet, the cues used for millennia by animals to identify suitable habitats can lead them into an ecological trap. Many mayflies, for example, locate fresh water by the way it reflects light. But tarmac produces similar reflections, causing the insects to lay their eggs on roads. Meanwhile, hilly moorland is attractive to both golden eagles and windfarm developers. Whenever a bird is killed by a turbine, its territory is quickly filled by another that risks a similar fate.

Wind turbines, used to generate electricity, have killed golden eagles.



A crossed beak allows the South Hills crossbill to extract seeds.

NEW SPECIES SPOTLIGHT

SOUTH HILLS CROSSBILL

WHAT IS IT? The South Hills crossbill is a new species in more ways than one. Not only is it new to science, but it diverged from its close relative, the red crossbill, only in the last few thousand years – a blink of an eye in evolutionary terms.

WHERE IS IT? Endemic to southern Idaho in the US, it feeds on the cones of lodgepole pines and has exaggerated crossed mandibles for extracting the seeds. Red squirrels, which eat lodgepole seeds elsewhere, are absent from the South Hills, where the new crossbill has filled the niche.

SOURCE: *Molecular Ecology* LINK: bit.ly/2fDMNJu

Whales: w destanimal/Getty; eagle: Oscar Diez/Minden/FLPA; crossbill: Craig Benkman; plant: blickwinkel/A amy

The grey dimorphic jumping spider's wooing technique is just as effective as its tufted counterpart.

ARACHNIDS

OPPOSITES ATTRACT

The courtship displays of male jumping spiders are wonders of the arachnid world. But one North American species offers twice the entertainment as the males come in two forms.

The grey and tufted varieties of the dimorphic jumping spider not only look different but also perform different courtship displays. Greys have orange spots, striped legs and yellow mouthparts, and shimmy from side to side in front of a female. Tufteds are black, with white legs and three tufts of head-hair. They court from afar by waving their legs, mouthparts and abdomen. The two types occur in equal numbers.

University of Michigan biologists have found that neither has an advantage, because females are equally impressed by both. "The fact that males have equal mating success and an equal offspring number would contribute to the 50:50 ratio," Juan Pablo Busso told *BBC Wildlife Magazine*.

Intriguingly, females were most impressed by slender greys that displayed little and often, and by heavier tufteds that were more patient and persistent, suggesting that it's the oppositeness of the males' displays that leaves females unable to choose between them.

SOURCE: *Animal Behaviour*
LINK: bit.ly/2fSB6yu

PRIMATES

NO FIGHTS FOR FEMALE CHIMPS

Patience pays off in terms of social status for female chimpanzees.

Working one's way up a dominance hierarchy often involves violence – unless you happen to be a female chimpanzee.

An analysis of 40-years' worth of records of interactions between chimps at Tanzania's Gombe National Park reveals that, while males rise through the ranks by aggressively challenging those above them, females play a waiting game, improving their position as older females above die off. "It's like a formal queue," said lead author Steffen Foerster of Duke University in North Carolina, US.

A rapid rise to dominance benefits males because it's only at the top that they can mate with many females. But females, who can only bear one infant at a time, leave more descendants by living longer.

"It is potentially dangerous for chimpanzees to challenge each other. They may get injured, their offspring may be killed if they have a little baby," said Foerster. "Finding that females actually don't fight for rank tells us how costly these challenges must be for them."

SOURCE: *Scientific Reports* LINK: go.nature.com/2fZGwfB

WILDLIFE UPDATES

DIGGING FOR OZ

Short-beaked echidnas play a keystone role in Australia's ecology. A single echidna's efforts to dig for termites turns over more than 200m^3 of soil a year, according to *Journal of Experimental Biology*. The behaviour aerates and fertilises the ground.

'EXTINCT' DOLPHIN HAS BEEN SPOTTED

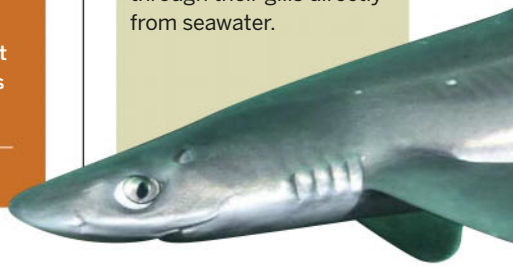
Chinese media have reported a sighting of a single Yangtze river dolphin or baiji. After surveys in 2006 found no signs of the species, it was declared "functionally extinct" – even if a few individuals did survive, recovery is unlikely.

RODENT RATIONS

Rodents were an important part of human diets in Orkney 5,000 years ago. *Open Science* reports that domestic waste deposits excavated from the Neolithic archaeological site of Skara Brae contain the charred bones of Orkney voles and wood mice.

HOW DOGFISH EAT THROUGH THEIR GILLS

Gills aren't just for breathing, it seems. Research published in *Journal of Experimental Biology* reveals that, when Pacific spiny dogfish can't get enough nitrogen from their diet, they can absorb nitrogen-rich ammonia through their gills directly from seawater.



Spider: Car Monopo /Alamy; chimp: Fiona Rogers/naturepl.com; echidna: Cyril Ruoso/Minden/FLPA; shark: Gerard Soury/Getty

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CHRIS PACKHAM'S

Unsung NATURAL HISTORY heroes

Ruary Mackenzie Dodds

A dream came true for this writer and conservationist when The Dragonfly Centre opened at Wicken Fen nature reserve.

I like enthusiasts a lot. While obsessives are too much for some, I'm instantly drawn in by their single-minded preoccupation with a subject. I like their dedication, total immersion, and all the knowledge it can produce. Fanatics are not so much my cup of tea – perspective and keeping an eye on the bigger picture are essential in my world of cold, hard pragmatism.

I mention these 'types' because, as naturalists, you will know them well - our science or hobby draws them like moths to a flame. And now you may be wondering... which category do you fall into?

Meeting knowledgeable, new and curious people is always a joy and I remember with fondness and great clarity my introduction to Ruary Mackenzie Dodds. At the end of a long drive in July 1991 I wandered down a muddy track beside a lake to find a Darwinishly bearded fellow doing everything he could to satisfy a film crew. As became apparent, 'dragonfly wrangling' was his mission but not perhaps his forte. But, then, trying to telepathically induce an otherwise occupied insect to within range of a camera is not mine either.

What struck me instantly and strongly was his effervescent passion for these brilliant dashing predators. It was an unconfined thirst to know them in every detail, child-like in its energy, boundless in its desire to catch up with any tiny shred of entomological fact, fiction or gossip.

Wow, I thought, I like this bloke. He's as mad to see and discover minutiae as I am. And when later discussions revealed his other passions as vintage racing cars, early battleships and steam locos – essentially, mechanical things – our association was sealed and I've had the pleasure of his company ever since.

His thirsty impatience probably arose from the fact that Ruary came to the Odonata late in life but, boy, did he catch up fast and make a real contribution to their profile and preservation in the UK. He motivated the establishment of the first dragonfly sanctuary at Ashton Water in 1990 and the National Dragonfly Museum in 1996 which I had the honour of opening. I drove a 'piece of motoring history' there to appeal to him and he spent as much time showing off the restored dynamos in the generating house as he did the beautiful pool with its attendant resplendents. When it unfortunately closed he preached his love for the 'devil's darning needles' from a bungalow at Woodwalton Fen for a season, before migrating to Wicken Fen. There, in 2009, a tiny cottage was re-instated as a museum/lab with a focus on the dragons and damsels on this fabulous reserve.

Ruary helped establish the first dragonfly sanctuary in 1990.

Jill Purse

Again, I did the honours. As much to revel in Ruary's beaming smile and bask in his irrepressible enthusiasm as to help the insects become more widely known. Thus The Dragonfly Centre exists and visitors peer into the private lives of these precious creatures and then set off on dragonfly safaris around the fabulous reserve.

Ruary will want me to point out that he didn't achieve all this on his own. A willing troupe of volunteers have been loyal to the cause, all drawn in and motivated by his restless ambitions and madcap energies.

A few years ago I inaugurated 'The Order of the Geek' on BBC Two's *Springwatch* in an endeavour to transform this label from one of sneering ridicule to one of acknowledged respect. Ruary was a recipient and, dare I say, a proud recipient, and that says a lot.

> "IT WAS A THIRST TO KNOW THEM IN EVERY DETAIL, CHILD-LIKE IN ITS ENERGY.

You need to know, that if you can differentiate the larvae of all the British dragonfly species, and hold your own in a conversation about 4-cylinder air-cooled Porsche engines from the mid 1950s, you are not normal. You are wonderful.

Ruary Mackenzie Dodds is the author of The Dragonfly-Friendly Gardener *(published by Saraband at £8.99).*

CHRIS PACKHAM
is a conservationist and presenter.
● Would you like to comment or name a conservation hero? Let us know: email **wildlifeletters@immediate.co.uk**

There's danger in the skies over Delhi for black kites, but there are people on the ground that are helping the birds stay healthy.

Kite CLUB

Photos by **Luke Massey**

Two brothers are fighting to save black kites from their injuries in Delhi, India. **Katie Stacey** met them to find out how.

Above: low-level flying through the city's streets put the black kites in the path of danger from kite strings, power lines and vehicles.

The roads become narrower as I venture deeper into the labyrinth, dodging autorickshaws, schoolchildren, feral dogs and mountains of rubbish. A cow steps out into the road and the surrounding drivers lean on their horns – an action as natural as breathing in the congested streets of Wazirabad, north Delhi.

My destination isn't easy to find. I ask a chai-wallah stirring a battered vat of spiced tea for directions. He spits a salvo of blood-red betel-nut paan as he nods towards a nearby alley. At the far end, another man pulls chickens from a cramped cage and chops off their heads. I interrupt his butchery to ask: "Is this Wildlife Rescue?" He nods grumpily towards a staircase.

After a quick phone call a smiling man appears in the doorway. "Don't mind the neighbours," he says. "They complain that since we've arrived there are many more black kites – and they poo everywhere!" He introduces himself as Mohammed Saud, and takes me up to meet his elder brother, Nadeem Shahzad. The two of them have been working together as the self-appointed saviours of Delhi's never-ending stream of injured black kites.

AS THE NUMBER OF KITES BROUGHT TO THEM ROSE TO MORE THAN 2,000 EACH YEAR, THEY QUICKLY BUILT UP EXPERIENCE.

The brothers have a history of activism, having long battled the illegal wildlife trade. Thanks to their efforts in helping to put criminal dealers behind bars they've received numerous death threats. Their work with black kites began in 2003 when an injured bird came into their care.

At that time, Mohammed and Nadeem had little experience with kites, so they took the bloodied bird to a local bird hospital. There they hit an unexpected obstacle: staff at the Jain hospital couldn't take in the raptor because they are strictly vegetarian and their religious beliefs prevent them from killing an animal to feed another. It quickly became clear that there was nowhere for birds like these to recuperate. So that's when the brothers stepped in.

ON-THE-JOB TRAINING

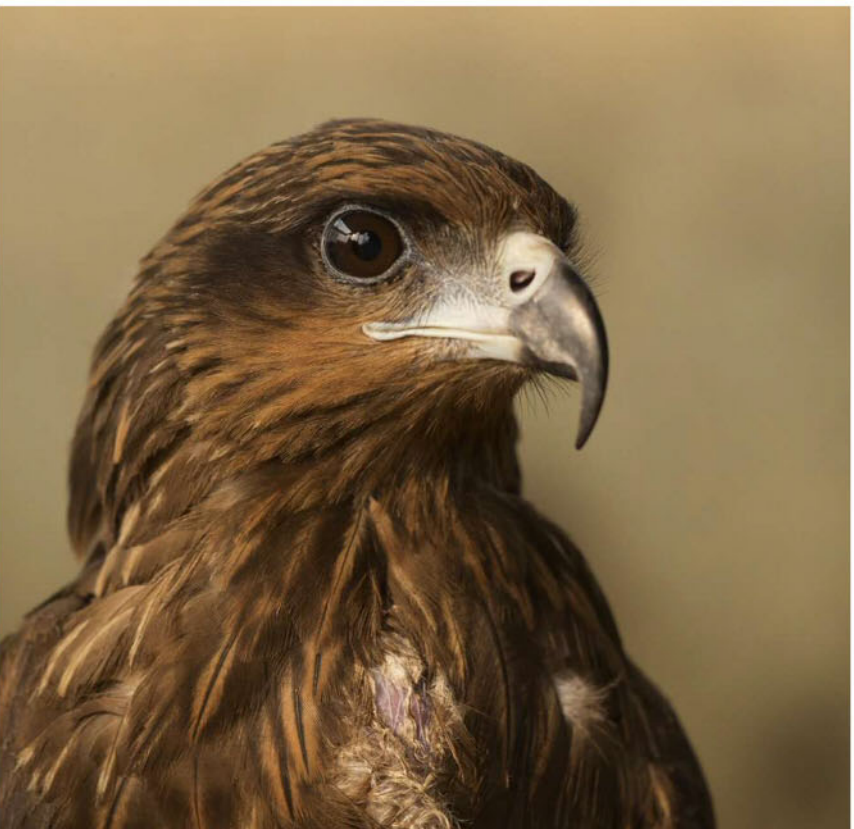
Initially, the established wildlife charities didn't think the brothers were up to the job – they had no formal veterinary training and only a small terrace at their home in Chawri Bazar in Old Delhi on which to house the birds. But Mohammed and Nadeem have proved their critics wrong.

By watching their neighbour Babu Khalifa, a famous kabootar baaz (keeper and trainer of pigeons), tending his wounded birds they learned to suture wounds – and as the number of black kites brought to them rose to more than 2,000 each year, they quickly built up practical experience.

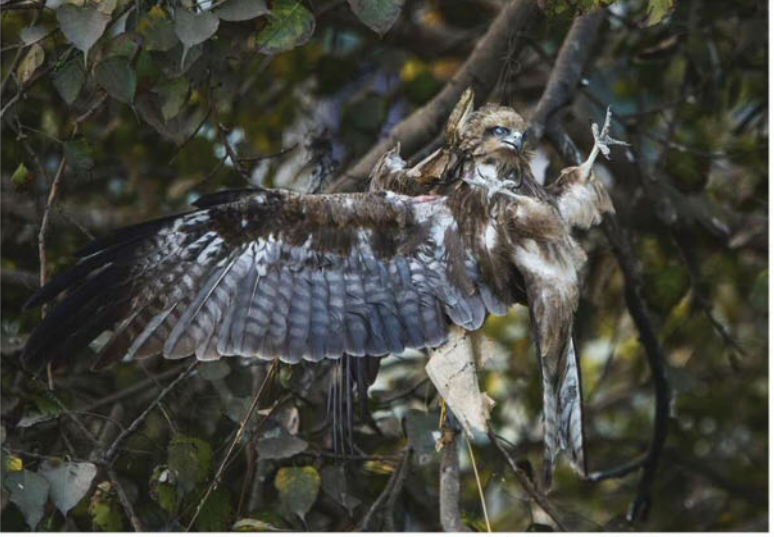
I ask what's causing so many injuries and Nadeem seems surprised by my naïve question. The answer to him is obvious: kites, of course. Not other raptors, but the toys, which are responsible for 70 per cent of the wounded birds that the brothers see. "They're being maimed by the glass-coated string [called manjha] used for competitive kite-flying," says Mohammed. "And the new Chinese metal-coated string slices through birds' bodies like a knife."

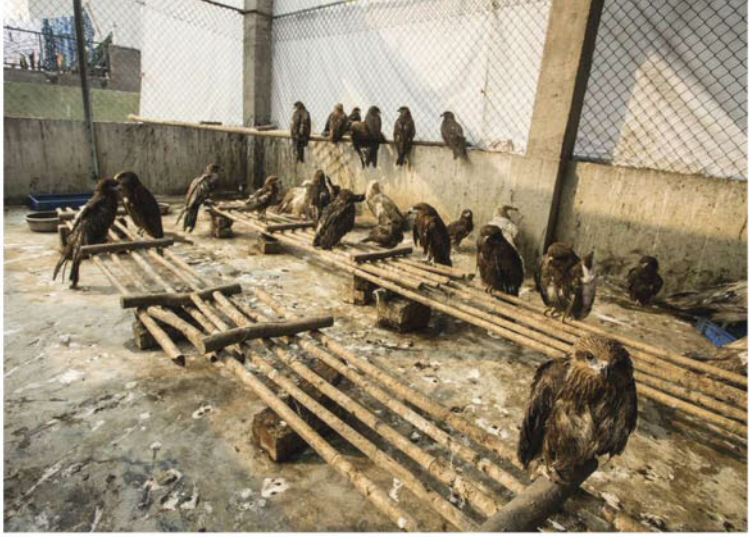
Among lines of colourful washing, satellite dishes and people relaxing in the Indian winter sun, the brothers'

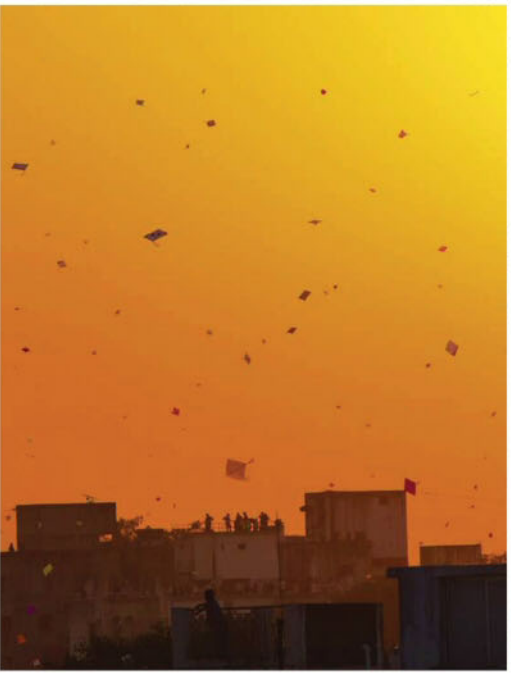
Clockwise from top left: Delhi's civic amenities provide useful nesting spots. Food and nest material can be scavenged from Ghazipur's landfill site. Black kites among the city's bright lights. A white beak indicates malnutrition. Butchers sell lambs' feet, a local delicacy, while birds circle overhead.

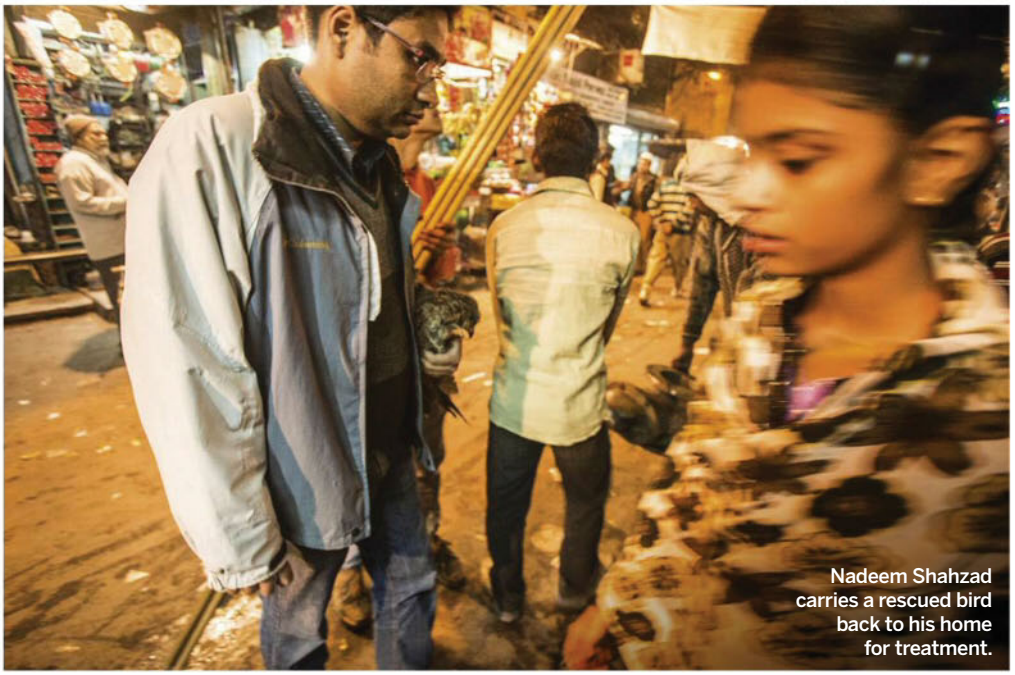


A wingspan that can reach a width of 1.5m in an airspace that's often filled with kite strings can cause problems.









Nadeem Shahzad carries a rescued bird back to his home for treatment.

Toy kites: Morten Fra ch Sort and/Getty; illustration: DEA Picture L brary/Getty

Top left: a black kite gets caught in a cobweb of broken kite strings. Top right: birds recuperate in the soft release pen on the brothers' terrace. Above: both types of kites – birds and toys – fill the skies above Delhi.

rooftop rehab centre is a unique sight. It consists of two cages – a small, dark one for the owls and newly admitted birds, and a larger, half-covered fenced area where birds continue their rehabilitation with a 'soft' release. During my visit the list of inmates includes 100 kites, four Egyptian vultures, a painted stork and a fish owl, all sporting large white bandages and a few nasty red gashes.

During the breeding season the tally can increase to 300 birds. In 2015, 400 fledglings were treated in just over two months. These are potentially overwhelming numbers for two men whose day job is making bathroom accessories.

But this is the brothers' passion. They don't see the work as a burden. "It's interesting that 20-30 per cent of the fledglings brought in are suffering from metabolic bone disease," observes Nadeem, pointing to a few of his patients. "You can see that some have white beaks, indicating that they're suffering from malnutrition."

POOR DIETS AND PRECARIOUS FLIGHTPATHS

I'd seen evidence of the birds' poor diet the previous day on a visit to the rubbish dump at Ghazipur, the city's vast landfill site where rag-pickers, dogs, birds and livestock eke out a living sifting through the mountain of refuse.

Here, the black kite – the old world's most common raptor and a species synonymous with cities – has adapted to survive on the by-products of human civilisation. With a current population of close to 20 million people, this city is the perfect feeding ground for these proficient scavengers and, as a result, Delhi now has the densest population of black kites in the world, with 15 breeding pairs per square kilometre. I saw dozens of them circling above and sifting through the detritus for food.

This isn't the only source of food on which the black kites rely. Astonishingly, India is the world's largest exporter of beef (largely from water buffalo), and with countless large slaughterhouses and illegal backstreet butchers in Delhi leftovers are easy to find – especially with the recent collapse of India's vulture population. In Old Delhi, Muslims buy offcuts to feed to the black kites in a symbolic act of selflessness. I'd seen the feeding from afar, watching silhouetted birds diving at the rooftops, but now Nadeem invites me to witness it close-up in Chawri Bazar, a warren of buildings in which each block is crammed with at least three generations of families living on top of each other.

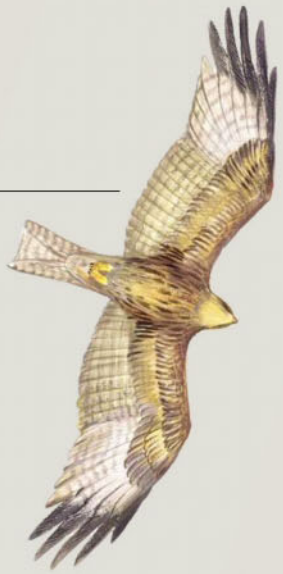
The passages around Nadeem's house are bustling with people, goats, fighting cockerels and food, and would be impossible for me to navigate without Nadeem's help. En route we stop to pick up meat from the local scraps seller.

"All birds are under threat from the string of the paper kite," Nadeem tells me, "but the black kite is the most vulnerable because it often flies low and takes circuitous routes." It doesn't take long for hungry birds to spot the meat thrown by Nadeem and they descend in a black cloud, swooping and diving as they vie for the scraps; aerial

FACT FILE

BLACK KITE

MILVUS MIGRANS



BREEDING

Black kites breed in the Indian capital during the winter after building their nests in November. Both parents build the nest to rear their chicks. A clutch typically contains two to three eggs and the young fledge after 42–56 days.

DESCRIPTION

Male black kites measure 45–65cm in length and weigh 600–900g. Females weigh 750–1,100g. Despite their name, the birds are dark brown and have a wingspan of 120–150cm. They produce a distinctive whistling sound, followed by a whinnying call.

DISTRIBUTION

Black kites (classified as Least Concern by the IUCN) have a vast range that spreads over Africa, Europe, Asia and Australasia. Their migratory habits vary but generally those found at higher northern latitudes migrate south over winter. Populations closer to the equator, such as India, tend to be sedentary.

DIET

Carrion is an important part of their diet but they also hunt live prey, including reptiles, small birds and mammals. In Delhi the raptors are seen around rubbish dumps and will scavenge slaughterhouse waste. If rescued, the raptors can eat approximately 100g of meat per day in captivity.

RESCUE

Since 2010, brothers Nadeem Shahzad and Mohammad Saud have helped over 10,000 injured birds from Delhi and the surrounding area. Over the past two years the number of injured birds has increased and they've dealt with about 4,788 cases. Their bedroom doubles as an operating theatre for injured chicks.

Above: a bandaged black kite continues to recover from its injury at the treatment centre set up in the brothers' home.

acrobats nimbly pirouetting between rooftops. As far as the eye can see little clusters of raptors dive for food. Gradually, though, diamonds of colour begin to appear among them – the kite-flyers have launched their toys and the invisible strings that present a danger to the birds are reeled out as the paper shapes soar higher into the sky.

PUPPET ON A STRING

As we eat lunch at Nadeem's house we're watched by two spotted owlets peering at us from a box in the corner of the room. Owls are used in black magic rituals and these two found their way here after being rescued from tantriks – Indian shamans. As we finish our food Nadeem receives a call from the fire brigade informing him that a black kite is caught in a tree.

We find the bird at the highest point of a tall tree stretching up as far as the surrounding rooftops. Old paper kites hang limply in its branches and through binoculars we can make out the raptor entangled in their strings. We negotiate access to a nearby rooftop and climb a treacherous succession of steps and ladders to reach the same level as the terrified bird. The sky around us is now a cobweb of kites, each line capable of stretching out to 1km. Nadeem catches my eye. "This is the slow season," he tells me grimly. Kite string has also been responsible for the deaths of at least 10 people this year, three of them killed in Delhi during India's Independence Day celebrations. Exposed on this rooftop, I fear for my own neck.

Our initial efforts to reach the bird prove fruitless. Dangling puppet-like from the innocuous-looking thread, the animal is completely powerless. A little way below it, the corpse of an ill-fated crow hangs, a gruesome warning of the bird's fate if we're unable to free it. Fortunately, Farman – a volunteer for Wildlife Rescue and a former kite-flyer – suggests an ingenious plan inspired by his erstwhile sport. The aim in competitive kite-flying is to sever your opponents' strings until yours is the last kite aloft. Picking up some discarded kite string, he attaches it to a piece of wood and tosses it out over the lines entangling the bird. After a few attempts he makes the first cut and the black kite drops a little, but struggles as it tastes freedom, tightening ▶

THE SKY AROUND US IS NOW A COBWEB OF KITES, EACH LINE CAPABLE OF STRETCHING OUT TO ONE KILOMETRE.

Nadeem (*left*) is helped by Farman as they tend to an injured black kite in the surgery, which doubles as Nadeem's bedroom.

the remaining cord around its neck. Despite the urgency of the situation, Farman calmly continues until finally the line breaks and the bird glides awkwardly to a nearby wall.

By now its mate has joined us, circling a little too close for comfort to the tree, which glistens with kite string in the fading evening light. We watch for a while, unable to reach the injured bird, as someone above starts throwing out scraps for the kites and their shadows dance ominously overhead. 'Our' black kite seems to be preparing to leave with its mate, and we pray that the string hasn't injured it, but our hopes are dashed as we watch it sail clumsily back into the tree to become entangled once again, now completely out of reach.

Fortunately, a gaggle of local kids, their kite-flying curtailed by the dimming light, climb the adjacent abandoned building and, using a long pole, push the injured bird – shrieking in terror – from the tree. Farman retrieves it and Nadeem and Farman carry it home through the bustling Delhi night, most people taking no notice of the exhausted raptor tucked under Nadeem's arm.

THOUGH CHINESE METAL-COATED MANJHA IS OFFICIALLY BANNED, STREET VENDORS CONTINUE TO SELL IT.

Nadeem suspects that it's been caught in the tree for two or three days but, incredibly, its wounds are only superficial, requiring only antibiotics, painkillers and care. The next day it's carried to the hospital in the brothers' bird ambulance – a box on the back of a moped. Three days later the recovered bird flies away from the brothers' soft-release pen – one of the lucky survivors.

ABANDONING TRADITIONS

Though Chinese metal-coated manjha is officially banned it's incredibly popular for its strength and durability, and street vendors continue to sell it. But all kite strings cause problems, and not just for birds: cut strings lie wherever the wind drops them – on trees, electric poles, even around the necks of motorcyclists. Despite the regulations, kite-flying has taken on political overtones: party members attend huge competitions on the Hindu festival of Makar Sankranti and on Independence Day. In south India various political parties even produce customised promotional kites.

"The kite-flying festival is a celebration of the finest things in India: the colour, the sport, the individual's battle with the wind, celebrating the outdoors," says Anjana Mehta, a supporter of Wildlife Rescue who is campaigning for the government to enforce the manjha ban. "But the competitive spirit and narrow vision has obliterated responsibility for public safety. It's decimating thousands of birds each year. Many hang entangled from trees and power lines, their wings torn, slowly starving to death."

The real question then is: how do you convince a nation to give up its heritage? Kite-flying has been popular since the Mughal era several centuries ago. In Pakistan, those who use the sharpened string can be with charged with murder and face a possible death penalty because chemically finished and metallic strings are classed as offensive weapons. Perhaps this is the only way to stem the flow of injured birds flooding into the brothers' hospital.

KATIE STACEY *gave up her job as a futures broker five years ago to become a wildlife and travel writer.*

FIND OUT MORE

Visit **wildliferescuedelhi.wordpress.com** for more information on the work of Wildlife Rescue in Delhi.

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Standing up for animals

Historically England was a place where cruelty to animals was an ordinary daily occurrence. William Hogarth's depiction of the *Four Stages of Cruelty* graphically captured our routine treatment of animals. Since then changes introduced by law and in society are proudly used by us to indicate our innate kindness in our claim as 'a nation of animal lovers'. Yet is that quiet pride valid or just a vainglorious boast?

In 1800 when Sir William Pulteney tried to abolish bull-baiting it was vehemently opposed and defeated. George Canning, the Foreign Secretary, with a politician's puerile humour, posed during the debate in Parliament: 'What could be more innocent than bull-baiting, boxing or dancing?'

In London and other cities it was not unusual for a horse to be beaten to death, whilst baiting of wild animals were popular entertainments in towns and villages across our land. Besides the pleasure of bloodlust from hunting and fighting, casual cruelty was visited upon animals, such as the custom of throwing unwanted cats into the drains of the Tower of London.

When Richard 'Humanity Dick' Martin, an Irish barrister and MP, proposed a law to curb cruelty he was greeted with contempt. The idea seemed so absurd it 'sent the House into convulsions'. Martin finally introduced an Act in 1822, the first major animal welfare legislation in the world. Commonly called 'Martin's Act', it was cleverly framed in favour of an owner, not protection for an animal. He knew the true value of animals was that in law, then as now, they are regarded as our property.

Martin prosecuted the first case under his Act. Bill Burns, a street-seller of fruit and vegetables, was charged with cruelty to his donkey. Though the evidence against Burns was manifest, the magistrates intended to dismiss the charge. So Martin produced the donkey as an 'exhibit', as proof the cruelty was self-evident. Only then did they convict Burns.

Martin explained the aim of the change: 'If legislation to protect animals is to be effective it must be adequately enforced.' So in 1824 Reverend Arthur Broome, Martin and others founded the Society for the Prevention of Cruelty to Animals (SPCA). Now the RSPCA, this was the first animal welfare society in the world. The Society's pragmatic purpose was to apply Martin's Act as an instrument of change within society.

Joseph Pease MP, of the SPCA, introduced The Cruelty to Animals Act 1835, which was the first Act in the world to make dog fighting illegal. That Act also banned badger-baiting, bear-baiting, bull-baiting and cock-fighting. In time it led to the Protection of Animals Act 1911 (POA) that belied its name.

The POA allowed animal abusers to escape their just deserts by legal loopholes and judicial fudges. Domestic animals were barely protected while wild animals were abused at will. The POA exempted vivisection and hunting.

In 2006 the POA was replaced by the Animal Welfare Act (AWA). This was a radical departure in letter and spirit. While the POA was concerned with cruelty, its replacement dealt with welfare. Instead of cruelty, the 'suffering' of animals became the watchword. The loopholes that riddled the POA, especially the treatment of farm animals and wild animals in captivity, were addressed. The AWA places a legal duty

Britain fondly considers itself to be a nation that loves animals, yet crimes against them continue unabated. Barrister **Noël Sweeney** asks if it's time to introduce an Animal Abusers Register.

Illustrations by Patrick George/Début Art

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of care on the person responsible for a 'protected' animal's welfare.

Notwithstanding those positive points, the inherent flaws in that law detract from its effect. Its impotence can be deduced by the acid test of sentencing. In case after case our courts and government have failed animals and society. The following three typify where the problem lies.

In 2010 Mary Bale, a middle-aged banker, seized a cat called Lola by the scruff of the neck and placed her in a wheelie bin, an act caught on CCTV. In court it was said it was 'obvious Bale's actions were deliberate' as she 'looked to see if anyone was watching' before doing so. Lola was abandoned and remained there until she was rescued 15 hours later. Bale explained, 'I suddenly thought it would be funny to put the cat in the bin.' The District Judge said, 'There was no excuse for what you did.' Bale was fined £250.

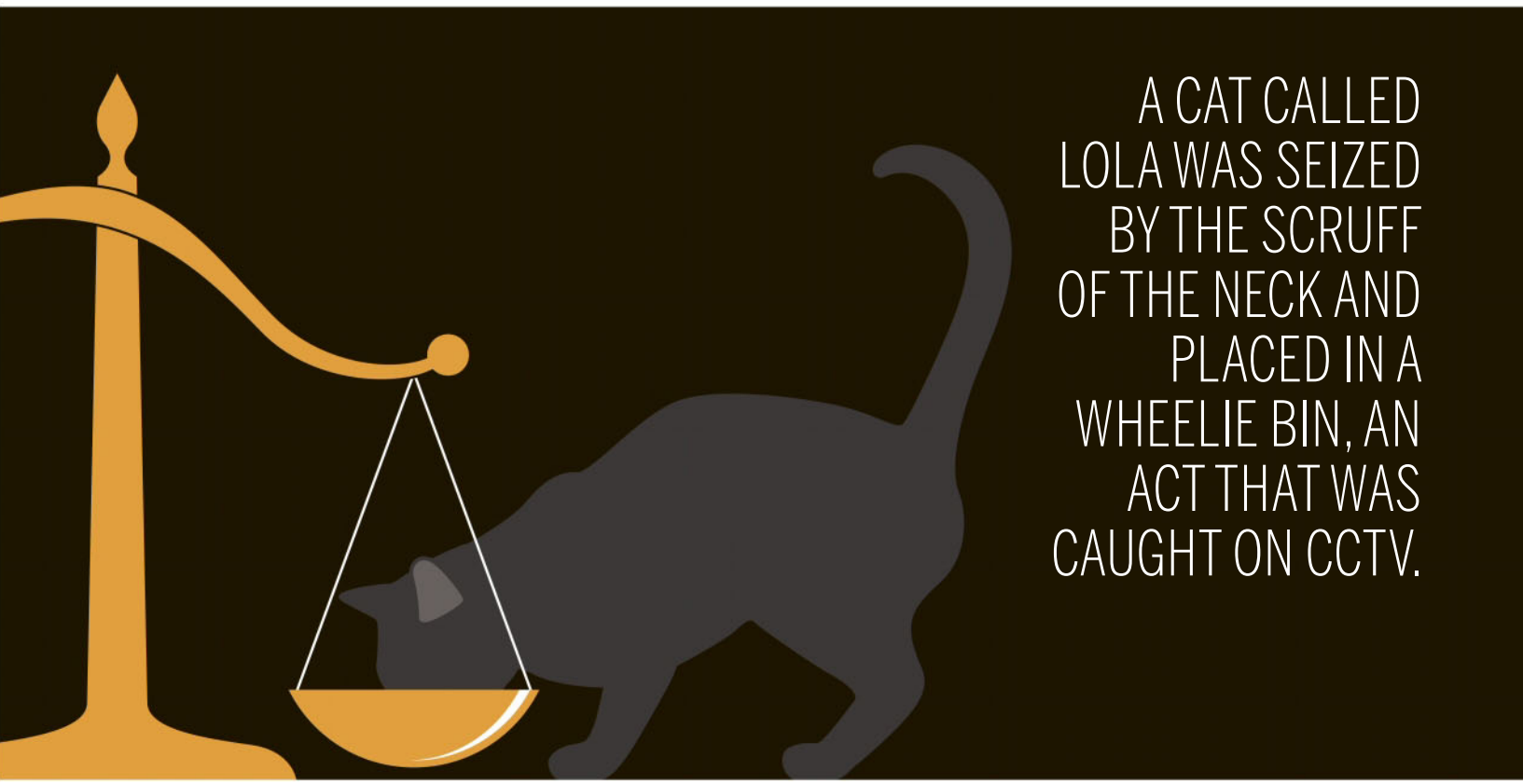
Also in 2010 Jamie Davies, Daniel Silvestros and one other were out drinking in Pontypridd when they visited Tesco to buy more alcohol. The Tesco's staff said there was a friendly fox nearby which they fed and had even given a name. Silvestros saw the fox hiding behind a car. He chased and 'caught the fox by the tail' and swung him 'from side to side'. He dropped the fox after '10 seconds' because it was "going nuts..." Another of them picked the fox up and in 'a very barbaric act, swung the fox from behind his back head-first into a wall'. He 'swung' the fox again, striking him 'on the floor'. Davies joined in the attack. He began 'kicking and stamping on the fox's head'. Davies picked the fox up then dropped him on the road. Tesco's staff watched with shock and one woman was openly weeping. The fox died within 20 minutes from 'multiple injuries'. The defendants were traced from CCTV that had captured their joint attack. Each received a suspended sentence.

Katy Gammon abandoned her boxer dog, Roxy, in 2014, leaving her without food and water so she starved to death. Roxy was so desperate she chewed at the kitchen door that had been tied shut with a rope by Gammon. Roxy emptied mop buckets in her 'desperate search for water'. Gammon had piled tins of dog food and dog treats outside the kitchen 'just feet away from where Roxy' was trapped inside. The remains of the dog were not discovered for 10 weeks. A post-mortem revealed that Roxy had suffered 'starvation and dehydration' leading to a 'prolonged and painful' death that may have lasted six days. Gammon, a practising Bristol solicitor, was sentenced to 18 weeks' imprisonment.

A sense of perspective of the inadequacy of sentencing can be gleaned from the fact that the maximum sentence for the gravest case of animal abuse a person could commit would be six months' imprisonment and a fine. If they plead guilty they are entitled to a discount of up to 33 per cent. So the sentence would be reduced to 18 weeks. Prisoners serving a short sentence only serve half the term. With the early-release-licence they could be released after a quarter of the term.

When rarely a court imposes a custodial sentence, it is usually suspended or for such a short term it could be deemed futile as a punishment or deterrent. Those sentences send a beacon sign to the perpetrators and the public: animal abuse is undesirable, but unimportant.

Another aspect the AWA has failed to address affects animals as victims. Sex offenders do not change with time except in one respect: with age they become more degenerate. The cliché relied upon by defence counsel on behalf of every priest who molests a choirboy is that he acted 'out-of-character', yet the advocate is wrong. Their offence is not out of character, but part of their character. Our legislators are aware of that disposition and seek to control such offenders from repeating their crimes. The Sexual Harm Prevention Order was introduced as a means to monitor the movements of those offenders during their sentence and afterwards.



A CAT CALLED LOLA WAS SEIZED BY THE SCRUFF OF THE NECK AND PLACED IN A WHEELIE BIN, AN ACT THAT WAS CAUGHT ON CCTV.

Precisely the same principle applies to our urgent need for animal abusers to be registered for precisely the same reason. Many criminals who are animal abusers go on to commit serious offences of violence towards human victims. Cruelty to animals and violence to children is connected as the perpetrator picks a victim who is vulnerable.

The lead was taken by America when three New York counties introduced an Animal Abuse Registry in 2010. The legislators acted because 'as many as 71 per cent of battered women say their pets have been killed or threatened by their abusers'. Jon Cooper, the bill's sponsor, explained: "We know there is a very strong correlation between animal abuse and domestic violence. Almost every serial killer starts out by torturing animals, so in a strange sense we could end up protecting the lives of people."

The American version is based on their Sex Offender Registry. If a person is on the Registry he would not be able to adopt or buy a pet in the city. The Registry is provided to all the interested parties such as animal sanctuaries, pet stores and the police. We need one, too. A register would have a dual benefit, acting as our alarm bell and the victim's legal voice.

The AWA allows a court to disqualify a person of ownership of an animal upon conviction for abuse, including causing unnecessary suffering, fighting and failing in his duty of care. If he applies for termination of the Order, 'The court shall have regard to the character of the applicant…' Hence that could be an offence of violence whether to animals or people. As it is mandatory for the court to take 'character' into account, abuse of animals or humans is relevant. Each are proof of a propensity for violence against victims.

Caretaker Ian Huntley worked in a village school in Soham in 2002. Though he had been investigated in the past for sexual offences with underage girls he was never charged. The police logs of the allegations were never passed on to alert other 'interested parties' about Huntley's propensity towards children. If the Soham community and the local police had known he was an animal abuser too, we might have saved the two 10-year-old schoolgirls who trusted him and as a result lost their lives.

Stephen Farrow was another dangerous man from whom people and animals needed protection. He was wandering around Worcestershire when he chanced upon Betty Yates, a 77-year-old retired teacher, and killed her in her own home. Farrow continued drifting and ended up in Bristol where he came upon a local vicar, Reverend John Suddards. He burgled the vicarage and killed Suddards. Farrow stood trial at Bristol Crown Court in 2012 and pleaded not guilty. Dr Tim Rogers analysed Farrow and confirmed he would: 'hurt animals on purpose' as well as 'shooting a swan with an air gun and killing people's pets if they "did his head in".' Dr Roger's report highlighted Farrow's 'sexual deviancy' and that he 'had fantasies about raping girls and bestiality with a number of animals'. Farrow was convicted of both murders by a unanimous jury.

The notion we are a nation of animal lovers can be seen in a sharp focus by this stark statistic: There are over 100,000 dogs abandoned every year. That is over 250 a day. Usually the owners escape prosecution while the stray animals often lose their lives.

Allied to those statistics, the Dangerous Dogs Act 1991 (DDA) has a 'presumption' that a dog is a 'prohibited' one unless the owner proves that presumption is false. Contrary to the normal legal principle that places the burden of proof on the defendant. Consequently, numerous dogs are killed by law whose real and only crime is being born.

All in all the AWA is a flawed law. Equally the DDA represents 25 years of constant failure. So our belief we are a nation of animal lovers is based on a trope not truth. Law is the lodestar of animal welfare, enabling us to use the language of natural justice to speak for the weak. As a nation, given that an animal has a minimal legal value, we are guilty of a self-serving notion that has no probative value at all.

NOËL SWEENEY is a barrister who specialises in human rights, criminal law and animal law. He is the author of *Animals-in-Law*.

MANY CRIMINALS WHO ARE ANIMAL ABUSERS GO ON TO COMMIT SERIOUS VIOLENT OFFENCES TOWARDS HUMAN VICTIMS.

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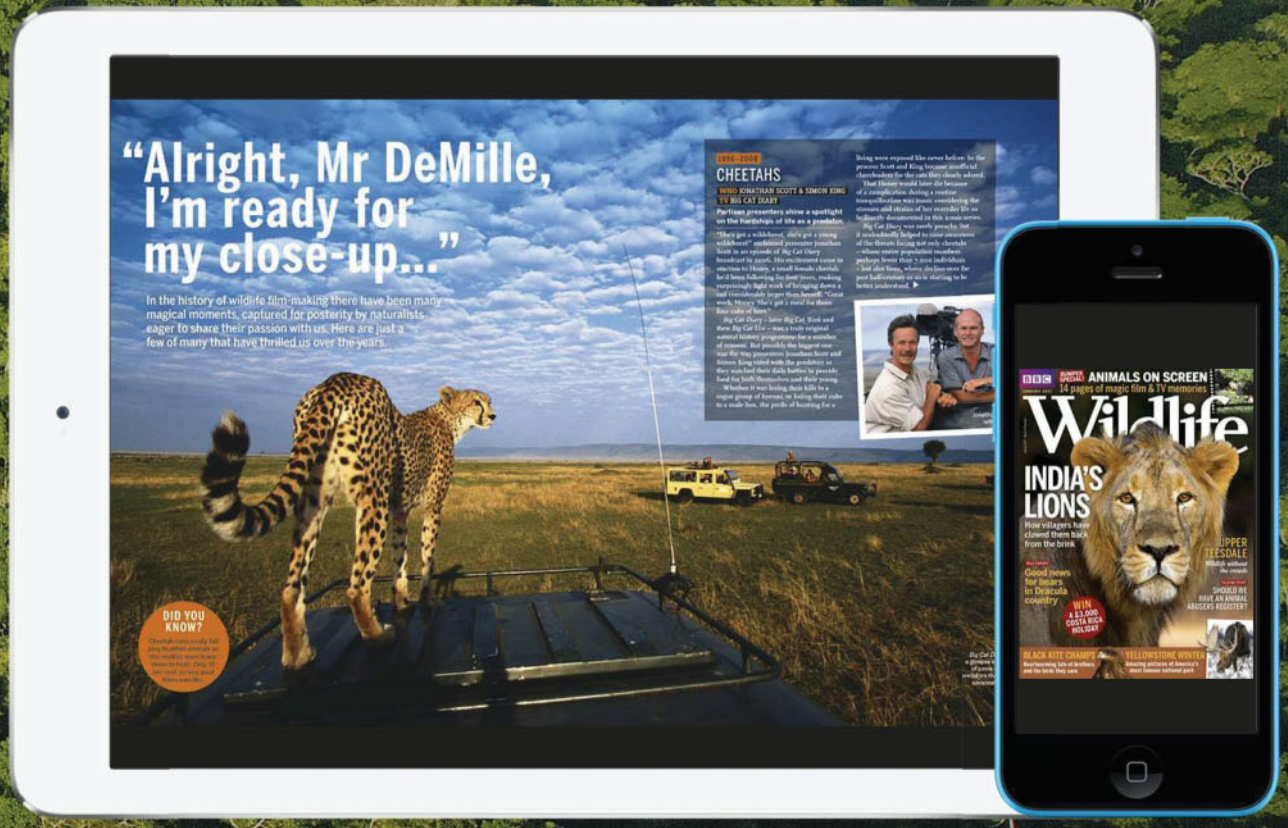

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BBC Wildlife

Alamy

Two male black grouse battle each other during the lek. The male with the best display gains dominance and access to more females.

BLACK MA

GIC

Each spring Upper Teesdale stages the high drama of black grouse courtship. Yet, as **Mark Cocker** explains, you're likely to witness this spectacle alone in this beautiful but infrequently visited reserve.

Above: the stonewall-lined track across Middleton Moor takes walkers through the Wear Valley to Weardale.

Half a dozen male black grouse, perhaps more, are gathered on a small patch of open ground, their plumage the deepest inky black punctuated by livid red eyebrows. Each inflates his neck, emphasising the lustrous sheen of his blue-black feathers, and arches down his head before thrusting it forward. A lyrate tail opens behind and white under-tail covert feathers puff up in an extravagant bustle, while broad black wings, banded and spotted with white, are bowed down and spread. As a final visual flourish, in the heat of display, the curious, sea-anemone-like wattles of bare skin above their eyes are engorged with blood and stand proud on their heads, thick gashes of scarlet.

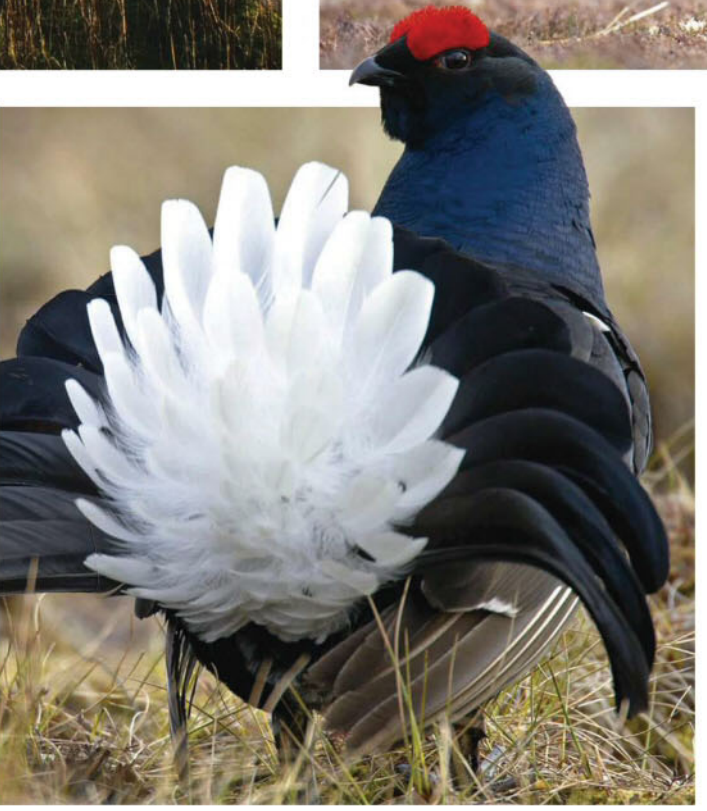
As if the splendour of this martial costume weren't enough, black grouse produce a music that has few equals and very little frame of reference in the rest of British ornithology. The base note is a strange, volatile quavering sound, often described as 'ro-cooing'. Unfathomable and seemingly without source, it's easier to imagine it emanating from the ground than the bird's vocal chords. It seems as if the unleashing of all that avian testosterone has somehow shifted the Earth beneath them and this is the noise that simmers out. From this array of territorial blackcocks, the speckled brown females, secreted away in the surrounding long grass, must choose their mates.

SITES AND SOUNDS

If you've never witnessed the spring display of black grouse, add it to your bucket list now. It's one of the most moving spectacles in British nature: a mass gathering of these striking birds at courtship areas known as 'leks'.

Both the range and number of black grouse declined dramatically in Britain during the last century, and they're now found mainly in the Welsh and Scottish uplands. They still appear at a few sites in England, however, and the best one I know of is in Upper Teesdale, County Durham, just above Langdon Beck. Leave the hamlet heading north and take the turning towards Weardale that goes over Langdon Fell. Just before the road starts to drop down you'll see the spot where the grouse assemble. It's private farmland, though, so you have to view them from the roadside.

What makes Upper Teesdale a great location for watching black grouse is that the lek sits in a



Landscape: David Taylor Photography/Alamy; snipe: Andy Sands/naturepl.com; whin sill: Jason Friend/Getty; female grouse: David Kjaer/naturepl.com; male grouse: Schulz/blickwinkel/Alamy

deep bowl, surrounded by high moorland. The drabness of the fell emphasises the brilliance of the grouse, while their glorious calls are caught in a natural sound chamber, reverberating with added intensity.

To see the full glory of the birds' displays, however, you should time your visit to coincide with dawn, when all around can be rimed with frost. If the sun is visible, the whole landscape glitters. And as the birds advance and retreat in synchronised formation each lets out a second vocal challenge: a hard, aspirated, crow-like 'cho-wakk'. Just before you hear it – the sound takes a split second to reach your ears – the noise is visible: a ragged globe of mist puffed from the bird's beak.

WADER WONDERLAND

However wonderful the lek may be, though, there is so much more to Upper Teesdale than just black grouse. It forms a National Nature Reserve, along with the adjacent Moor House area, that accounts for almost 8,000ha on the eastern flanks of the highest Pennine peaks. Both parts of the reserve lie at about the same latitude to Keswick or Pooley Bridge on Ullswater but, whereas those Lake District honeypots are overwhelmed by visitors, Upper Teesdale is far less well known.

From top: despite a declining population snipe can still be found in Teesdale; Whin Sill burst through the Earth's crust as molten magma millions of years ago; female black grouse lack the attention-grabbing colours of the males; white feathers are revealed when the males fan their lyrate tails.

UPPER TEESDALE

You can expect to encounter the distinctive coloration, crest and call of the lapwing in Teesdale.

THE GROUSE MAY NOT BE THE ONLY ATTRACTION, BUT THEY'RE EMBLEMATIC OF THE EXTRAORDINARY ABUNDANCE OF GROUND-NESTING BIRDS IN THIS DALE.

Top: water tumbles over submerged rocks where the River Tees meets Harwood Beck at Cronkley Fell. Above: curlews are a common sight in the Teesdale landscape.

Though the Pennine Way runs around the reserve, many is the time when I've had it almost to myself.

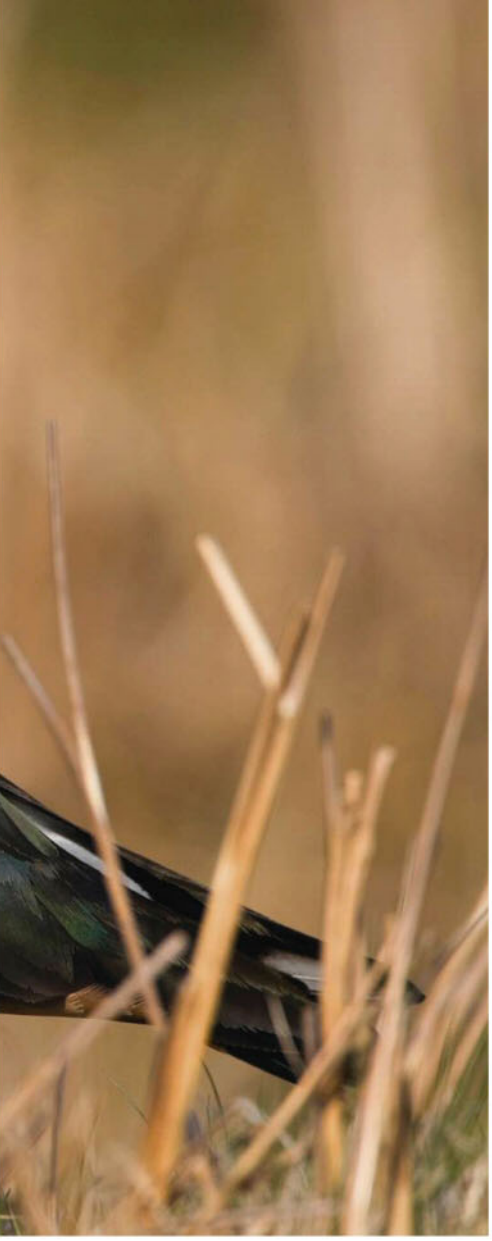
The grouse may not be the only attraction, but they're emblematic of the extraordinary abundance of ground-nesting birds in this dale, which hosts some of the highest densities of breeding waders anywhere in the country. Lapwing, snipe, curlew, oystercatcher, redshank and golden plover are everywhere. On one memorable occasion, eight snipe displayed over my head; often they can be seen standing on fence posts at the roadside. During another visit, every foot drain in the slopes around the grouse lek contained a feeding woodcock.

So much joyous song-flighting by so many displaying waders is redolent of an older English countryside, and in many ways this is a feudal landscape. The Raby Castle estate to the east, seat of the Barnard family, includes many of the farms and properties along the upper reaches of the Tees River. The surrounding moors are used for driven grouse shoots and the entire area is heavily managed, with nine keepers working for the castle estate alone. It's rare to see a crow, weasel or fox, and even birds of prey aren't numerous, yet no one can dispute the benefits of the paucity of predators to the nesting waders and grouse.

Keen birdwatchers make routine pilgrimages here, but the community that pioneered the study of Upper Teesdale's wildlife comprised botanists. They've been visiting since the 17th century, though it would be truer to say that the botanical story of the area began not three centuries ago but about 330 million years earlier, when this part of Britain lay close to the equator and was covered by a shallow sea.

The sedimentary limestone and sandstones laid down during that period were violently disrupted about 35 million years later by intrusions of hot magma. That hot fluid burst through the surface and eventually developed into the extremely hard rock called Whin Sill, which can be seen in the two great crags at the heart of Upper Teesdale: Cronkley Fell and Widdybank Fell.

On its molten journey through the older sedimentary rocks, the Whin Sill cooked the adjacent limestone layers into a coarse crystalline marble that, according to



Aptly named redshanks wade in Teesdale's marshland

Marsh-marigold is a large buttercup-like flower that grows in wet places.

geologists, weathers to the consistency of white sugar granules. Surface patches of this 'sugar limestone' are found only on Cronkley and Widdybank Fells, where they support one of the most distinctive botanical communities found anywhere in England.

The list of rarities, more typical of alpine and arctic environments, includes alpine bartsia, alpine bistort, alpine cinquefoil, alpine meadow-rue, alpine penny-cress, bearberry, bird's-eye primrose, bog orchid, hair sedge, hoary rock-rose, hoary whitlow grass, holly fern, mountain avens, Scottish asphodel, three-flowered rush and a tiny, tufted perennial called Teesdale sandwort that isn't found anywhere else on these islands. The flower that attracts most attention, for its astonishing blue colour and star-like beauty, is spring gentian, more often seen at the snowline in the Alps. Yet, for my money, it's hard to beat some of the really abundant species.

In early spring, many of the wet fields where lapwing and snipe breed are unrelieved sheets of golden yellow – extensive beds of flowering marsh marigold. Such common flowers, along with the 75 rare plant species at Upper Teesdale, offer a glimpse of the British countryside as it was 12,000 years ago at the end of the last Ice Age, when this region was finally freed from its crushing carapace of glacial ice.

A DAM SHAME

Another major but much more recent environmental drama is embedded in this landscape. Upper Teesdale was the site of the UK's first and, at that time, biggest battle between developers and ecologists. Fifty years ago a factory plant then owned by Imperial Chemical Industries (ICI), located downstream at Billingham on Teesmouth, placed increased demands upon the local water board. To cope with the added demand, the water board sought to build a large reservoir in Upper Teesdale, and initiated a private bill in the Houses of Parliament to push through the plan.

PETALS IN THE PENNINES

It's not just the bird life that's varied and abundant in the Teesdale area, the plant life is just as rich. Here are just a few of the highlights you'll find there...

Spring gentian
GENTIANA VERNA

Bird's-eye primrose
PRIMULA FARINOSA

Mountain avens
DRYAS OCTOPETALA

Teesdale sandwort
MINUARTIA STRICTA

Teesdale violets
VIOLA RUPESTRIS

River: David Forster/A amy; cur ew: Ray Kennedy/rspb- mages.com; apw ng & redshank: Ann and Steve Toon/A amy flowers from top: Mark Cocker x3; Dav d Chapman/A amy; Bob G bbons/Alamy x 2

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Polar Bear © S Blanc

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Walrus viewing from Zodiac © K Ovsyanikova

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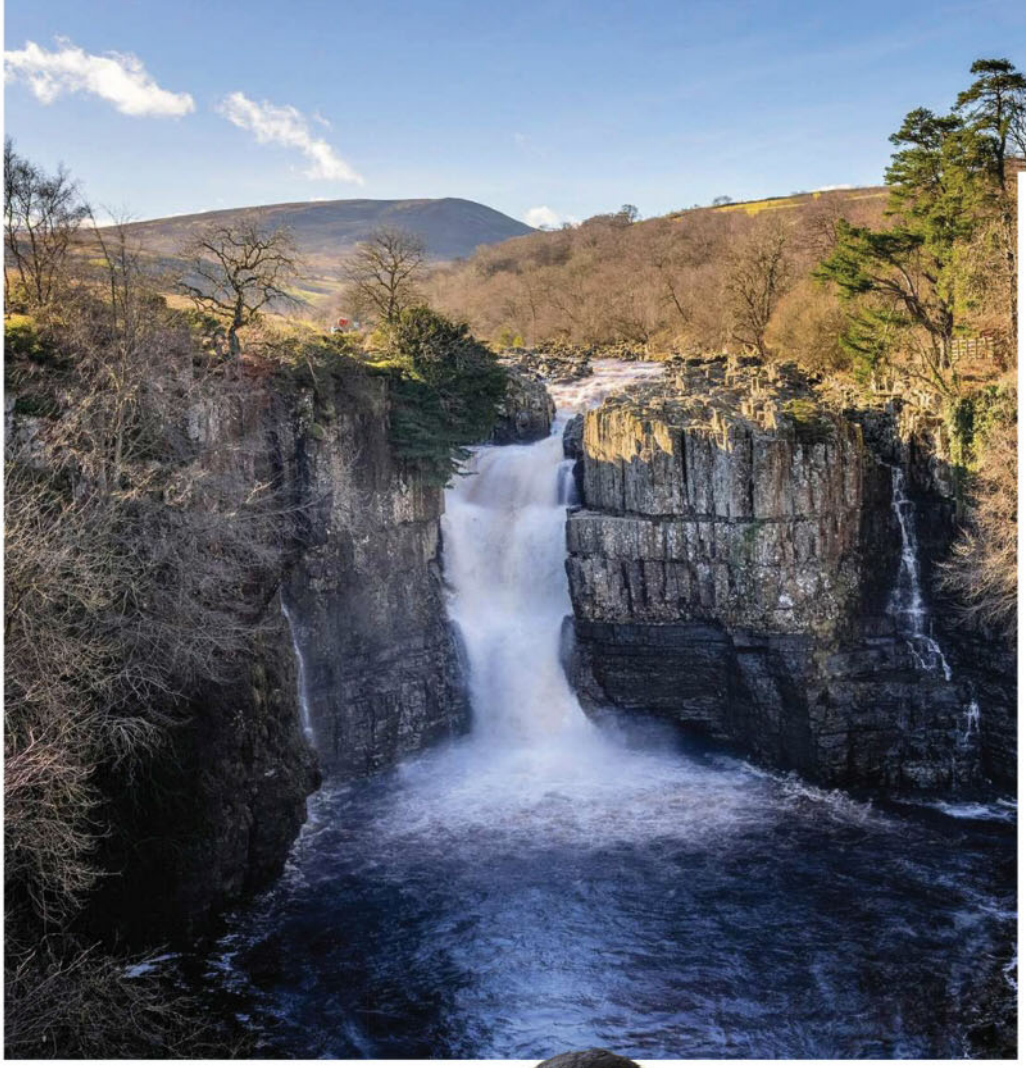


Waterfa : Clearview/Alamy; ouzel: Andy Sands/naturepl.com

Building the reservoir on Cow Green on the edge of Widdybank Fell, was an act of vandalism that eventually destroyed one-tenth of the precious sugar limestone areas. Yet the fight to save the flowers and their habitat brought into alliance the entire conservation and outdoor community of the day. Organisations ranging from the National Parks Commission (now part of Natural England) to the Cyclists' Touring Club, the Ramblers' Association and the Council for the Preservation of Rural England (now the Campaign to Protect Rural England) rallied to the cause. Alas, it was to little avail.

Given that the ecologists were up against the largest multinational of its day, and that they were forced to argue the importance of tall bog-sedge and Teesdale violet over jobs and exports in a region noted for its economic hardship, the outcome was probably a foregone conclusion. The granting of royal assent to the bill came in March 1967, and today its legacy is visible in the dark, acidic waters of Cow Green Reservoir, completed in 1971.

Mercifully, Upper Teesdale is testament not only to past follies but also to environmental commitments for the future. The blocking up of the old drains to improve the carbon-storing capacities of the blanket mire, and the expansion of native juniper woodland, beloved of ring ouzels – another Teesdale speciality – are just two of the ongoing measures being undertaken to improve this upland landscape.

Top: water plunging over High Force has gradually eroded the soft rock below. Above: ring ouzels make their homes in the area's craggy outcrops.

FEW, IF ANY, ENGLISH VALLEYS COMBINE THE SAME SPECTRUM OF LANDFORMS, FROM HAY MEADOW TO BARE CRAG.

If this place is more than its glorious black-grouse lek, then it's certainly far greater than the black waters of a reservoir. For the very essence of Upper Teesdale is its complexity. Few, if any, English valleys combine the same broad spectrum of landforms: hay meadow, woodland, heath, free-flowing upland river, juniper scrub, bare crag, heather moor, spring-flushed bog and open water. On the 50th anniversary of the Cow Green controversy we should give thanks for the survival of this glorious diversity.

MARK COCKER *is a naturalist and contributor to* The Guardian's *'Country Diary'. His books include* Claxton: Field Notes from a Small Planet.

HOW TO VISIT UPPER TEESDALE

GETTING THERE

The nearest rail station is at **Stanhope**, about 15km to the north-east, but local public transport is limited to a bus service that runs between **Barnard Castle** and **Langdon Beck** on Wednesdays only (www.hodgsonsbuses.com/upload/files/73Route.pdf).

ACCOMMODATION

Langdon Beck Hotel (01833 622267, www.langdonbeckhotel.com) has rooms from £40 per person B&B, plus pub food and birding breaks, including visits to the black grouse lek. **Langdon Beck YHA Hostel** (0345 371 9027, www.yha.org.uk/hostel/langdon-beck) has beds from £22, available at weekends from March to October; at other times it's available for group hire only. **High Force Hotel** (01833 622336, www.thehighforcehotel.co.uk) is a former hunting inn with bright rooms from £50 per person B&B.

TOURS

Wild North Discovery (01388 529154, www.natureholiday.co.uk/birdwatching.html) offers private tours to see the Teesdale black grouse lek, costing from £50 for two people.

*in*FOCUS

FIGHTING FOR FOOD

Winter brings hungry **REDWINGS** into gardens on a quest for a meal.

As temperatures tumble, the redwings that streamed into Britain in autumn start to invade rural and suburban gardens across the country.

"Redwings are highly sensitive to cold weather, and heavy frosts trigger a switch in feeding preferences, with the birds turning from invertebrates to berries," says Mike Toms, associate director at the British Trust for Ornithology. "Scarce, concentrated food supplies, such as windfall apples, become highly prized, and ownership of these resources can provoke some fierce squabbles."

These are nomadic little birds, turning up in vastly different parts of Europe – and beyond – from one winter to the next. "Individuals ringed in the UK have been seen in France, Italy and even as far away as Syria and Lebanon," says Toms. "This flexibility is vital to their survival, since berry crops, like beech mast, vary hugely each year, meaning that food is not always available year-on-year in the same place."

Nevertheless, redwings and other migratory thrushes are not mere opportunists. A study in the juniper woodlands of Spain's Iberian highlands suggests that these birds can effectively track berry crops in winter – though quite how they do it remains unknown. The research also revealed migratory individuals to be better trackers than their sedentary cousins.

Nomadism is not unknown in birds. "Some species, such as the nightingale, cover vast distances but always return to the same site, defending it with song," says Toms. "Others – including waxwings, short-eared owls and redwings – are more flexible."

You can attract redwings to your garden by planting shrubs that bear red berries, which the birds select over yellow or white. And keep back some apples to put out when the weather takes a turn for the worse – though be prepared to see feathers fly.

● *Mike Toms is a regular contributor to the Q&A section of* BBC Wildlife *(see p114).*

Visitors from Scandinavia and Iceland, redwings are handsome little thrushes, easy to identify by the flash of red under the wings and cream stripe above the eye.

Andrew Parkinson/naturepl.com

“Alright, Mr DeMille, I’m ready for my close-up...”

In the history of wildlife film-making there have been many magical moments, captured for posterity by naturalists eager to share their passion with us. Here are just a few of many that have thrilled us over the years.

DID YOU KNOW?

Cheetah cubs easily fall prey to other animals as the mother must leave them to hunt. Only 10 per cent survive past three months.

1996–2008

CHEETAHS

WHO JONATHAN SCOTT & SIMON KING
TV BIG CAT DIARY

Partisan presenters shine a spotlight on the hardships of life as a predator.

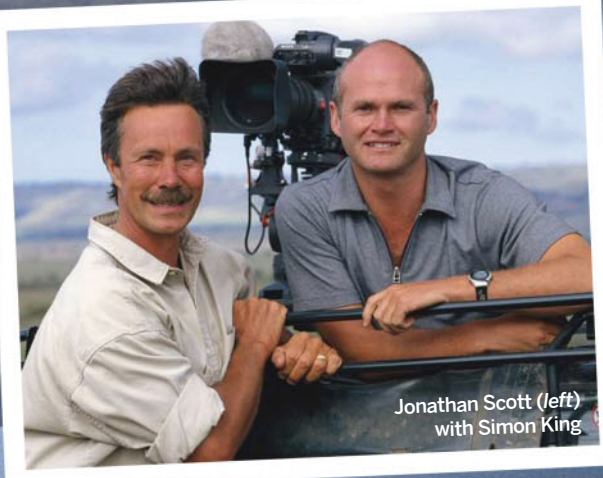
"She's got a wildebeest, she's got a young wildebeest!" exclaimed presenter Jonathan Scott in an episode of *Big Cat Diary* broadcast in 2006. His excitement came in reaction to Honey, a small female cheetah he'd been following for four years, making surprisingly light work of bringing down a calf considerably larger than herself. "Great work, Honey. She's got a meal for those four cubs of hers."

Big Cat Diary – later *Big Cat Week* and then *Big Cat Live* – was a truly original natural history programme for a number of reasons. But possibly the biggest one was the way presenters Jonathan Scott and Simon King sided with the predators as they watched their daily battles to provide food for both themselves and their young.

Whether it was losing their kills to a rogue group of hyenas, or losing their cubs to a male lion, the perils of hunting for a living were exposed like never before. In the process Scott and King became unofficial cheerleaders for the cats they clearly adored.

That Honey would later die because of a complication during a routine tranquillisation was ironic considering the stresses and strains of her everyday life so brilliantly documented in this iconic series.

Big Cat Diary was rarely preachy, but it undoubtedly helped to raise awareness of the threats facing not only cheetahs – whose entire population numbers perhaps fewer than 7,000 individuals – but also lions, whose decline over the past half-century or so is starting to be better understood. ▶



Jonathan Scott (*left*) with Simon King

Big Cat Diary gave us a glimpse into the lives of some of the feline predators that prowl the savannahs of Africa.

Cheetah: Jonathan and Angela Scott/Getty; inset: Angela Scott/naturepl.com

DID YOU KNOW?

Pablo, the infant gorilla that made himself comfortable on Attenborough's lap, became the dominant male in a troop of 60 gorillas.

Poaching and habitat loss pose a danger to mountain gorillas, as does the civil unrest in the Democratic Republic of the Congo.

Gorilla: David Yarrow Photography/Getty; Sir David: John Sparks/naturepl.com

1979

MOUNTAIN GORILLAS

WHO SIR DAVID ATTENBOROUGH
TV LIFE ON EARTH

The encounter that cemented the broadcaster's legendary status.

Grooming and grappling: Attenborough gets a taste of what life is like in a gorilla troop.

"There is more meaning and mutual understanding in exchanging a glance with a gorilla than any other animal I know." With these words, Sir David Attenborough gilded the sequence that confirmed him as the first wildlife presenter superstar – the highlight of his landmark 13-part series *Life on Earth*, which redefined natural-history film-making.

Of course, the real stars of the show were Attenborough's simian sidekicks: the mountain gorillas of two family units known as Group 4 and Group 5. The BBC camera team arrived in the Virunga volcanoes of north-western Rwanda in January 1978, basing themselves at the research station at Karisoke. The station had been established by the primatologist Dian Fossey who was then mourning the loss of her beloved silverback Digit to poachers just days earlier. Today, visitors must maintain a distance of at least seven metres from gorillas in order not to pass on infections, but back then Attenborough was able to sit among the family as they played, fed and tussled. One of them – baby Pablo – even sat on the broadcaster's lap.

Despite the continued threats of habitat loss and poaching, thanks to the work of Fossey and the numerous conservationists who have followed in her wake, the population of this Critically Endangered ape, most recently estimated at about 880, is slowly increasing. ▶

DID YOU KNOW?

Under the Caribbean, a sequel to *Under the Red Sea*, was the first film to have underwater footage of a sperm whale.

Filter-feeding whale sharks each have a unique pattern of spots on their bodies, which researchers use to identify individuals.

1952

WHALE SHARKS

WHO HANS & LOTTE HASS
FILM UNDER THE RED SEA

The success snatched from the jaws of near-tragic failure that helped save sea life

While filming in the Red Sea, the surprise appearance of a whale shark almost resulted in tragedy for marine photographer Hans Hass. His then-secretary, Lotte Baierl, standing in for one of his team, was trying to photograph a manta ray and failed to notice a second one swimming towards her. It knocked her unconscious just as Hass and the rest of the dive team spotted the whale shark. When they realised Lotte was missing a frantic search began. She was found unconscious but alive on the reef before being brought safely to the surface. Only then could the team celebrate the fact they'd made history by capturing the first shots of whale sharks and manta rays underwater, which they turned into the critically acclaimed feature-length documentary, *Under the Red Sea*, that won first prize at the 1951 Venice Film Festival. The whale shark population has more than halved in the last 75 years, but thanks to legal protections the species is showing signs of recovery.

Bill Travers and Virginia McKenna's experiences on *Born Free* inspired them to set up the conservation foundation.

1981

MILLIPEDE

WHO DAVID BELLAMY
TV BELLAMY'S BACKYARD SAFARI

A small step for man; a giant leap for kids' TV.

"Cor, blimey – look at that! It's a monster millipede!" Shrunk down to just 5mm in height, the then-ubiquitous David Bellamy walked along a garden path encountering minibeasts that were no longer so mini, and created a pioneering TV strand in the process.

It wasn't just that the programme makers had used groundbreaking macro-photography techniques to put Bellamy on a level with slugs and the snails. What made this series genuinely innovative was that it was programmes about wildlife aimed at children – years before *The Really Wild Show* or Steve Backshall's *Deadly 60* came on the scene.

That Bellamy was later largely disowned by both the conservation and broadcasting establishment because he denied the existence of anthropogenic climate change shouldn't detract from the genuine contribution he made to the progress of natural history television.

David Bellamy is shrunk down to a size that brings him face to face with garden insects.

1960/1966

AFRICAN LION

WHO BILL TRAVERS & VIRGINIA MCKENNA
BOOK/FILM BORN FREE

A family of lions, a family of people and the start of a wildlife conservation foundation.

The story of Elsa the lioness captured the public imagination twice – first when Joy Adamson's book *Born Free* was published in 1960, and again six years later when the film adaptation starring Virginia McKenna and her husband Bill Travers became a box-office hit.

Elsa and her two sisters came to live with the Adamsons after George, a game warden in Kenya, shot their mother as she defended her cubs against perceived attack. The Adamsons reared the three cubs in what has since become Meru National Park and, while the two larger sisters were sent to Rotterdam Zoo, Joy was determined to release Elsa into the wild. Three years after her release, the Adamsons saw her with three cubs.

The film's human stars were profoundly moved by their experiences and in 1984 founded the international wildlife charity, the Born Free Foundation, now headed up by their son Will. In Southern Africa, lion populations are doing fairly well, but due to habitat loss, poaching and human-animal conflict in East, Central and West Africa numbers are plummeting, having declined by more than 40 per cent in the past 20 years. ▶

Charlotte Uhlenbroek meets a young 'man of the forest'.

2000

ORANGUTAN

WHO CHARLOTTE UHLENBROEK
TV COUSINS

Getting to know some of our closest relatives just a little bit better.

Until *Cousins* was broadcast, orangutans were arguably the forgotten great apes. Thanks to Attenborough, Dian Fossey and Jane Goodall, most of us knew about gorillas and chimpanzees, but orangutans? Many people would have been hard-pressed to say what continent they were found on.

But when these extraordinary Asian animals got their own billing we discovered that they were largely solitary (unlike all their close relatives), fruit-eating and the most arboreal of the six great ape species.

Slowly, it's dawned on the world that the two species – the Bornean and Sumatran orangutans – are in great danger of going extinct thanks to the proliferation of vast plantations of palm oil plants, providing the 'hidden' ingredient used in half the products found on supermarket shelves.

Both species are classified by the IUCN as Critically Endangered – the Bornean orangutan was re-assessed in 2016 – and the Sumatran species is particularly vulnerable to ongoing habitat loss, as it only survives in a small fragment of rainforest at the northern end of its island home. ▶

A typical inter-birth interval of eight years means orangutan populations are under greater pressure than other great apes.

Charlotte: Bernard Walton/naturepl.com; orang: Paula Bronstein/Getty

1955

WOODPECKERS

WHO SIR PETER SCOTT
FILM WOODPECKERS

An ingenious idea gives viewers a new persepective on woodpeckers.

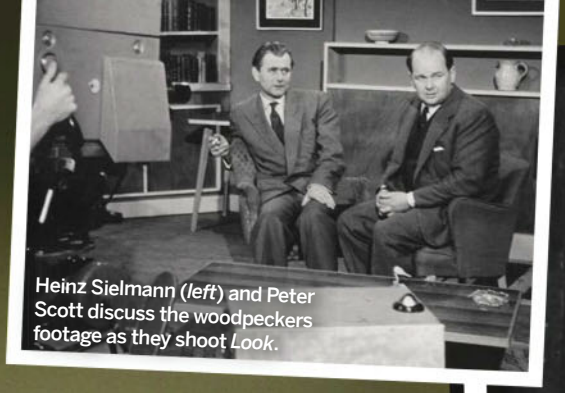
A short black and white film about a family of great spotted woodpeckers may not seem particularly groundbreaking now, but after ornithologist Peter Scott showed it in an episode of his *Look* nature programme broadcast in 1955, ecstatic viewers blocked the BBC's telephone lines for two hours.

The film, made by German naturalist Heinz Sielmann, was like nothing anyone had ever seen. Sielmann had placed a camera in the back of a woodpecker's nest so that the audience could see what went on inside the bird's home.

"Here it is, like Father Christmas coming down the chimney," said Scott as one of the parents descended into the nest to feed its primeval-looking chicks. "These incredibly under-developed young ones hatch out after a very short gestation period of just 12 days," he added to explain their bizarre appearance.

Other footage showed in remarkable detail the different feeding techniques of great spotted and green woodpeckers. One bird would probe for beetle grubs in holes in trees, while the other used its long tongue to hoover up ants.

Sielmann's sophisticated footage was a sensation and, for the first time, the BBC realised just how important natural history could be to its output. ▶



Heinz Sielmann (*left*) and Peter Scott discuss the woodpeckers footage as they shoot *Look*.

A male great spotted woodpecker presents a juvenile with some food. The adult male has a red nape but the youngster has a red crown.

DID YOU KNOW?

Peter Scott was the son of Captain Scott, Navy officer and Antarctic explorer, who died with his team on an expedition to the South Pole.

Lobo Park

Science Centre for Studies on canis lupus/canis familiaris

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ANTEQUERA

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29200 Antequera (Malaga), Spain

info@lobopark.com
www.lobopark.com

DID YOU KNOW?

Before rearing Harriet and her twin sister, Juliette, Singh raised a male leopard cub, called Prince, who was reintroduced to the wild in 1973.

1979

LEOPARD

WHO DIETER PLAGE

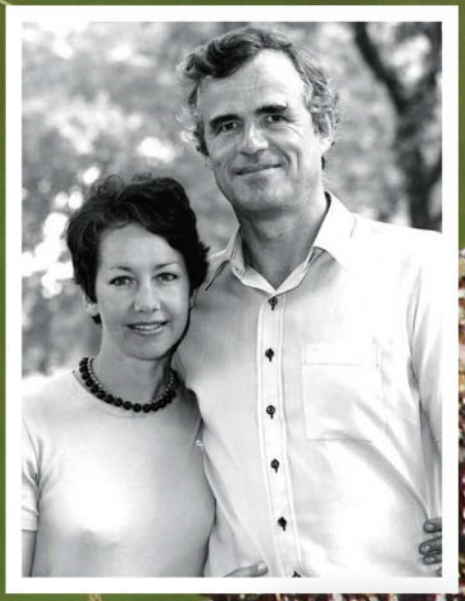
TV SURVIVAL: THE LEOPARD THAT CHANGED ITS SPOTS

The tale of the leopard that left a sanctuary to start a family.

The story of Harriet the orphaned leopard's return to the wild to have cubs of her own had all the ingredients for a hit: a mesmerising star, a film-maker renowned for his affinity with animals and natural dexterity with a camera, and a stunning location.

Award-winning cameraman Dieter Plage filmed Harriet at Tiger Haven, an animal conservation site in India and the home of former hunter turned conservationist, Billy Arjan Singh. Voiced by the debonair David Niven, the documentary contained rare and remarkable footage of Harriet's interactions with Billy (the first person to try reintroducing tigers and leopards from captivity into the wild), a tiger named Tara and a dog named Eelie.

Dieter Plage was renowned for always going to great lengths to capture wildlife footage. His prolific film-making career came to a premature end in 1993 when, while filming for another *Survival* documentary, he fell to his death from an airship over the Sumatran rainforest.



Cameraman Dieter Plage, seen here with his wife Mary, died while experimenting with new ways to film wildlife.

The large, colourful yet flightless takahe still exists in the wild on New Zealand's South Island but is an Endangered species.

Gerald Durrell set up a wildlife conservation trust in 1963 that still exists today.

1960/1969

SMOOTH-COATED OTTER

WHO GAVIN MAXWELL
BOOK/FILM RING OF BRIGHT WATER

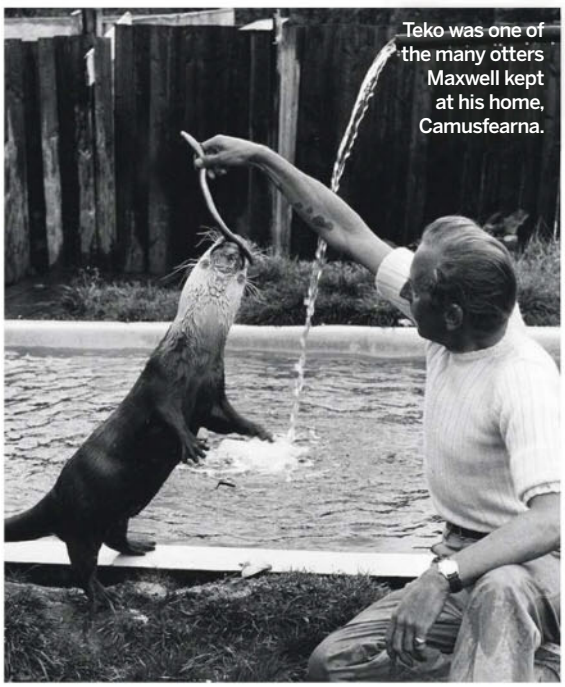
An otter from Iraq begins a new life in Scotland.

Having toured the reed marshes of southern Iraq, Scottish naturalist and author Gavin Maxwell returned home with an unusual souvenir: a smooth-coated otter named Mijbil. The story of how Maxwell raised Mijbil at his home on the west coast of Scotland was the basis of his book *Ring of Bright Water*.

The part-fictionalised film, released just before Maxwell's death and starring Virginia McKenna and Bill Travers, boosted awareness of the plight of the UK's Eurasian otters, which by the 1970s were almost extinct due to pesticide pollution and persecution.

In 1981, the killing of otters became illegal, and improved water quality helped the species fight back. In 2011, the news broke that otters had returned to rivers in every English county.

Sadly, the smooth-coated otter hasn't been so fortunate and is declining across much of its range in the Indian subcontinent and South-east Asia. Although a report published by the IUCN's Otter Specialist Group in 2013 reported they were thriving in the southern marshes where Maxwell found Mijbil.



Teko was one of the many otters Maxwell kept at his home, Camusfearna.

1963

TAKAHE

WHO GERALD DURRELL
TV TWO IN THE BUSH: THE ANIMALS THAT VANISHED

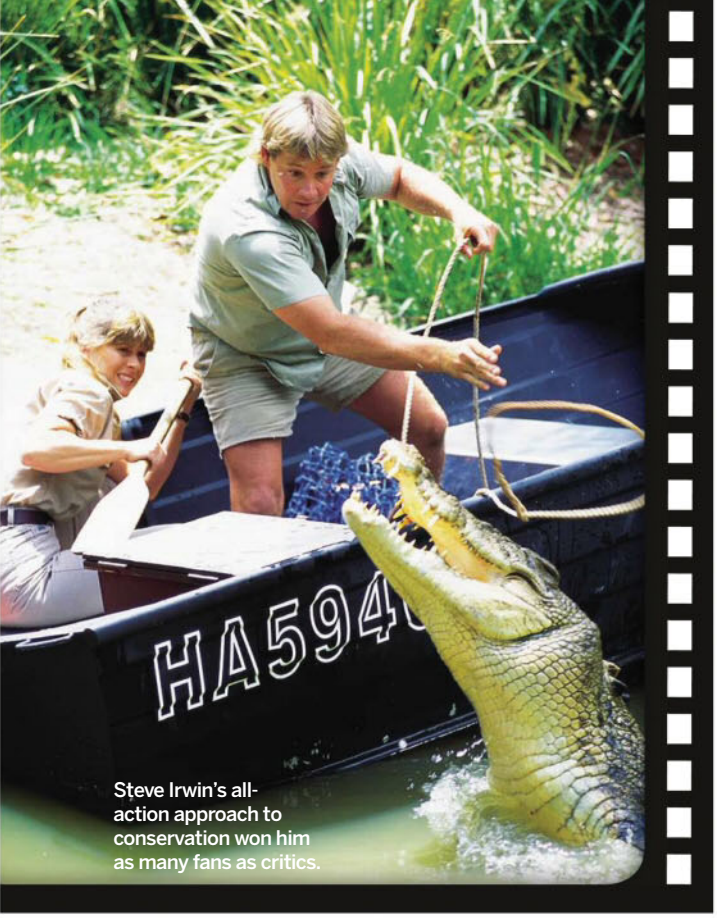
The man who took the BBC on a search for the bird that came back from the dead.

If you've never spotted a New Zealand takahe, you're not alone. Unseen for 50 years, since 1898, they were thought to be extinct until a small breeding colony was found in 1948 to the west of Lake Te Anau in the Murchison Mountains of South Island.

Some 15 years later, the conservationist and writer Gerald Durrell arrived with the BBC's Natural History Unit on a mission to track down rare species and film whatever he could find.

At first, the search for the flightless takahe seemed fruitless. Then, a turkey-sized bird emerged from the undergrowth. "He glowed like a jewel," Durrell later wrote of the encounter. "He had a heavy, almost finch-like beak that, like his legs, was scarlet; his head and breast were a rich Mediterranean blue, and his back and wings a misty dragon green. I gazed at him with admiration, and he looked back at me with the deepest suspicion. Presently, having examined me carefully, he bobbed his head and then slowly and with immense dignity, stepped carefully around a clump of snow grass and disappeared."

Two in the Bush helped raise awareness of many conservation issues, and Durrell used it to make a very clear point to the world: "You cannot begin to preserve any species of animal unless you preserve the habitat in which it dwells." Today, the South Island takahe has a population of some 230 mature individuals, with some now surviving and breeding on its predator-free islands.



Steve Irwin's all-action approach to conservation won him as many fans as critics.

1996–2007

SALTWATER CROCODILE

WHO STEVE & TERRI IRWIN
TV THE CROCODILE HUNTER

No wildlife presenter divided opinion more than the man who wrestled with crocodiles

Described by his wife Terri – who co-presented *The Crocodile Hunter* – as an "environmental Tarzan, a larger-than-life superhero guy", Steve Irwin took the dramatisation of wildlife television right to the edge of – and, for some people, beyond – what was acceptable.

A large part of the show consisted of Steve and his mates wrestling 3m-long saltwater crocodiles. The 'salties' would be satellite-tagged and translocated in order to see if moving the animals would help the giant reptiles avoid conflict with people. But despite the professed conservation ethic, the programme divided opinion.

Sir David Attenborough praised Irwin's brash presenting style, but others accused him of unnecessarily antagonising the crocodiles for the sake of ratings.

There was also always a debate about whether Irwin exaggerated how dangerous the crocs were and thereby exacerbated people's fears – potentially leading to persecution – or whether he raised awareness of the need to protect them.

Nevertheless, Irwin must have done something right: the foundation he set up, now called Australia Zoo Wildlife Warriors, works with established partners such as Fauna & Flora International and Generation Nature on a range of conservation projects in Australia, Sumatra and South Africa.

1958

BLACK RHINO

WHO ARMAND & MICHAELA DENIS
TV TRAVELLERS' TALES: ARMAND AND MICHAELA ON SAFARI

The husband and wife who brought a splash of style to wildlife safaris.

The 'Search for Gertie' was the first episode of *On Safari*, which detailed the exploits of pioneering documentary filmmaker Armand Denis and his glamorous wife Michaela. In an age when few people travelled abroad and fewer still had ever seen exotic creatures such as giraffes, impalas, elephants and rhinos, the series became a huge hit. Viewers were hooked on the adventures of the jeep-driving, binocular-wielding duo. The pair would get as close to the animals as possible, but not until after Michaela had paused to apply her lipstick.

In episode one, Gertie, an elusive black rhino with an unfeasibly large, curved horn, was successfully tracked down. As well as bringing the wonders of the African bush into people's living rooms, Armand insisted on filming everything in colour, even though the BBC would only pay for black and white. "There'll be colour television very soon," he said, presciently.

The years since the 'Search for Gertie' haven't been kind to the black rhino. Once estimated to have numbered 850,000 across sub-Saharan Africa, the population had crashed to 100,000 by 1960 thanks to habitat loss and hunting. By the mid-1990s it had dropped to just 2,500. Since then, intensive conservation work and protection has nearly doubled the global population to some 4,800, most in South Africa and Namibia. ▶

Michaela and Armand Denis's documentaries brought the glamour of exotic travel and wildlife into people's homes.

Irwin: LFI/Photoshot; Michaela: TopFoto; Michaela & Armand: Metromedia; rhino: Tui De Roy/Minden/FLPA

Despite some encouraging growth in their numbers, black rhinos remain Critically Endangered.

DID YOU KNOW?

In January 1963, Armand Denis became the first editor of *Animals* magazine, which went on to become *BBC Wildlife Magazine*.

Jane Goodall's studies of chimpanzees showed them to be even more complex animals than had previously been thought.

DID YOU KNOW?

Before going to study chimps, Goodall worked for a film-making company in London choosing music for documentaries.

1996

CHIMPANZEES

WHO JANE GOODALL
TV FIFI'S BOYS: A STORY OF WILD CHIMPANZEES

The woman who changed the way we see chimpanzees.

Jane Goodall had been studying the chimpanzees of Gombe in the north east of Nigeria for more 35 years when the story of Fifi and her progeny was broadcast as part of *The Natural World* series in 1996. So, although the scientific community was well aware of Goodall's discoveries, the fact that there was the high-degree of inter-male aggression within chimpanzee communities came as news to a large proportion of the British public. More shocking, however, was the revelation that the chimpanzees also hunted and ate monkeys.

The film made no bones about the fact that some of our closest relatives were murderous warmongers, which perhaps shouldn't have come as such a surprise.

Later events were to show Gombe's chimpanzees in an even darker light. In 2002, one of Fifi's male offspring, Frodo, attacked, killed and partially ate the baby of a woman who had been walking through the park.

In an episode of *Horizon* broadcast in 2004 and called 'The Demonic Ape', Goodall described how Frodo had always been an aggressive character. "When he was about three, he started throwing rocks," she said. "If you dared to touch a rock, he would pick up a bigger rock and throw it again and again. He was a real bully."

Goodall has since made it her life's work to speak up for the conservation of chimpanzees, which, despite being the most abundant and widespread of the great apes are nevertheless threatened by habitat loss and fragmentation. She's used her work to make the point that humans' actions affect the entire planet.

OVER TO YOU...

When it comes to nature documentaries, there are almost too many memorable moments to mention... certainly in the limited space available here. Inevitably, we'll have overlooked a few favourites but which ones have we missed? Maybe it's meeting the residents of *Meerkat Manor* or perhaps the footage of orcas chasing seals up the beach? Share your favourite wildlife TV moments with us by writing to **wildlifeletters @immediate.co.uk**

FIND OUT MORE

To watch five of Sir David Attenborough's favourite nature TV moments go to: **bbc.in/2g1RI8U**

1968–1976

CORAL REEFS

WHO JACQUES COUSTEAU
TV THE UNDERSEA WORLD OF JACQUES COUSTEAU

French scuba pioneer opens a window into another world.

At a time when colour TV was new, the brilliant oceanic hues of Jacques Cousteau's underwater explorations transfixed TV audiences. Not only was he one of the first people to share his knowledge of marine ecosystems with the rest of the world, he also helped create the technology – from the 'aqualung' to the 'diving saucer' – that made underwater exploration possible.

In 1950, he founded the French Oceanographic Campaigns and leased a ship called *Calypso* that he refitted as a mobile laboratory and base for diving and filming *The Undersea World of Jacques Cousteau*. In an episode entitled 'The Savage World of the Coral Jungle', he revealed the vibrant coral reefs of the Indian Ocean. It gripped millions of viewers around the world and helped cement the series' status as a landmark in documentaries.

Scientists predict a third of the world's remaining coral reefs could be lost within the next 30 years. Marine Protected Areas are one of the most effective ways to safeguard and restore coral reef ecosystems, along with initiatives such as the National Oceanographic and Atmosphere Administration's Coral Reef Watch, which uses satellite data to track rising sea temperatures, which can lead to devastating coral bleaching.

The coral reefs of the Indian Ocean mesmerised viewers when Cousteau captured sealife on film.

Finding a clear spot to land can be tricky given the number of guillemots on the Farne Islands.

2005

GUILLEMOTS

WHO BILL ODDIE **TV** SPRINGWATCH

Brummie birder brings an irreverant approach to presenting.

Producers had been looking for ways to incorporate both the former Goodie Bill Oddie and British wildlife for a few years, until they eventually came up with *Springwatch* in 2005. It was the birth of a completely different type of wildlife programme that's still going today.

The new format was designed to be informal, spontaneous and make British wildlife appear highly accessible – and with his easy charm and way with words, Oddie was the perfect host.

A trip to the 'seabird city' of the Farne Islands offers a memorable example of the charm Oddie brought to the subject. "It's guillemots, guillemots, guillemots, guillemots, guillemots," Oddie observed, using his cheeky Brummie accent to get away with repeating the word five times.

In the end, Oddie only presented *Springwatch* for three years before being replaced by Chris Packham, but his laid-back and irreverent style of presenting natural-history television was here to stay.

The original *Springwatch* presenting pair: Kate Humble and Bill Oddie.


Holding On
Iain Scott
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AGENDA

» UNDERSTAND THE ISSUES | BE PART OF THE SOLUTION

ANALYSIS

WHY WE MUST CHANGE THE WAY WE VIEW NATURE

● HOW THE RSPB PLANS TO REVERSE THE DECLINE OF BIRDS - SEE P70

Scientists are concerned about the impact of a volcanic eruption on Zavodovski Island's chinstrap penguins.

James Lowen/FLPA

PENGUINS IN VOLCANO TRAP

PLANET EARTH II'S CHINSTRAPS MAY STRUGGLE TO BREED THIS YEAR BECAUSE OF A MASSIVE ERUPTION.

Scientists are closely monitoring how many penguins return to Zavodovski Island in the sub-Antarctic for this year's breeding season.

The chinstrap penguins – which were seen defying huge waves in the *Islands* episode of *Planet Earth II* – may have been affected when the island's volcano erupted in 2016, depositing ash over up to half its surface area.

According to Dr Norman Ratcliffe, a penguin ecologist for the British Antarctic Survey (BAS), the adult penguins were moulting at the time of the eruption last March and would have been unable to go out to sea because waterproofing and insulation of their feathers would not have been fully developed.

"Inhalation of ash can be detrimental to bird health," he said in an email to *BBC Wildlife*. And though there would be no impact on the penguins' food resources, it could have a knock-on impact on the amount of land available for breeding in 2017, he added.

"Penguins build nests of pebbles to keep eggs clean and dry," Ratcliffe said. "If the ground is covered in ash and no pebbles are available, they will either refrain from breeding or lay on the ash, in which case the eggs may well get clogged when it gets wet, and fail to hatch."

Zavodovski Island is the single most important breeding site in the world for chinstrap penguins, with an estimated 600,000 pairs, as well as 90,000 pairs of macaroni penguins.

It is part of a volcanic chain called the South Sandwich Islands, which provide breeding grounds for an estimated 1.3m pairs of chinstraps, about half of the global population.

"This is a very important colony," said Ratcliffe, "so if survival or breeding success is affected it could have global implications in the short term, but it's likely any declines will be quickly reversed by density dependent compensation."

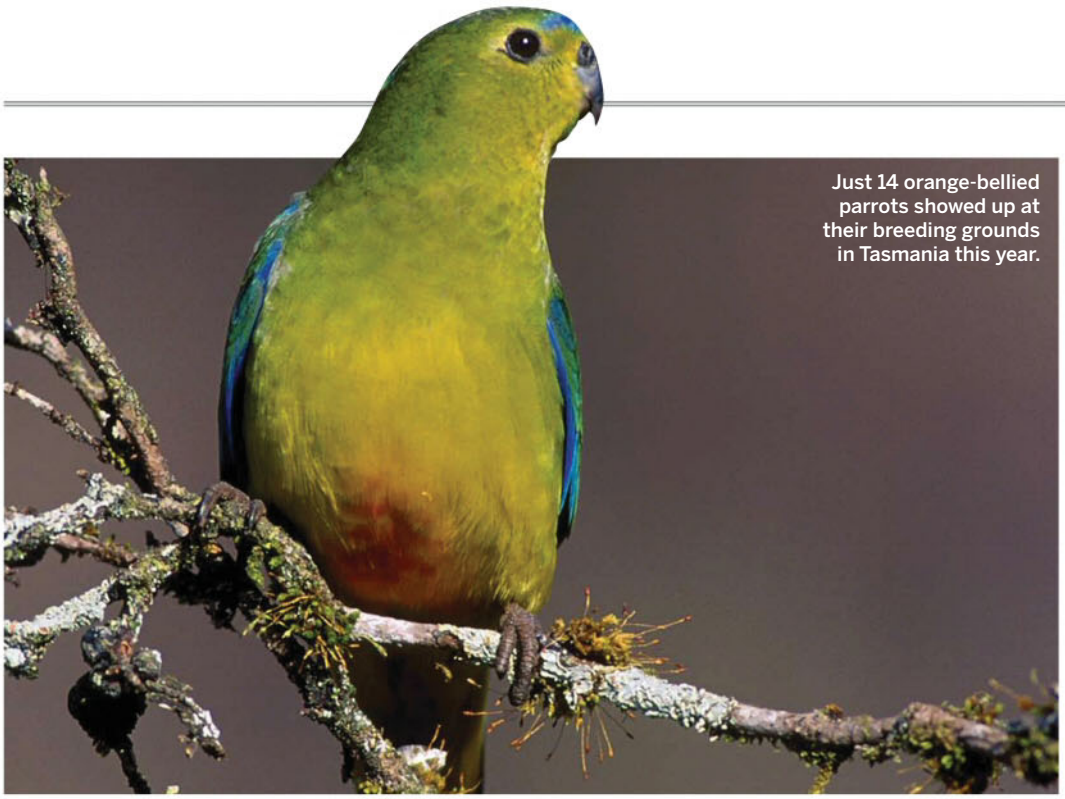
BAS geographic information officer Peter Fretwell said satellite images showed the volcano has recently begun erupting again, but there was no evidence of further ashfalls that could affect the pengins. **James Fair**

DID YOU KNOW?

Scientists can track penguins returning to their colonies to breed by using satellites to monitor their guano – they can even differentiate between species!

FIND OUT MORE

British Antarctic Survey
www.bas.ac.uk



Just 14 orange-bellied parrots showed up at their breeding grounds in Tasmania this year.

RARE PARROT'S LAST CHANCE

Intensive intervention planned to save Australia's orange-bellied parrot.

Scientists are making a final bid to stop one of the world's rarest birds going extinct in the wild.

A recent count at the orange-bellied parrot's breeding grounds in Southwest Tasmania produced just three females and 11 males. The parrots fly there every spring from South Australia and Victoria, where they spend the winter.

A crowd-funding campaign raised AU$60,000, which will be used to maximise the number and health of the chicks born during this breeding season.

"To do this, we will use eggs and nestlings from captive-breeding birds to supplement the clutches of wild ones," said Prof Robert Heinsohn, a conservation biologist at Australian National University.

"We will also remove and nurse any nestlings that are underweight or unhealthy and then return them to the wild, and increase, where possible, the number of female nestlings, because the females are disproportionately low in numbers."

This sort of intensive conservation management has been used in the past to rescue species such as the echo parakeet in Mauritius from going extinct – in 1986, there were fewer than 12 birds in the wild, of which only three were female. Today, their population numbers several hundred.

Heinsohn said that orange-bellied parrots are threatened by loss of habitat in both Tasmania and on mainland Australia. Introduced predators and parrot beak and feather disease are also having an impact.

Because orange-bellied parrots migrate, it would be hard to recreate a population if only captive birds were left. "Their need to migrate seems to require 'corporate' knowledge of where to go that is only maintained by wild birds," he said.

James Fair

FIND OUT MORE
Difficult Bird Research Group
www.difficultbirds.com

MARINE RESERVES CREATED

The UK government's scientific advisors have recommended a further 50 marine sites for protection.

If implemented, it will bring the number of Marine Conservation Zones (MCZs) around the UK to 100.

MCZs proposed by the Joint Nature Conservation Committee include a 200ha area of seagrass meadow off the Isle of Wight, and Mud Hole, a 7,300ha site off the coast of Cumbria that provides habitat for Dublin Bay prawns and a group of animals related to corals, known as sea pens.

Though conservation groups welcomed the news, some scientists have criticised MCZs as being 'paper parks' with no management plans.

Dublin Bay prawns: protected at Mud Hole.

Parrot: Dave Watts/naturepl.com; prawns: age fotostock/Alamy; hunting: Christopher Furlong/Getty

CONSERVATION briefing

GOLDEN INCREASE

Golden eagle numbers in Scotland have risen by 15 per cent to 508 adult pairs in the past 13 years, according to a new census. It's the highest population since monitoring began, but well-below the potential for about 800 pairs, according to the RSPB.

"I WOULD HAPPILY LET MY OWN KIDS USE A TRAMPOLINE USED BY BADGERS."

Prof Rosie Woodroffe *responds to the row over John Lewis' Christmas advert – some viewers said it ignored the issue of badgers carrying bovine tuberculosis.*

Eagle: Markus Varesvuo/Getty; portrait: Rosie Woodroffe; poverty: David Tipling/NPL

A review of the hunting ban in Scotland has recommended legislative changes.

HUNTING BAN REVIEW

Report recommends suite of measures to make legislation easier to enforce.

The ban on hunting foxes in Scotland could be strengthened if recommendations made in a government-commissioned report are accepted.

The review arrived at two broad conclusions: that the legislation was too complicated and made prosecution of offences difficult and that illegal hunting of wild mammals takes place and should be addressed.

In particular, it should be easier to investigate, and prosecute where necessary, hunts where foxes have been accidentally killed by hounds, the report said, and recommended a "recklessness" clause to deal with this.

It also said independent monitors should observe hunts, the identity of all participants should be given to the police and landowners should be liable to prosecution if they permit illegal activity on their land.

The report was welcomed by both the League Against Cruel Sports and the Scottish Countryside Alliance.

FIND OUT MORE
Read the review:
http://bit.ly/2fV4BTI

11,000 **The distance in km of new roads and railways that will be – or have already been – built through tiger landscapes between 2012 and 2020, according to WWF. It warns that the developments could have adverse impacts on the recovery of the species.**

BOG-TASTIC

An area of 76km² north of Manchester with some of the best-preserved blanket bog habitat in the UK has been protected as a Site of Special Scientific Interest (SSSI). The upland habitat has important populations of breeding curlews, snipe and golden plovers.

My AGENDA

PLANT RECORDER

BEING A BOTANIST UNDER 20 MAKES ME RARE, BUT I LOVE BEING OUTDOORS AND MAKING A CONTRIBUTION, SAYS **GEORGE GARNETT** FROM GUERNSEY

I originally got into botany because I'm a musician and I decided to build myself a guitar – that got me interested in wood, and so trees and then all plants.

I enjoy seeing plants in situ, but it's also nice to record them and make a contribution to our botanical knowledge of Guernsey.

I'm not sure I have any natural talent for identifying plants, but as I've kept on looking, I've got better. There are so many plant species, I'll never learn them all. Plant ID is quite challenging.

My best finds on the island of Guernsey have been some hybrids in the *Asplenium* fern genus – though these hybrids have been found once or twice in the Azores, the only place they consistently do it is on Guernsey.

There are three *Asplenium* hybrids on Guernsey. One is relatively common and distinctive, another is common but very difficult to identify due to similar looking parent species, and the last one is very rare but distinctive – I think I've mastered it now, but I'll never be as good as the pros.

I went to the Peruvian Amazon in 2015 and found two rare *Begonia* species – I was able to identify them because I happened to know someone who is doing a Phd on them.

I am unusual in being young and interested in botany because most botanists are much older than myself – they are really knowledgable people and it's incredible to learn from them.

FIND OUT MORE
George was a winner in the 2016 National Biodiversity Network awards for biological recording.
https://nbn.org.uk

One of George's best finds has been this hybrid fern.

George Garnett

EXPERT BRIEFING

CONSERVATION INSIGHT

RED PANDA

THE RED PANDA IS IN AS MUCH PERIL AS OTHER CHARISMATIC ASIAN MAMMALS SUCH AS RHINOS AND TIGERS, SAYS DAMBER BISTA.

The red panda is the only member of its own distinct family group with its closest living relatives being weasels, raccoons and skunks.

Though it is extremely rare, its range covers a greater area than the giant panda and extends across Bhutan, China, India, Myanmar and Nepal.

Numbers in 2001 were put at between 16–20,000, but more recent estimates suggest this has dropped to about 10,000 mature individuals. According to the IUCN, its population has declined by more than 50 per cent over the past 20 years.

Red pandas are only found in temperate forests between about 2,200–4,400m and where there is an abundance of bamboo on which they largely feed.

The major threats to the species are habitat loss and fragmentation and poaching – the illegal trade in their hides has been reported to be increasing in recent years.

To ensure their long-term survival, we need to offer communities living alongside their habitat alternative livelihoods so they are less inclined to cut down trees, and we must seek to conserve tracts of forest that can support genetically viable populations.

Promoting red panda-focused ecotourism and raising awareness among local communities would also help. These practices are being carried out in an area of Eastern Nepal that holds 25 per cent of the country's population.

We also intend to do work to determine what impact climate change is likely to have on this Endangered species.

Damber Bista manages the conservation programmes in Nepal for the Red Panda Network.

> "THE MAJOR THREATS TO THE SPECIES ARE FRAGMENTATION AND HABITAT LOSS AND POACHING.

FIND OUT MORE
The Red Panda Network
http://redpandanetwork.org

Megh Roy Choudhury

FACT FILE

RED PANDA

AILURUS FULGENS

HABITAT High-altitude forests in the Himalayas and mountainous parts of Myanmar and Sichuan and Yunnan provinces in China.

DIET Mainly bamboo but will also take roots, fruits, small vertebrates and birds' eggs.

THREATS Deforestation and habitat fragmentation and poaching are the main ones.

IUCN RED LIST STATUS
ENDANGERED

Red pandas can be found in forests where there is plenty of bamboo in the understorey. The giant grass constitutes 83 per cent of their diet.

Mark Carwardine's AT A GLANCE...

11

NATURAL ENGLAND

WHAT IS NATURAL ENGLAND?

Natural England is the government agency responsible for the protection and improvement of the natural environment in England. It was formed in 2006 by the amalgamation of English Nature and parts of the Countryside Agency and the Rural Development Service, and is funded by the Department for Environment, Food and Rural Affairs (Defra). It has 2,000 staff throughout England, with a head office in York.

WHAT ABOUT THE REST OF THE UK?

Natural England's counterparts are Natural Resources Wales, Scottish Natural Heritage and the Northern Ireland Environment Agency, though in reality they are all different and have different responsibilities and origins.

WHAT DOES NATURAL ENGLAND ACTUALLY DO?

Its remit is huge and complicated but, in a nutshell, it is responsible for everything from enforcing laws that protect wildlife and designating protected areas to managing the influence of developers and farmers. In other words, it is mandated to look after our wildlife and wild places, but also to contribute to sustainable development.

IS IT INDEPENDENT?

No. It used to be able to speak its mind – and sometimes did – but nowadays, it does not make public pronouncements (except of the inconsequential kind) and is expected to deliver government policy. Ever since Natural England was formed in 2006, the Secretary of State for Environment, Food and Rural Affairs – a position currently held by Andrea Leadsom – has had the legal power to issue guidance on various issues, for example on badger culling. So, Natural England has issued licences that permit the shooting of free-running badgers (as well as the trapping and shooting of them) as it's following a government directive.

HOW IS IT FUNDED?

Its funding comes from Defra, but since 2010 this has been subject to cuts. Between 2010 and 2015, it had to find savings of nearly £60m, a reduction of 35 per cent over the course of that parliament, and critics say this has resulted in less protection for wildlife sites threatened by developments. Since 2013 it has reduced its reliance on government funding by charging water companies, house builders and wind farm developers, for example, for non-statutory services such as advising on environmental work for planning applications.

BUT IT STILL PROTECTS WILDLIFE?

Not always. This year, it issued a licence permitting a landowner to control up to 10 buzzards "in order to prevent serious damage to young pheasants", while the RSPB says it has sanctioned the burning of blanket bogs on the Walshaw Moor grouse moor and Special Area of Conservation (SAC) in the North Pennines. The European Commission is currently investigating the British Government for failing to uphold its obligations under the Birds and Habitats Directives with regards to our internationally important peatlands.

In 2015, Devon Wildlife Trust took legal action against Teignbridge District Council over its decision to go ahead with a housing development that threatened a colony of greater horseshoe bats that Natural England had given the green light to. However, the Trust's request for a judicial review was rejected by the High Court.

WHAT OF THE FUTURE?

Our wildlife is in serious trouble – State of Nature 2016 concluded that nature is faring worse in the UK than in most other countries in the world. Many conservationists now wonder whether Natural England has the wherewithal to help us restore our declining biodiversity.

Buzzards' fates can be determined by Natural England.

> "NATURAL ENGLAND IS MANDATED TO LOOK AFTER OUR WILDLIFE AND WILD PLACES, BUT ALSO TO CONTRIBUTE TO SUSTAINABLE DEVELOPMENT."

MARK CARWARDINE is a frustrated and frank conservationist.

● Every month he demystifies some of the most important issues affecting the world's wildlife and assesses the organisations that protect it.

Would you like to comment on this column? Send your letters to wildlifeletters@immediate.co.uk

● Find out more about Natural England **http://bit.ly/2gGQR0g**

Kristian Bell/Getty

ONCE IN A LIFETIME

RESTORING WILDLIFE IN THE UK INVOLVES CHANGING THE WAY WE VIEW NATURE, SAYS RSPB CONSERVATION DIRECTOR MARTIN HARPER – AND BREXIT PROVIDES US WITH AN HISTORIC OPPORTUNITY, HE TELLS **JAMES FAIR**.

The RSPB must change society's values and the way in which people interact with wildlife in order to reverse the declines in UK biodiversity seen over the past 40 or 50 years.

That's the view of director of conservation Martin Harper, who was speaking to *BBC Wildlife* about the society's plans to engineer a transformation in the fortunes of Britain's birds, bats and butterflies over the next one and a half decades.

The RSPB has set itself the ambitious target of quadrupling the amount of land that is well managed for nature in the UK by 2030, increasing from an estimated 1.2m hectares to nearly 5m hectares.

That will require both improving the habitat of many of our areas in the UK that are protected as Sites of Special Scientific Interest (SSSIs) or under EU legislation (though that may be lost) but also enhancing the quality of our farmed landscape for wildlife.

"At the heart of how we make things better is our belief that part of our role as a charity is to change societal values," Harper said. "Indeed, that's where our charity's origins lie, in changing the way in which humans related to wild birds and the use of feathers in the hat trade."

But Harper warned that it wouldn't happen overnight, and that some of this engagement would involve difficult issues such as changing our attitude – as a society – to predators and birds of prey especially.

LAND PURCHASES

As part of the RSPB's plans for reversing biodiversity loss, it wants to double its own land-holdings to about 300,000 ha. It currently owns 210 reserves across the UK, and Harper said adding to larger ones such as Forsinard in northern Scotland's Flow Country – a flat peatland landscape of international significance and a breeding ground for threatened waders such as golden plovers and raptors such as hen harriers – would be the RSPB's primary strategy.

20%

THE AREA OF THE UK THAT THE RSPB WANTS TO BE WELL-MANAGED FOR NATURE BY 2030.

"We have about 30,000ha there, which is a massive area but, at the same time, the extent of the flows – which is in a degraded state because of historic tree-planting – is enormous," he said. "Our ambition is to restore the flows to their natural state."

BETTER FARMING

But as Harper acknowledged, buying land to improve it and protect wildlife can only achieve a limited amount – even should the RSPB succeed in its aim of doubling its assets, that will give it control of 1.2 per cent of the surface area of the UK.

PRIORITY SPECIES

SEABIRDS

KITTIWAKE

Kittiwakes are the world's most abundant species of gull, but numbers have dropped by 70 per cent since the mid-1980s.

Kittiwakes are surface-feeders of mainly sand eels, and they are affected more than some other seabirds by changes in prey distribution, which may be a result of climate change.

A more important ambition is to look at how some of the other 98.8 per cent can be made better for wildlife. Since 75 per cent of Britain is farmed, then tackling the biodiversity declines in our farmed landscape will be key.

"Given that we have decided to leave the EU and will regain control of agricultural policy, we have a once-in-a-generation opportunity to make land-use policy across the UK work better for wildlife, provided that we bank existing levels of legal protection for those other areas," Harper said.

BREXIT BONUS

In the months before the EU referendum, the RSPB warned of the dangers of Brexit, pointing out that protection afforded by the Birds and Habitats Directives, and other environmental legislation governing standards of air and water quality, had helped maintain wildlife populations as they crashed elsewhere. But there is still much uncertainty about what will happen to these laws when we leave Europe and whether the British Government would decide to introduce domestic laws to maintain the status quo.

The UK has more than 50 per cent of the world's population of northern gannets, with some 300,000 pairs during the breeding season.

Gannets: Dan Kitwood/Getty; kittiwake: Duncan Usher/M rden/Getty; Mart n Graham Madge/RSPB

> "PART OF OUR ROLE AS A CHARITY IS TO CHANGE SOCIETAL VALUES – THAT'S WHERE OUR ORIGINS LIE."
>
> **Martin Harper** RSPB's conservation director

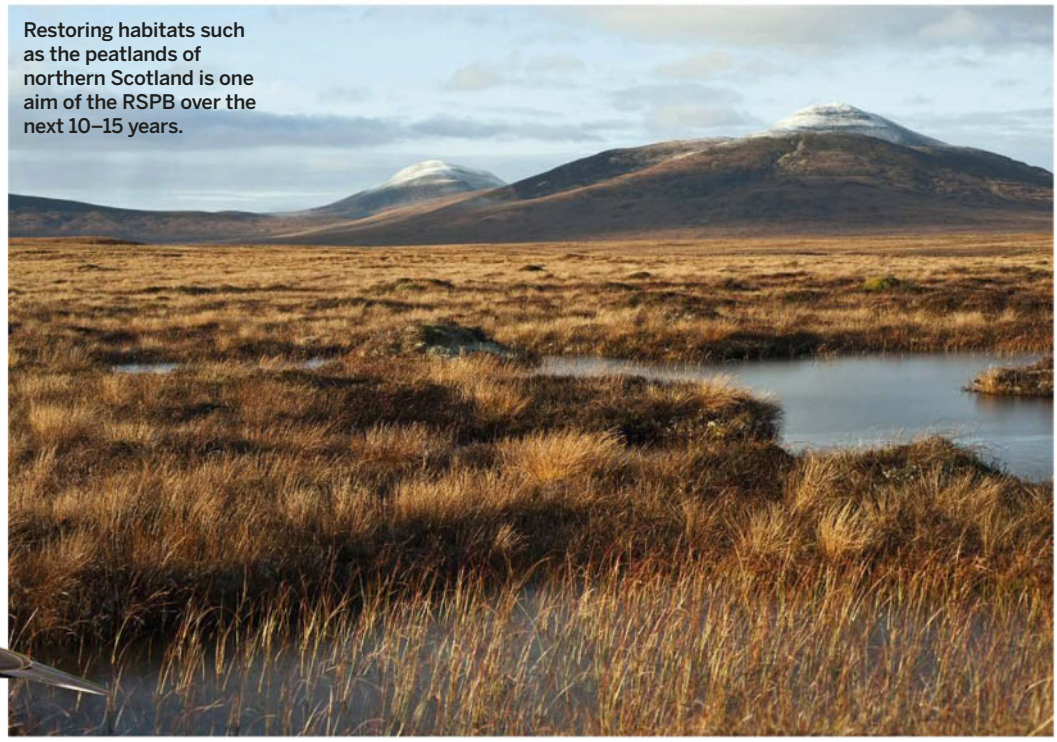
PRIORITY SPECIES

MIGRANTS

TURTLE DOVE

The turtle dove is the UK's fastest declining bird, with numbers crashing by 93 per cent in the past 20 years.

Though hunting pressure on its migration route and changes to its overwintering habitat in West Africa may have an impact, the biggest factor may be a shortage of seeds when they arrive here in the spring.



Restoring habitats such as the peatlands of northern Scotland is one aim of the RSPB over the next 10–15 years.

Turtle dove: Neil Bowman/FLPA; forsinard: Eleanor Bentall/rspb-images.com; curlew: Ann & Steve Toon/robertharding/Getty

Likewise, the way in which we farm could be significantly changed because the £3bn worth of subsidies currently distributed under the Common Agricultural Policy (CAP) is up for grabs. "That money can be made to work much harder," Harper said. "Farmers shouldn't get money for nothing." This would involve building on the environmental stewardship schemes that pay farmers – under CAP – to restore hedgerows or put in wildflower strips. But, as many commentators have said, farmers could also be paid to manage their land for much broader social benefits such as reducing flooding downstream or storing carbon as a way to offset climate change – so-called carbon sequestration.

These sorts of public gains can – theoretically – be achieved with relative ease, Harper said, because the benefits are so clearcut, but it is much harder where some of society's activities are in direct conflict with wildlife.

UPLAND ISSUES

That's the case with grouse-shooting where the desire of some to build a sizeable surplus of game birds conflicts with the ecology of birds of prey such as hen harriers and golden eagles which predate them. The result can be – in parts of both England and Scotland – illegal persecution of birds protected by law.

But this situation can be resolved, Harper said, as long as society has a shared objective of restoring raptor populations, and collaboration is the key. "Where we – and the likes of [former RSPB conservation director] Mark Avery, The Wildlife Trusts, and many within the shooting community – align is in the desire to reform the current levels of intensity of driven grouse-shooting because of its adverse environmental consequences," Harper said.

150,000ha

THE AREA OF LAND OWNED BY THE RSPB – EQUAL TO FOUR ISLE OF WIGHTS.

300,000ha

THE AREA OF LAND IT WANTS TO HAVE BY 2030 – EQUAL TO TWO ISLE OF SKYES.

POLITICAL ENGAGEMENT

Much of what the RSPB wants to do and how it will achieve it will involve persuading the Government that its ideas are the right ones to implement.

From introducing a nature-friendly 'Son of CAP', to retaining current levels of protection for our most important wildlife sites, it will be the politician in charge at the Department for Environment, Food and Rural Affairs (Defra) – currently Andrea Leadsom – who makes key decisions. "You don't effect change unless you engage with the parliamentary process," Harper said.

But in the six years since the Conservatives took power – initially as part of a coalition but on their own since 2015 – there has been a very high turnover of incumbents at Defra. "We have had four secretaries of state in six years," Harper said. "I think it's very hard to have an impact in an 18-month period. Irrespective of the party or the individual, I wish they had more time to get on top of the brief and develop their own ideas. They also need to be held to account for their actions – my worry is that many are not around to pick up the pieces when things go wrong."

WHAT DO YOU THINK?

What should the RSPB be doing to conserve our wildlife? Is it right for it to seek to persuade governments to improve its policies for nature and to aim to change society's attitude towards wildlife? Send your thoughts to **wildlifeletters@immediate.co.uk**

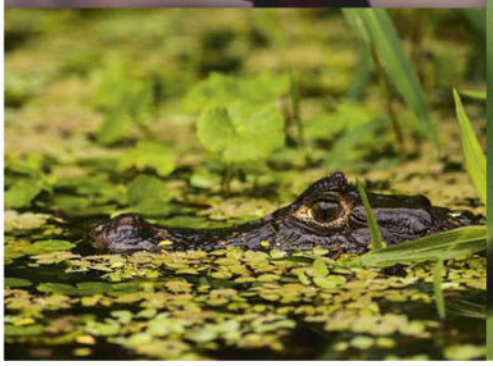
PRIORITY SPECIES

UPLAND BIRDS

CURLEW

Nearly 70,000 pairs of curlews breed in the UK, and double that overwinter here, but breeding bird numbers fell by 46 per cent between 1994 and 2010.

Reasons for the decline include: an increase in predator numbers such as foxes and stoats, changes in farming practices, loss of breeding habitat and the impact of climate change.



Join this amazing holiday for the chance to see a green honeycreeper, chestnut-mandibled toucan and caiman.

EXCLUSIVE COMPETITION

BBC Wildlife

WORTH £3,000!

WIN AN INCREDIBLE COSTA RICA HOLIDAY!

BBC Wildlife has teamed up with TravelLocal to offer an exclusive chance to win an eight-day/seven-night stay for two wildlife-watching in Costa Rica.

Costa Rica is a nature lover's paradise. With towering cloud forests, cascading waterfalls and sprawling rainforest canopies, its biodiversity is vibrant and varied. It is home to more than 500,000 species, hundreds of which are endemic. Costa Rica is one of the best countries in the world for wildlife watching. Howler monkeys, ocelots, tree frogs and jaguars are just a small sample of the animals that can be seen in its diverse ecological systems. This special prize will give one lucky winner and their travelling companion the chance to experience Costa Rica's incredible natural habitats and enjoy close encounters with its wildlife. TravelLocal specialises in bespoke travel itineraries, created with local experts around the world and is bringing the 'buy local' concept to international travel. This involves cutting out the middlemen and connecting the holidaymaker with their handpicked selection of local experts around the world, ensuring quality and local knowledge. It's a great way to benefit the countries and support the communities you visit, and get you a better trip.

THIS AMAZING HOLIDAY INCLUDES:

- Return flights (a voucher for £1,500 will be provided for the purchase of two return flights to San José through The Flight Centre)*
- Excursions as described
- Transport within Costa Rica – either transfers or self drive
- Seven nights' guesthouse accommodation
- Breakfast everyday, full board in Tortugero

Not included: Meals outside of those stated above; travel insurance; Visa fees, transport to and from UK airports; tips and gratuities

THE PRIZE

After a flight from the UK to San José, the winner and their companion will travel to Tortuguero where jungle treks and boat trips await. The tour will then head to Guapiles, a birdwatcher's paradise, where you can see collared aracaris, oropendolas and euphonias before taking in the iconic Arenal Volcano. A day trek will be followed by a soak in natural hot springs and dinner under the sprawling canopy. The final day in Guapiles will include a guided trek through Costa Rica's famous cloud forest before returning to San José. With its fascinating and vibrant culture, exploring the city is a perfect end to this experience.

HOW TO ENTER

Simply answer the question below by visiting **www.discoverwildlife.com/win-costa-rica-holiday**

What is Costa Rica's national bird?

a) Clay-coloured thrush

b) Blue-footed booby

c) Maguari stork

TERMS AND CONDITIONS

1. Visit www.discoverwildlife.com/win-costa-rica-holiday to enter and read the full terms and conditions. 2. The first entry with the correct answer drawn at random after the closing date will win the holiday for two. 3. The holiday is subject to availability, and must be taken between 24 April and 30 June, or from 1 September and 18 November 2017. 4. No cash alternative is available. 5. Only one entry per household. 6. The competition is open to all residents of the UK, including the Channel Islands, aged 18 years or older, except employees or contractors of Immediate Media or TravelLocal and anyone connected with the promotion or their direct family members. 7. Closing date for entries is **11.59pm on 18 January 2017**. 8. *International flights must be bought by the winner. A voucher for £1,500 will be provided for the purchase of two return flights to San José through The Flight Centre. TravelLocal is not a member of ATOL so cannot provide international flights. TravelLocal is a member of ABTA so all arrangements in Costa Rica have full financial protection. If you do not require flights no credit or discount will be possible. If the flights to Costa Rica cost more than £750 per person the difference must be paid by the winner.

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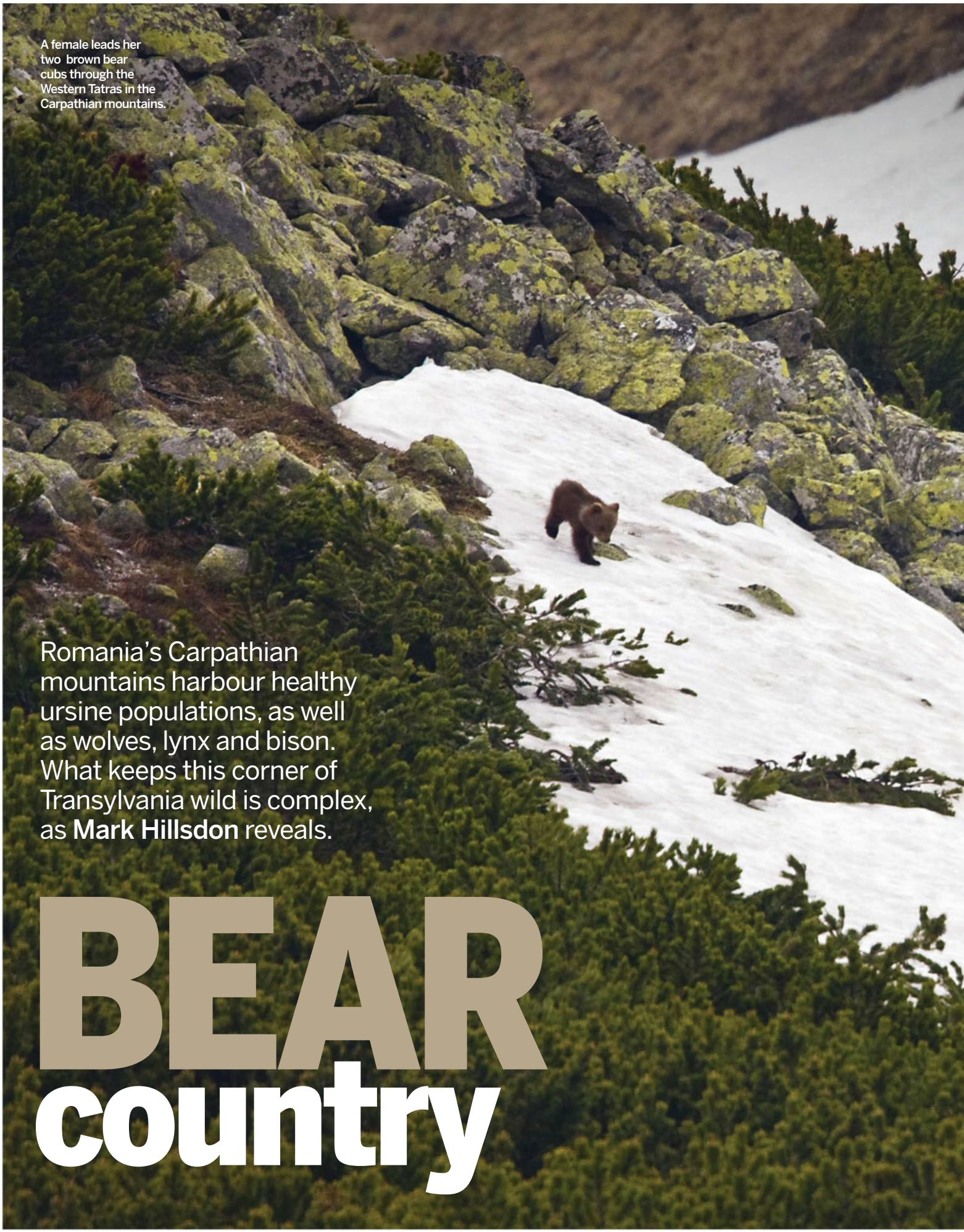


A female leads her two brown bear cubs through the Western Tatras in the Carpathian mountains.

Romania's Carpathian mountains harbour healthy ursine populations, as well as wolves, lynx and bison. What keeps this corner of Transylvania wild is complex, as **Mark Hillsdon** reveals.

BEAR country

Wild Wonders of Europe/D'Amicis/Getty

Signs of bears are everywhere in the thick forests that cloak the Zarnesti Gorge in Romania's southern Carpathians. Tree trunks are scarred by deep gouges where they've been sharpening their claws or scrambling up into the canopy. In places bark has been peeled back by bears hungry for the rich, sweet sap, leaving sticky wounds edged by tufts of wiry hair. The soft ground is stamped with unmistakable five-clawed paw prints alongside droppings speckled with seeds from wild raspberries.

An estimated 6,000–8,000 brown bears live in the Carpathians, a mountainous arc that stretches across 20 million ha of central Europe, spanning seven different countries. The southern Carpathians, which include some of Europe's largest unbroken tracts of old-growth forest, pristine rivers and flower-strewn alpine meadows, are the jewel in the crown – an area that can justifiably claim to be Europe's last great wilderness.

Its rich mosaic of habitats has made this area one of the last bastions for some of our most iconic carnivores: bears, of course, and over 20 per cent of the Continent's wolves and 2,500 of Europe's 9,000 lynx. The Carpathians are also a stronghold for chamois, among the lynx's favourite prey. Red and roe deer, wild boar and pine marten roam the forests, while the pesticide-free grasslands are rich in insects. Leggy white storks strut through fields, while golden and lesser spotted eagles patrol the skies. All 10 species of European woodpecker make a home here – a sign that the ecosystem is in good health. "They're the doctors of the forest," says local guide Dan Marin. "They get rid of all the bad things, like spruce bark beetle."

The remoteness of the Carpathians is one factor in why the area has stayed so wild. "You can walk 60 or 70km without meeting anyone," says Adrian Hagatis, a project ▶

"FOREST MANAGEMENT WAS ONE OF THE FEW GOOD LEGACIES OF COMMUNISM. NOW THE CHALLENGE IS TO MAINTAIN IT."

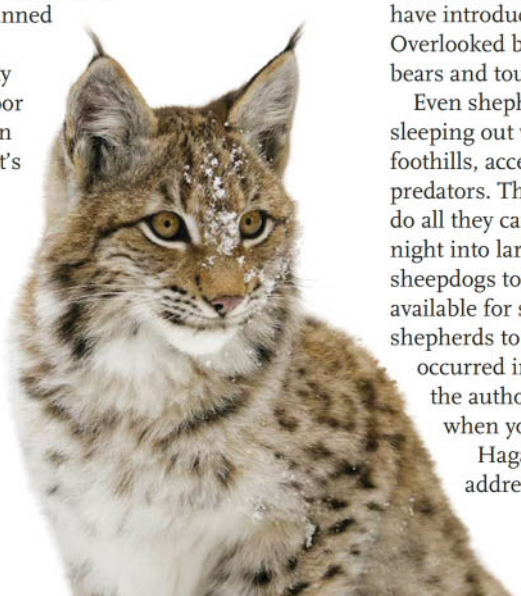
manager at Rewilding Europe, a programme backed by the EU and WWF that aims to rewild one million hectares of land across 10 different regions by 2020.

THE LEADER'S UNEXPECTED LEGACY

A more surprising element in the preservation of Romania's wilderness is the country's communist past. Under the old regime forests were state-owned, a well-managed national asset with logging only carried out on a small-scale, sustainable basis. "Forest management was one of the few good legacies of communism," says Hagatis. "Now the challenge is to maintain it."

Former dictator Nicolae Ceausescu's love of hunting also inadvertently benefitted wildlife. He banned local people from hunting in the woods, a right he reserved for himself and other party grandees. But he and his comrades were poor shots, and the bears they targeted were often drugged and tethered. As a result, the forest's megafauna flourished.

"There was nothing altruistic about it but the net results were good, not just for bears but other carnivores too," says Toby Aykroyd, a director at Wild Europe, an international partnership devising a coordinated strategy for the protection and restoration of wilderness across the Continent. "Wildness needs large carnivores," he adds. "They keep ungulates in check, which prevents overgrazing and allows other species to thrive." The willingness of Romanians to live alongside bears and wolves has also protected the Carpathian's wildness. "People aren't really worried by them," says Marin. "When they're out picking raspberries or mushrooms they know the bears are there, and they know they might be watching them."



Above: clouds hide the peaks of the mountains in the Piatra Craiului National Park. Below: almost a third of Europe's wild lynx live and hunt in the Carpathian mountains.

Around the Piatra Craiului National Park, an area Marin knows well, bears have started to come into towns to raid bins in recent years. Nearby Busteni made international headlines in 2012 when two bears were shot while raiding dumpsters in the town. Now the locals have found an alternative course of action, Marin explains. Rather than embark on a cull, park rangers have introduced feeding stations deep in the woods. Overlooked by hides, they have proved popular with bears and tourists alike.

Even shepherds, who spend the summer months sleeping out with their flocks on the Carpathian foothills, accept they must share the mountains with the predators. Though the odd loss is to be expected, they do all they can to protect their flocks, herding them at night into large corrals patrolled by huge Carpathian sheepdogs to deter opportunist bears. Compensation is available for sheep killed by predators, but it's hard for shepherds to make a claim. They must prove that any kill occurred in the open, not in the woods, and report it the authorities within 48 hours – not always possible when you're miles away from the nearest road.

Hagatis believes it's an issue that needs to be addressed to keep the shepherds on side. "If we,

Landscape: Wild Wonders of Europe/Dörr/Getty; wolf: Grzegorz Lesniewski/ NiS/ Minden/Getty; bears: Nick Turner/Alamy; woodpecker: Wild Wonders of Europe/Lesniewski/NPL; eagle: Dietmar Nill/NPL; lynx: Imagebroker/FLPA

Predators such as the grey wolf help to keep the deer population at a sustainable level in the Carpathians.

The three-toed woodpecker and nine other European woodpecker species can all be found in the Carpathians.

Lesser spotted eagles have a varied diet but will rely mainly on mammals in the mountains.

AN END TO HUNTING?

In October 2016, the Romanian government decided to ban all trophy hunting of large carnivores. The ban reverses a trend that's seen hunting grow into a multimillion-euro industry. In 2015, hunters from all over the world shot more than 420 bears, 330 wolves and 210 big cats in Romania, paying up to £10,000 per animal.

Hunting was only possible due to a loophole in European law. All large carnivores are protected under the EU Habitats Directive, but a State can order the killing of specific animals that are a danger to humans or property.

"Hunting for money was already illegal, but it was given a green light anyway," the environment minister, Cristiana Pasca-Palmer, told *The Guardian*. "The damages [clause in the Habitats Directive] acted as a cover for trophy hunting."

Conservationists have cautiously welcomed the ban while pointing out that the government will still need to manage the threat that large carnivores present to Romania's rural population. Csaba Domokos, a bear specialist with the Milvus Group, believes that without such a commitment the situation could get worse. "It's a myth that hunting reduces conflicts between carnivores and humans," says Domokos, "but the rural population believes that hunting is the answer. Unless they can be convinced otherwise, people may start to take the problem into their own hands."

Luke Dale-Harris

Hunting bears is now illegal in Romania but poaching may continue.

Agile chamois are adapted to highland terrain. Males and females both bear slender black horns.

A female wild boar typically gives birth to between four and eight piglets.

Above: brown bears climb trees in search of rich sap. Park rangers have introduced feeding stations to the Carpathians to prevent the bears from raiding bins in towns.

the people living in towns, want to keep and enjoy this wilderness, we should pay compensation," he says.

The situation contrasts with that in much of Western Europe, where farmers are well compensated for the loss of livestock to predators.

Despite Romania's pragmatic approach to conservation, the Carpathian wilderness is under threat. As the country's economy grows, so do its trading requirements, and motorways are being built across the mountains. These act like a fence to wildlife, says Hagatis, and only through strong lobbying of the Ministry of Transport have concessions been won – promises of tunnels and bridges to allow wildlife to wander freely. Overgrazing is a problem, too. Though today Romania has almost the same number of sheep as 25 years ago, only half the grassland remains, much of it lost to urbanisation and ill thought out reforestation.

Poaching and hunting also cause problems when large carnivores and the herbivores they prey on are targeted. Many conservationists see no role for hunting in the Carpathian mountains, if they are to be truly wild.

HUNTING IS INGRAINED IN ROMANIAN CULTURE BUT IS NOW GOVERNED BY A COMPLICATED SYSTEM OF LICENCES.

Groups such as Rewilding Europe and the Foundation Conservation Carpathia (FCC), founded in 2009, have been buying up these permits and turning the land into 'no-take zones' to thwart the hunters. And in October 2016 the Romanian government announced a ban on the hunting of large carnivores, ending years of sanctioned killing of bears, wolves and lynx.

DEALING WITH 'DANGER'

Before the ban, hunting associations were given quotas by the government on the basis of the number of bears in their area, and the number of bears believed to be a threat to local people and their livestock. Now, none of that is happening – the government will deal with 'danger' bears directly, through an arm of the gendarmerie.

The greatest threat to the Carpathian wilderness, however, is the uncontrolled logging that's destroying some of Europe's last virgin forests, great ancient tracts of mixed woodlands: Scots pine, spruce and pedunculate oak, along with great drifts of beech, grey alder and silver poplar. In 2005, the government began a process of 'restitution' – returning tracts of forests to their original private owners, and ending nearly 60 years of state protection of the land.

Though well intentioned it was a disastrous move, with land being given back to families who'd long since moved to the city and lost all connection to the countryside. As a result, many were only too keen to sell

Boar: Grzegorz Lesniewski/W d Wonders of Europe; chamo s: s v umate /Getty; bear: Ange o Gando fi/Getty; logging: YouraPechk n/Getty; shepherd: Staffan Widstrand/Getty; Iammergeier: Aoosthu zen/Getty

Above: logging is currently the biggest threat to the Carpathian wilderness. Left: shepherds have developed ways to avoid losing their sheep to bears and wolves.

to logging companies, some of which have, says Aykroyd, "been logging fairly indiscriminately ever since".

Whereas the local timber industry was small-scale and selective, big corporations concentrate on clearfelling. The European Wilderness Society now estimates that illegal logging in Romania has resulted in the loss of 120,000ha of prime forest over the past 10 years.

"Of course, a country has a right to use its natural resources, but it needs to do so in a way that benefits the local economy," says Aykroyd. "Very often you get large, foreign companies coming in, taking all the timber and using contract labour so there's no jobs for the locals."

PROTECTING LANDSCAPES OF ALL TYPES

"We're not going to have too many opportunities to save what's left... not just in Romania but everywhere," Aykroyd continues, lamenting that so much of Europe's last remaining old-growth forest is "being converted into nothing more noble than nappies and cardboard boxes".

The FCC is one body looking to put the brakes on this destructive industry, working with various partners to establish the Carpathia National Park. Dubbed the 'European Yellowstone', the park will encompass an area of wilderness sprawling across 100,000ha in the Fagaras mountains, among the most spectacular alpine landscapes to be found in the Romanian Carpathians.

Above: carrion feeders are key to a complete ecosystem and so there are plans to reintroduce bearded vultures, or lammergeiers, to the area.

COULD THE UK BE LIKE THE CARPATHIANS?

The UK lacks the space and mixture of habitats to see bison roaming free, but rewilding is about more than reintroducing megafauna. "There's a lot that can be done in the UK to increase the scale of wilderness and ecological richness," says Toby Aykroyd, from Wild Europe. "It's just a matter of being mature enough as a society to say: let's keep parts of the land only for nature." Germany, for instance, is committed to keeping five per cent of the country free from development.

There are different ways of rewilding an area, says Adrian Hagatis, from Rewilding Europe, from 'spot rewilding' – correcting deforestation or dealing with erosion created by forestry vehicles – to increasing biodiversity with reintroductions. Areas can also simply be left to nature, or more active management can be employed to remove invasive species and human interventions to restore natural balance.

Hagatis believes the best option for the UK is an improved green infrastructure: corridors and strips of land that act as 'veins,' linking areas of higher biodiversity.

A change in mindset is also needed, he says – and perhaps some of that Romanian pragmatism. "Romanians, especially from rural areas, have never been disconnected from wildlife," he says. "In western countries people are no longer used to wild predators and that leads to a negative attitude."

The FCC also recognises that protecting wild areas isn't just about the wilderness but also the cultural and economic landscape. So it has launched a major survey of local communities to find ways that they can benefit from protecting the wilderness.

"It's no longer just a question of nature conservation," says Aykroyd. "You need to look at the whole socio-economic agenda – how you can stick to your principles and make sure they're benefitting the wider community... they need to see something in it for them."

Ecotourism is inevitably high on the list, but Hagatis also talks of controlled forestry, craft products, medicinal plants, mineral water and even breweries.

Another project helping local employment prospects as well as the ecosystem is the reintroduction of the European bison, or wisent, which has created jobs for guides, rangers and local guesthouses. The programme to reintroduce the Continent's largest mammal, hunted to extinction in the region some 200 years ago, is being run by Rewilding Europe and WWF Romania. Though in a truly international effort, funding has come from such unlikely sources as the Swedish Postcode Lottery.

The European bison is Europe's largest terrestrial mammal, weighing up to one tonne. Fewer than 3,000 survive today – their numbers being lower even than the black rhino in Africa. After the last Ice Age, hunting drove the bison from all but the most remote corners of

Europe; the last wild animal died around 1920, leaving just 54 individuals in zoos around the world. Their numbers have been bolstered by a captive breeding programme and the first bison were released back into the wild in Poland's Białowieza Forest in 1954. There are now herds in more than a dozen European countries.

For Hagatis the bison is a keystone species that will have a dramatic effect on the Carpathians by helping to create new habitats and help biodiversity thrive.

The first release of 17 bison in the Tarcu mountains in 2014 saw animals translocated from sources across Europe, including the Avesta Visentpark in Sweden, Parco Natura Viva in Italy and Germany's Hirschfeld Zoo. Eleven more were released in 2015, a further 10 in 2016. The ultimate aim is a herd of around 300 by 2024. Rewilding Europe and WWF have also established a breeding centre at Romania's Hunedoara Zoo, under the EU-funded LIFE Bison project.

Bison are browsers rather than purely grazers, eating shrubs and saplings as well as grass, helping to keep areas clear of undergrowth. They're also bulldozers, trampling the ground and churning up the soil with their hooves, and spreading seeds on their shaggy coats and in their dung, helping plants to colonise new areas.

European bison, or wisent, were released into the Tarcu mountains in 2014 (*above*) and it's hoped the presence of a functioning herd (*below*) will help other species colonise the area.

"It's an animal that can shape the landscape in a valuable way," says Hagatis.

So, despite the threats, Hagatis and his colleagues are optimistic about the future for Europe's last great wilderness. They're already contemplating their next major project, the reintroduction of griffon and bearded vultures. With a wingspan up to 3m, the latter – also called lammergeier – would make an impressive sight over the Carpathians, scanning the land for carrion. This bird is famed for its habit of dropping bones from a great height to smash on rocks below to expose the protein-rich bone marrow. Hagatis smiles at the thought. "Scavengers play an important role in an ecosystem, along with the carnivores and herbivores. They're also key species that can help keep the Carpathians a wild and biodiverse place."

MARK HILLSDON *is a freelance writer specialising in nature, the environment and sustainability.*

HOW TO EXPLORE THE CARPATHIANS

- **Brasov**, in the foothills of the Carpathians in south-eastern Transylvania, is a good base from which to explore the area. It's 180km north of Bucharest – two and a half hours by car, bus or train.
- **Transylvanian Wolf** (transylvanianwolf.ro), run by experienced guide Dan Marin, offers the chance to track wolf and bear in and around the Fagaras mountains from a base in Zarnesti.
- **WWF** runs hiking treks to see and learn about the bison (http://bit.ly/2fUJ0Zx).
- International tour operators offering wildlife-spotting trips to the Carpathians include **Naturetrek** (01962 733051, www.naturetrek.co.uk), **Exodus** (02031 317053, www.exodus.co.uk) and **Wildlife Worldwide** (01962 302086, www.wildlifeworldwide.com).

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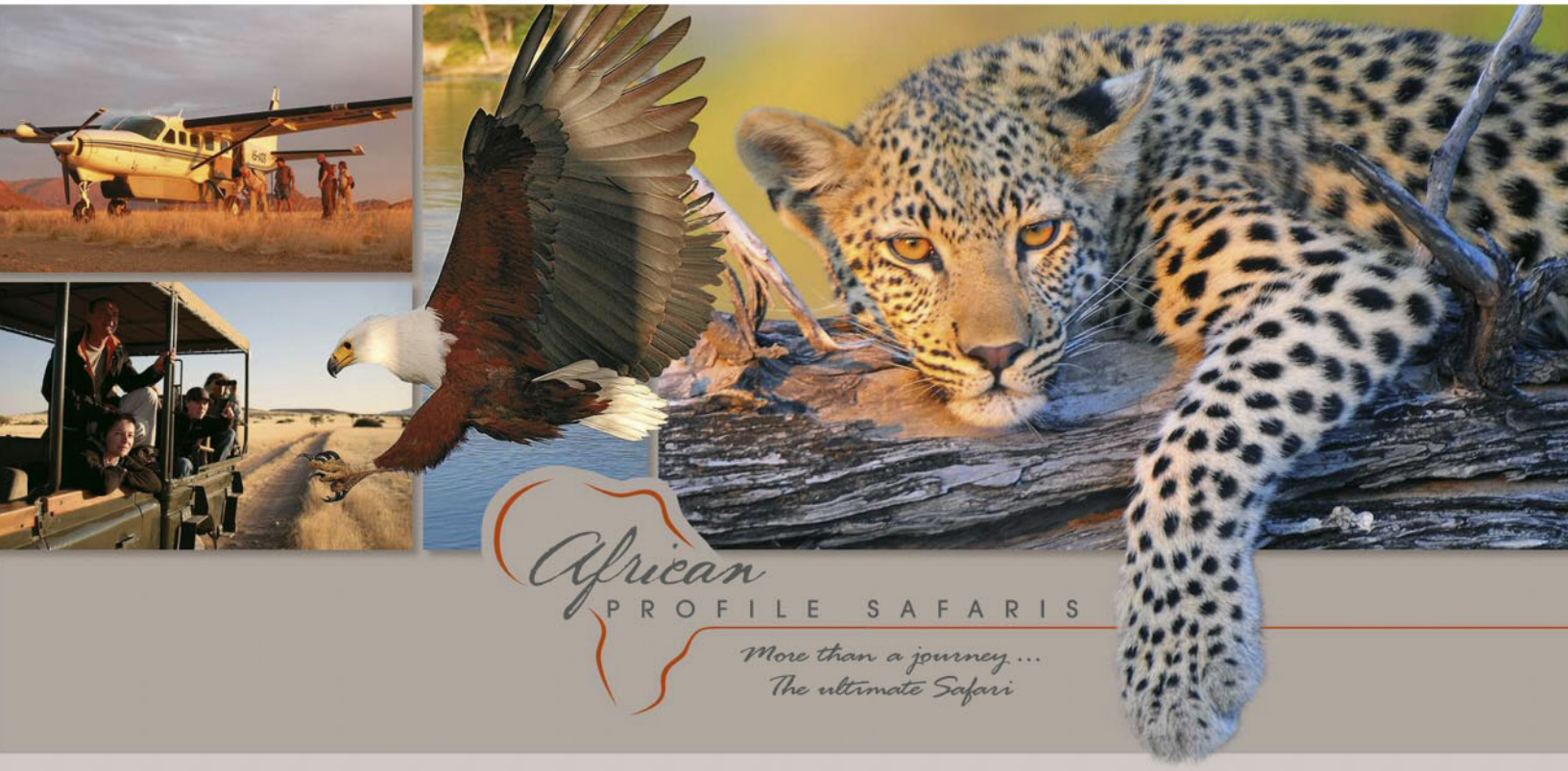

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SAVING INDIA'S LIONS

Perilously close to extinction 100 years ago, the Asiatic lion has made a remarkable recovery. **Sarah McPherson** reports on the combined efforts that made it happen – and what lies ahead.

Lion: Tapan Sheth; inset: ZSL

We never really think of India as lion country. Lions belong on the savannahs of Africa, patrolling the long grass and reclining on rocky outcrops. India, surely, is tiger country, where these iconic cats rest on crumbling temples and cool off in mirror-calm pools.

Yet India, too, has lions. These are members of the Asiatic subspecies, descendants of those that left north Africa some 21,000 years ago and dispersed as far as Europe and south-west Asia. But then came a succession of Mughal emperors, maharajas and colonial rulers with an insatiable thirst for trophy hunting. One by one, India's states emptied of lions. By the early 1900s, the subspecies was confined to a relic population of just 20 or so individuals in Gir, a region of rolling dry forest, scrubland and savannah in the western state of Gujarat. It was only the last-ditch intervention of two successive ruling princes that prevented these cats from vanishing for good.

Since then, thanks to decades of in-depth conservation work and extraordinary support from local people, the Asiatic lion has clawed its way to recovery, with numbers soaring to 523 at the most recent count in 2015. "It's one of the greatest conservation success stories in the world," says Gitanjali Bhattacharya, biologist and manager of international conservation charity the Zoological Society of London's (ZSL) South and Central Asia programme. "The Asiatic lion is now flourishing in its landscape. Not only has its future been secured, but it's even starting to regain some of its old territories."

Much has been invested in safeguarding the subspecies, with conservation efforts spearheaded by the government-funded Gujarat Forest Department (GFD). The ▶

Asiatic lions are closely related to their African cousins, with physical differences including a sparser mane and fold of skin on the belly. Gir's forest guards (*inset*) can recognise many individuals by sight.

human landscape bears obvious signs of husbandry towards the lions: signs instruct trains to slow to 20kmph; wells are covered or adapted with parapets; water sources are provided.

The GFD's field staff are based predominantly in the Gir Protected Area, a 1,412km² swathe of land comprising both the Gir Forest National Park and surrounding Gir Forest Sanctuary. This 300-strong team of vets, guards and rangers is supported by the Wildlife Institute of India (WII) and ZSL, who provide training and share expertise. One significant development introduced by ZSL is the use of patrol-based monitoring, particularly using the SMART (Spatial Monitoring and Reporting Tool) method. Broadly speaking, SMART combines a 'best practice' approach with data-sharing technology. Since its launch in 2013, the procedure has been deployed in wildlife refuges across the globe, including the Dja Biosphere Reserve in Cameroon and Parsa Wildlife Reserve in Nepal, and is currently being rolled out in Gir. "Everyone who works in the field is constantly collecting information, so there's a fantastic repository of data out there," says Bhattacharya. "If you can plot it all out, you can identify emerging threats across a landscape and allocate resources accordingly. It's a fantastic conservation tool taking us well into the 21st century."

Vets and forest guards are on the front line here, on 24-hour alert to deal with sick, injured or problem lions. Interestingly, Gujarat was the first forest department in India to employ females in these roles, with the new recruits taking their posts in 2007. Widely celebrated in the media and known as the 'Indian Queens', these women are trained in close-range tranquillisation and immobilisation techniques and respond to emergencies by motorbike. On occasion, armed with dart guns, they are lowered into unadapted wells in cramped metal cages to rescue lions (and leopards) that have fallen inside. "These are dedicated, courageous women – they are incredible role models," says Bhattacharya. "Not only are they good at what they do, but

THERE'S A FANTASTIC REPOSITORY OF DATA OUT THERE. IF YOU CAN PLOT IT ALL OUT, YOU CAN IDENTIFY EMERGING THREATS.

TIMESPAN

A LIFELINE FOR LIONS

Following a century of conservation efforts sparked by an Indian prince, the Asiatic lion has recovered from near-extinction.

The lion-saving prince: Khanji III.

1892
Nawab Sir Muhammad Rasul Khanji becomes ruler of Junagarh, one of the districts encompassing Gir. Realising he is custodian of India's very last lions, he declares the region a protected area.

1911
Nawab Muhammad Mahabat Khanji III (*left*) takes over from his father. An animal-lover, he restricts shooting of lions at Gir.

1965
The Gir Forest National Park and Wildlife Sanctuary, also known as Sasan Gir, becomes formally established and a conservation programme initiated.

Lions were sought after by hunters.

Clockwise from left: Asiatic lions live for 18–20 years in the wild; speed limits of 20kmph have been imposed on trains in parts of Gujarat after six lions were killed on the tracks; female forest guards examine pug marks.

Loness & cub: Ur Go man; tra n: ZSL; guards: Anndi to Mukherjee/Reuters; Sir Mahabat: Dinodia Photo/Getty; hunters: Mansel /Getty; adv: Superstock

since women often forge greater emotional connections with people, they are good ambassadors for the GFD, helping to engage local communities in the importance of protecting this subspecies."

Such outreach work is vital, as the locals themselves, in particular the Maldhari – an indigenous grazing community that has lived alongside lions in the Gir Forest for decades – are playing a crucial part in this conservation success story. In a controversial move, the GFD resettled many families out of the Gir Protected Area in the 1970s to allow the lions' habitat to regenerate and numbers of their natural prey (chital, nilgai, sambar and boar) to recover. Compensation was offered in the form of financial aid and land for agriculture, and most ▶

213 cubs were counted in the latest census.

Maldhari have long lived with lions.

1972
The controversial Maldhari resettlement programme begins. This will eventually lead to a ten-fold increase in the lions' natural herbivore prey, reducing the cats' dependence on livestock.

2005
The Asiatic lion is downgraded from Critically Endangered to Endangered by the IUCN as the population reaches 359 individuals. Numbers have been increasing steadily since 1965.

2015
The Zoological Society of London signs a Memorandum of Understanding with the Wildlife Institute of India and the Gujarat Forest Department to safeguard the Asiatic lion, a significant moment for those involved in the partnership.

2016
A five-day census counts a total of 523 lions, comprised of 109 males, 201 females and 213 cubs. This is a 27 per cent increase from the 411 animals counted during the previous census in 2010. Translocation plans are still pending.

Maldhari graze cattle and buffalo within the Gir Forest Sanctuary.

(though not all) agreed to the proposals. Today, a small population of about 2,000 Maldhari remains within the sanctuary, living in scattered settlements and continuing their pastoral lifestyle as they have for generations. That the Maldhari – both those that rear livestock within the sanctuary and those that grow crops on its periphery – can have such a harmonious relationship with these large carnivores is nothing short of astonishing.

"The Maldhari are utterly brilliant at living alongside lions and accepting of them," says Bhattacharya. "They can read behaviour and recognise the warning signs – roaring, raising paws in the air or pawing the ground. Farmers also welcome the lions because they control numbers of nilgai antelopes, which can destroy crops."

They need practical strategies, of course. Fences are built around living quarters, livestock losses are forestalled by positioning the least productive beasts on the outside of a herd, and going out after dark, when the lions are hunting, is avoided. When livestock is taken – and many farmers will lose three or four cows per year – they accept these losses and are compensated for them.

FUTURE SUCCESS WILL DEPEND ON ACHIEVING GOODWILL ACROSS A WIDER SWATHE OF THE LANDSCAPE.

LIVING IN HARMONY

But the Maldhari do more than merely live with lions. A reverence for and pride in the animals is deeply entrenched into their spiritual and cultural beliefs. "I haven't seen this level of pride anywhere else," says Bhattacharya. "In other places in Asia and Africa, there can be huge conflict between large animals and locals. Here, the tolerance that has been there for generations has become even stronger."

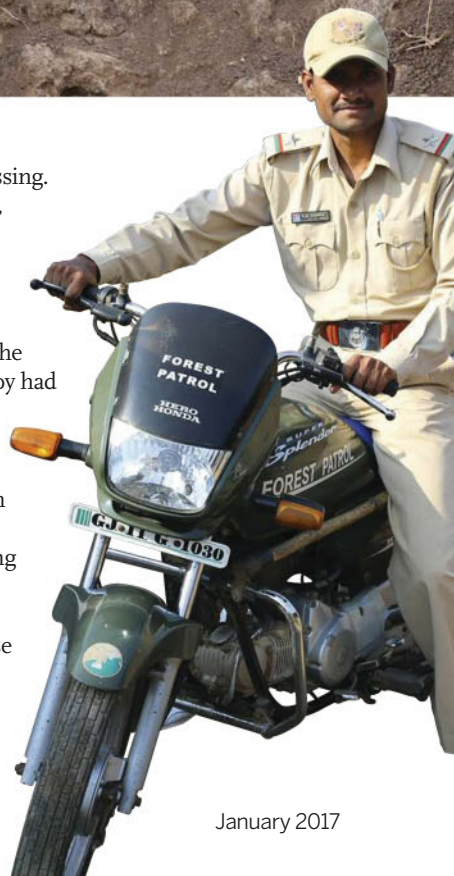
Wildlife biologist Meena Venkataraman, who has spent years studying Asiatic lions, agrees. "A harmonious co-existence between humans and wildlife is part of the culture in India. It is responsible for the survival of many species that have gone extinct in habitats elsewhere. The tolerance of people here is legendary."

In June 2015, ten lions drowned in monsoon floods. Hundreds of locals went into mourning, grieving almost as if they had lost a family member. In November 2016, a popular male named Ram died of natural causes. He was reportedly cremated in the presence of government and village officials, with GFD staff fasting for a day to mark his passing.

The Asiatic lion currently exists as a single sub-population holding on precariously in India.

Even lion attacks on people – which are rare, amounting to no more than a handful a year – are met with acceptance and understanding. In 2014, a teenager was killed by a lioness when he attempted to take a photo of her on his mobile phone. The Maldhari did not hold the animal accountable, acknowledging that the boy had failed to act appropriately in her presence. The GFD offered to relocate the lioness, but the villagers declined.

Nevertheless, many challenges remain. With Gir Protected Area having long exceeded its capacity, lions have been increasingly dispersing outside of its boundaries, now walking among mainstream communities in burgeoning human settlements. For some, living with these predators is a new phenomenon that carries with it a sense of fear and unease. This is particularly the case in the village of Ambardi, where a string of fatal lion attacks occurred



Herders & motorbike: ZSL. lions: Uri Golman; cage: Martin Fletcher

HOW TO SEE ASIATIC LIONS

- **Gir Forest National Park** is around 55km from the city of Junagarh, the most common base for making a visit. It is open from mid-October until mid-June (www.gujarattourism.com).
- Travel by rail to Junagarh from Ahmedabad or Rajkot and then take a road trip in a bus or taxi to the park entrance. You can also travel via local trains from Junagarh.
- A **Gir Jungle Trail** entry fee grants visitors a permit to enter the national park. The cost depends on the day you visit and is more expensive for foreigners. Permits must be booked online at www.girlion.in

early in 2016. "Conflict mitigation will become highly challenging as lion numbers increase," says Venkataraman. "The further the animals disperse, the less positive attitudes towards them will be. Future success will depend on achieving goodwill across a wider swathe of the landscape."

So, where are the lions supposed to go, if there's no longer room in the safe zones? "The GFD is currently identifying areas that the animals can move into, how corridors can be created to link them, and how they can be suitably restored – Barda Sanctuary, 100km west of the protected area, is a good example," says Bhattacharya. "Work is also being done to engage locals in an understanding of lion behaviour."

There's still one pressing – and thorny – issue. The limited geographical range of this subspecies leaves it acutely vulnerable to calamities such as contagious disease and forest fires. For two decades, there has been enormous pressure on Gujarat to translocate a number of its lions to Kuno-Palpu, in the neighbouring state of Madhya Pradesh. Vast sums of money have been spent readying the reserve, yet the lions have still not arrived.

Above right: Rasila Vadher, India's first female forest guard, with the cage that's used to rescue lions from wells. These instances are becoming rarer as wells are adapted to take account of lions, but fatalities still occur. Left: motorbikes allow swift access to injured or problem lions in Gir's forested landscape.

"Most scientists and conservationists are unanimous in the view that establishing a second population of lions would be in the best interests of the subspecies, but the proposal has been met with resistance from the Gujarat State Government," says Belinda Wright, executive director of the Wildlife Protection Society of India. "In April 2015, the Supreme Court of India ruled in favour of the translocation, but in May, a review petition was filed, claiming that the court had been misguided by its neighbours, and that Madhya Pradesh had not taken sufficient steps to curb poaching."

While the proposal is still pending with the Supreme Court, there's another twist in the tale: in April 2016, the Madhya Pradesh Government decided to develop Kuno-Palpu as a tiger reserve. No one can say whether Asiatic lions will ever thrive outside of Gujarat, but as their roars grow louder, there is still plenty to celebrate.

SARAH MCPHERSON is section editor of *BBC Wildlife*. She introduced her sons to Asiatic lions at ZSL London Zoo last summer.

ON THE TRAIL OF CAPE CARNIVORES

How do you track the elusive Cape leopard in a South African nature reserve? **Scott Dutfield** joined an ambitious expedition as a volunteer to find out.

After trekking through coarse branches, marching along dusty roads and scrambling over boulders, we finally reached the summit and a scene dominated by undulations of rain-carved fynbos mountains. Wiping the sweat from our brows, our eyes took in a landscape filled with the vibrant colours of exotic flowers and crystal clear blue skies, and noted the bouncing body of a grey rhebok.

It's a scene that many of us can only dream of, but it is an everyday occurrence for the research scientists and volunteers working in this remote area. And now I was lucky enough to be seeing it, too.

Deep in South Africa's private Blue Hill Nature Reserve, which is part of the Cape Floral Region, I joined a team to record the species that inhabit this area, including the elusive Cape leopard.

DATA-DRIVEN RESULTS

The Carnivores of the Cape Floral Kingdom survey is an annual survey that is run by wildlife holiday company Biosphere Expeditions and its partners. It started in 2015 and aims to gather information on the biodiversity of Blue Hill Nature Reserve, with an emphasis on capturing data on its predators. The scientists working on the project are augmented by paying volunteers, on a two-week trip. As a volunteer my job was to help record sightings and collect data to feed into the study. The survey has already assembled information on a vast

Illustrations by Shelly Perkins

number of species living in this region.

Over recent years there have been growing conflicts between local farmers and leopards, leading to their persecution. Landmark Foundation is a charity that has been studying the ways farmers can protect their herds since 2007. Its researchers found that by fitting sheep with neck barriers and, surprisingly, introducing larger animals, such as donkeys and alpacas to a herd, the chance of a big cat attack is reduced. It noted a 56 to 97 per cent decrease in livestock losses when these methods were used. The data gathered helps to measure the success of these deterrents and improve the relationship between people and nature in the reserve. The Carnivores of the Cape Floral Kingdom survey we volunteers participated in also aims to mitigate human-wildlife conflict.

OVER RECENT YEARS THERE HAVE BEEN GROWING CONFLICTS BETWEEN FARMERS AND LEOPARDS.

As a consultant ecologist in the UK, expedition leader Craig Turner has years of experience working with wildlife. "There is a big picture plan for the research," he told us. "Collecting data will help us better understand leopard disruption, and that information can help in the future."

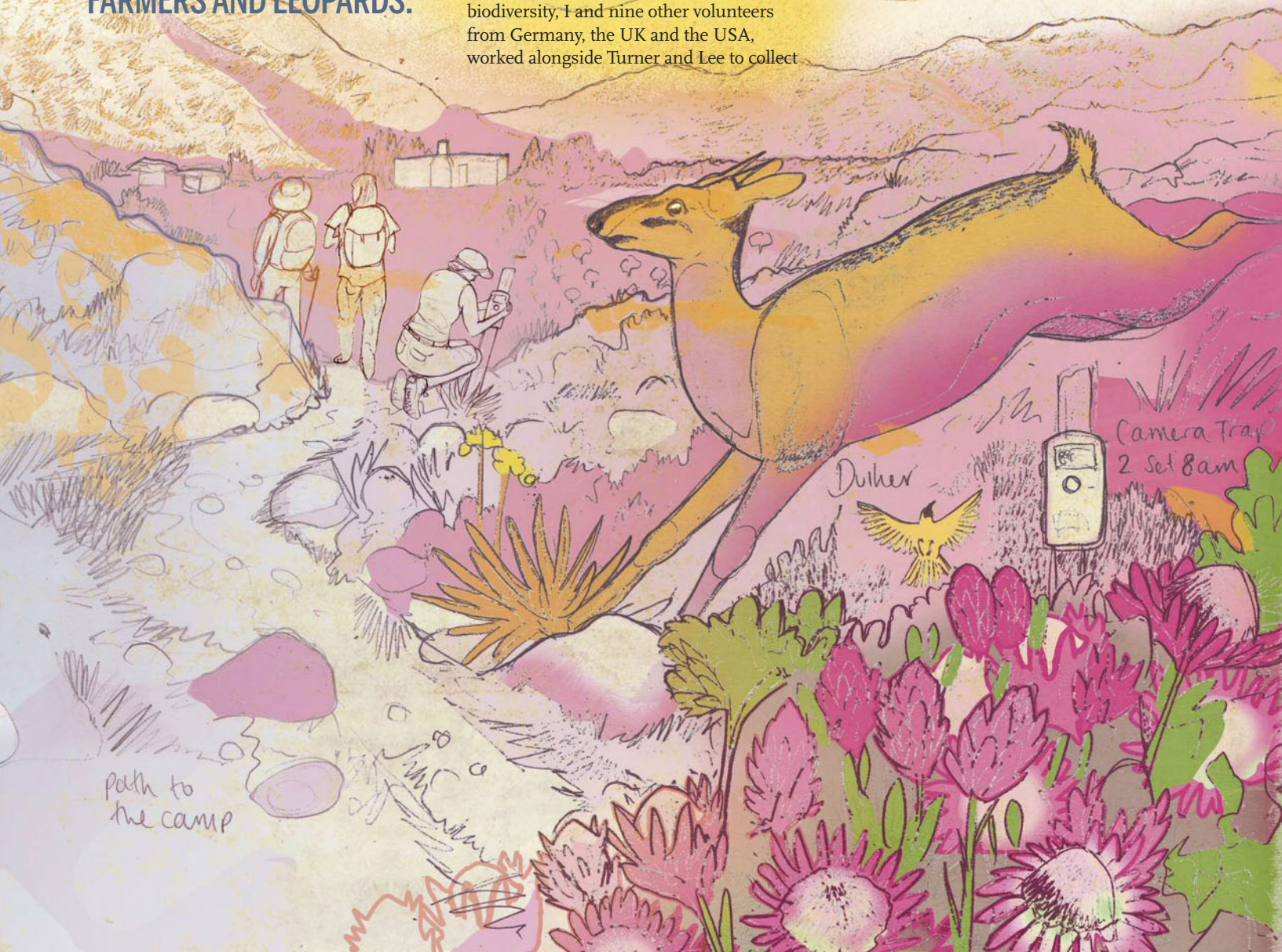
A POSITIVE CHANGE

The land that is now Blue Hill Nature Reserve was purchased in 2007 by Chris Lee, a retired geologist who is also the father of resident expedition scientist, Dr Alan Lee. Previously used for livestock farming, all 2,300ha have been left to grow wild in order to attract back leopards and other native species.

"There are trends of animals doing well as a result of land use change," said Dr Alan Lee. "That then translates into greater resources that underpin leopard research being made available." The more information that surveys collect, the more data scientists have to attract sponsors. As a result, the number of volunteers can increase, more equipment can be purchased and more data can be collected.

In order to learn about trends in biodiversity, I and nine other volunteers from Germany, the UK and the USA, worked alongside Turner and Lee to collect the raw data required to further support the protection of Cape carnivores. It was a unique experience for anyone who has not been involved in field research before.

Cold in the mornings and evenings was something I hadn't expected in South Africa. Waking up in a quaint cottage that just about held in the heat of the fire from the night before was a surprise and a pleasure, especially because I knew I would long for the evening chill later on when the midday sun beat down. Along with two other volunteers, Viv and Lou, I shared what was aptly named 'Baboon Cottage' as it was in the middle of a troop of chacma baboons' regular hang-out. It was worth walking out in the cold mornings to see them and take in the beauty of their homeland before our work for the day began. It was easy to forget that I wasn't just there to enjoy myself; I was there to do a job. As with any conservation expedition, training volunteers from all walks of life, who may never have experienced a project like this before, is very important. ▶



At the beginning of the trip we gathered outside in a cool 7.00am breeze, huddled around a collection of equipment that we would all become very familiar with. Devices such as Global Positioning Systems (GPSs), range finders and a leopard cage, would help us collect data for the next fortnight. Excitement grew amongst the team as we learnt how to use the cage, instructed by a trainer from the Landmark Foundation.

The best way to track a leopard is with a radio collar – but first you've got to try and catch one. The leopard trap is designed with a trigger mechanism in the floor of the cage. As the big cat enters, it will release the trigger, simultaneously closing doors at each end, with no harm caused to the feline.

We took it in turn to assemble and set the trap, with one of the volunteers, Jane, even going so far as to climb inside to demonstrate the cage in action. We let her out eventually...

The main source of information collection on this expedition, however, was obtained using camera-traps. These robust cameras are strapped to chicken wire fence posts and are set to take images, either when a sensor is triggered or at regular intervals. Our main challenge was to find the best sites for them. In South Africa, leopards have been found to pace a territory stretching to around 25,000ha for males and 12,000ha for females. So finding evidence of their continued presence is key.

Indications such as leopard scat or the remains of prey allow researchers to identify the paths that these animals regularly take. So when we found a tree that had been used as a scratching post, it seemed like the perfect place to set up the cage and a camera-trap. The devices stayed here until the end of our expedition, and we checked them twice daily with baited breath.

THE BIGGER PICTURE

"Camera-trapping is a bit like Christmas," said Turner. "You never quite know what you're going to get when you open that box or download those images. But now and then you find what you're looking for, and when you do it completely validates why you're here."

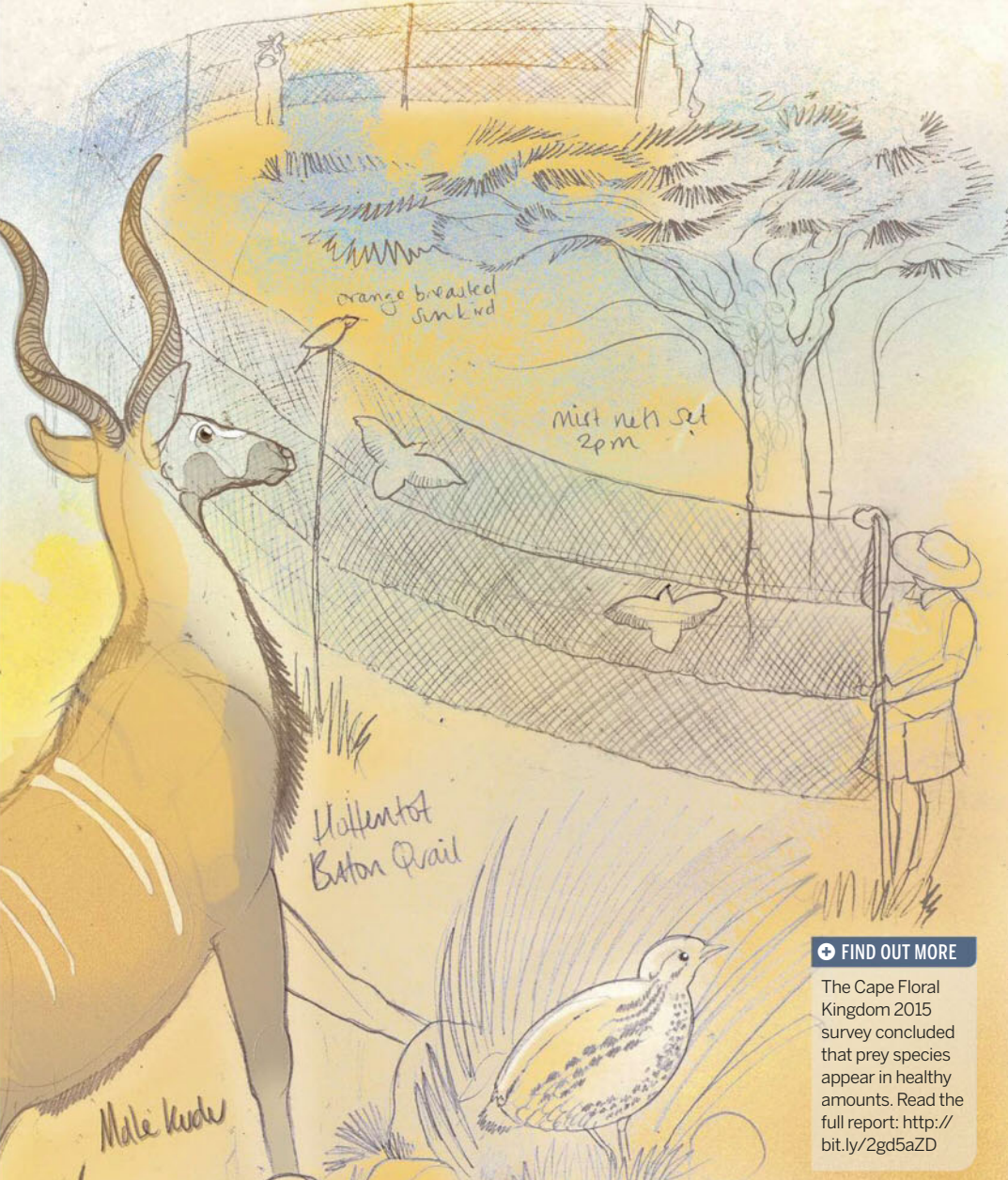
Strapping on my hiking boots, coating myself in sun block and filling my water bottle became the daily routine. Hiking across hills, strolling through valleys and cutting through the bush, we traversed the reserve to retrieve camera-traps left by expedition volunteers the previous year and site new ones.

Our efforts were rewarded when, during the course of our trip, multiple photos of leopards were captured. But that was just the first step; telling them apart is a difficult but important task. Thankfully it's true what they say: 'A leopard can't change its spots'. From the individual rosette spot patterns on a leopard's fur, you can tell if you have captured a picture of the same one twice. Much like a snowflake, each animal's spot structure is unique – although seeing them at the right angle to tell can be tricky.

CAMERA-TRAPPING IS A BIT LIKE CHRISTMAS. YOU NEVER KNOW WHAT YOU ARE GOING TO GET WHEN YOU DOWNLOAD THOSE IMAGES.

The pictures captured by these cameras are translated into plentiful data. It's extraordinary what you can learn simply from looking at an image, captured as they are with a time stamp. These can help researchers track the movements of animals, identify potential mated pairs and assess their reproductive success. Images can also record a species' abundance, gender, possible age and geographical location, and create a complete picture of the reserve's biodiversity. From our efforts retrieving the camera-traps from the previous year, nearly 3,000 photos were collected for analysis.

With guides and reference images in hand, we had to establish which species appeared



FIND OUT MORE

The Cape Floral Kingdom 2015 survey concluded that prey species appear in healthy amounts. Read the full report: http://bit.ly/2gd5aZD

in each photo. The majority of animals inhabiting the Blue Hill Nature Reserve are nocturnal, so sometimes only a shady silhouette or the glow of a pair of eyes is visible. And, of course, no animal stands to pose for the camera, so identifying them can be tricky. Does that antelope have small furry socks like a duiker? Does that hazy image of a cat have long flicked tufts of hair at the ends of its ears like a caracal?

Staring fixedly at a laptop screen in the research office, we volunteers learned the subtle differences between species, especially antelopes. A common duiker looks very similar to a Cape grysbok, except for a teardrop marking on the face of the grysbok, but when you're looking at an image in darkness, it takes a little practice.

CREATURES GREAT AND SMALL

The presence of prey species can explain how well leopards are responding to their environment. If prey are in abundance, it is very likely that leopards are doing well. However, any project exploring the biodiversity of an area cannot just focus on one large charismatic mammal and its associated species. During the expedition we also recorded the presence of non-prey species – as far as the leopard is concerned at least – such as elephant shrews and African striped field mice. However, an Endangered species that was of particular interest to Lee – a small bird called the hottentot buttonquail, endemic to a narrow strip of southern Africa – continually eluded us. There is little information known about this species that only numbers in the hundreds. It has never been caught and ringed with an ID band anywhere in this area. A ringed bird would help immensely in working out its movements and the challenges it faces. Lee was determined to find one so we took a rocky drive to a road where he thought we might get lucky.

With the sun beating down, we put up a series of poles to hold a finely woven mist net. We then slowly walked in line towards the net, doing what is known as flush surveying to hopefully drive any birds out of the dense ground vegetation around us.

Amazingly, after a few attempts, a small brown-faced buttonquail darted out of a nearby sugar bush and straight into the net. No one was more amazed than our mentor.

"Catching a buttonquail is surreal, I can't believe we've done it," said Lee. "I've been ringing for years and have never caught one."

PEAKS AND TROUGHS

It's this sort of lucky chance that adds to the thrill of an expedition. It's rewarding to know that your efforts at data collection will produce information to aid the conservation of precious species. It's a view that Craig shares: "When you witness something that you don't ordinarily see every day, whether it's an elephant shrew, an endemic bird or, if you're very lucky, a leopard, it makes it worth the effort of getting people out here and teaching them how to do surveying techniques. They may seem simplistic, like camera-trapping, but with them you get that magic piece of data."

During my time in South Africa I engaged with a wealth of wildlife and retrieved and processed a bounty of data. There was only one, small disappointment – no leopard sighting – but you can't have it all. The cage that we sited at the start of the expedition unfortunately didn't prove enticing enough for a solitary cat. Only a disgruntled Cape porcupine was found to have triggered it. It appears that the leopards in Blue Hill Nature Reserve are too wily to be caught by anything more than the lens of a camera.

SCOTT DUTFIELD joined a Biosphere Expeditions trip to South Africa. Find out more at www.biosphereexpeditions.org

A VOLUNTEER'S DAY

6:00am–6:30am
A pair of volunteers check the leopard cage.

7:00am–12:30pm
First data collection activity, such as camera-trap setting up/collection or mist netting and flush surveys.

12:30–2:00pm Lunch

2:00pm– 5:00pm
Second data collection activity, such as mist netting, small mammal trapping or enteri g camera-trap findings into the database.

5:00pm–6:00pm
A pair of volunteers check the leopard cage.

6:00pm–6:30pm
Debrief on the day's activities and handing out the assignments for the following day.

7:30pm–8:30pm Dinner

During winter in Yellowstone bison gather around the steaming hot springs at Lower Geyser Basin, Firehole Valley. On very cold nights, when the mercury drops below -20°C, the steam freezes onto their coats and forms frost. In the coldest season many bison migrate into the valleys from their higher summer ranges as the warmth from the geysers helps to melt the deep snow and some grazing areas remain accessible. The grass contains elevated levels of silica, which wears the bisons' teeth down more quickly, and reduces their lifespans. Locals say: "In summer bison feed on cereals, but in winter they eat the box."

IN THE BLEAK MIDWINTER

When temperatures fall in Yellowstone National Park, USA, it can be a hostile place to live in, and yet animals have strategies to survive the coldest months.

Words and photos by **Nick Garbutt**

ABOVE The reintroduction of wolves in 1995 is one of Yellowstone's defining achievements. The subsequent shifts in the ecology of the park have been dramatic. Before the wolves returned, the elk population was artificially high, riverside vegetation was overgrazed and beaver populations had declined. Now, elk numbers are kept in check, riparian areas such as Soda Butte Creek have recovered and beavers are thriving.

LEFT Geothermal changes caused the Firehole Valley to become flooded with hot water from nearby geysers. This killed the lodgepole pines, which now stand in stark, ghost-like splendour. They look especially dramatic in the monochrome palette of winter.

ABOVE Many moose move to lower elevations outside the park during winter, but they can still sometimes be seen grazing in the area where Soda Butte Creek joins the Lamar River. This bull will shortly shed his antlers, before regrowing them in time for the autumn rut. Being mainly at high elevations, Yellowstone is not ideal moose habitat: the park supports fewer than 200 animals.

LEFT During the summer, bighorn sheep are found on high mountain pastures throughout Yellowstone, but in the colder months they make their way down to the valley bottoms. Where snowfall is deep, they dig away with their front legs to reveal the coarse grass beneath.

While bobcats are not uncommon, they are rarely seen and can be frustratingly secretive. However, during the winter, they often move to more accessible areas such as the Madison River Valley to hunt. Because the river is fed by hot water from geothermal springs – via the Firehole and Gibbon Rivers – it never freezes, even when the air temperature drops below -30°C. This makes it a regular haunt for goldeneye ducks, trumpeter swans and other waterfowl, which bobcats hunt. This individual was remarkably tolerant while I watched it patrol along the edge of the river. The feline walked through areas of deep snow, which made following it to get into a good position to take a photograph, a big challenge.

LEFT This sun pillar at Grand Canyon of the Yellowstone is an optical phenomenon that forms when light is reflected off ice crystals suspended in the atmosphere. When temperatures drop below -25°C at night, spray from the Lower Falls of the Yellowstone River freezes and hangs in the air. When the sun rises over the canyon rim, light hits the crystals and they twinkle in the air like fairy dust. From a particular viewpoint nearby, the beam always appears to strike the same tree that grows precariously on the cliff edge.

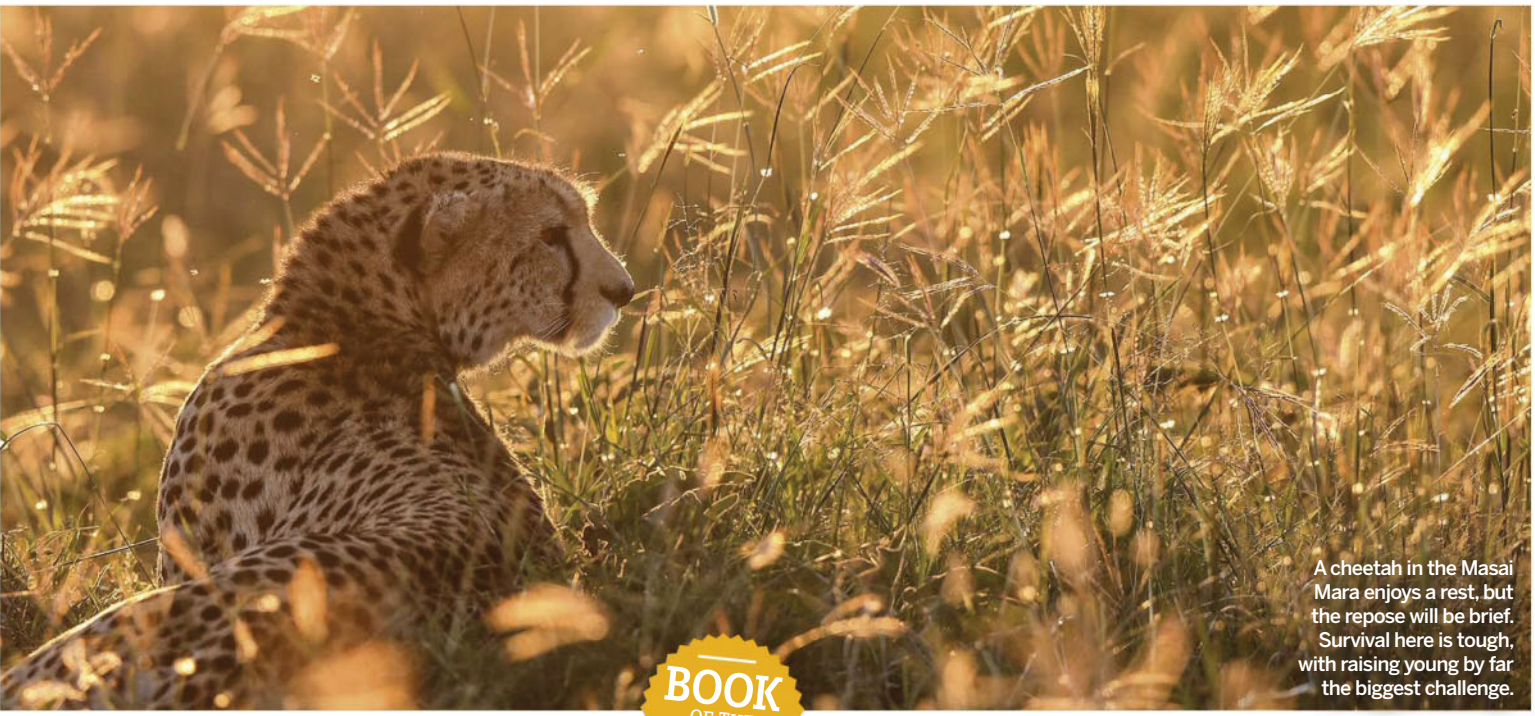
ABOVE A red fox hunts in the Hayden Valley. This remote area has a lower coyote population than other places in the park and is an excellent location to spot red foxes in winter. It is possible to encounter as many as five or six individuals on the lookout for rodents that live in the labyrinth of tunnels beneath the deep snow.

LEFT North America's largest waterfowl species rests on the frozen edge of the Yellowstone River. By 1930, trumpeter swans had disappeared from 48 states due to habitat loss and hunting – Yellowstone was one of their few refuges. Today, the population on the continent has recovered to about 46,000 birds but fewer than 30 live in Yellowstone. They can be seen along the Madison River and Upper Yellowstone River.

NICK GARBUTT *is an award-winning wildlife photographer and author with a passionate concern for biodiversity. He has been visiting Yellowstone National Park for many years to photograph the species that live there. Find out more at www.nickgarbutt.com*

REVIEWS

- BOOKS
- TV
- RADIO
- DIGITAL
- MOVIES



A cheetah in the Masai Mara enjoys a rest, but the repose will be brief. Survival here is tough, with raising young by far the biggest challenge.

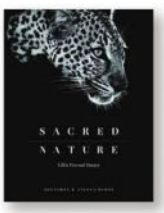
BOOK OF THE MONTH

DEFENDING OUR LAST WILD PLACES

Rediscovering a reverence for nature.

Sacred Nature: Life's Eternal Dance

By Jonathan & Angela Scott HPH **£39**



This is a glorious, romantic, old-fashioned hymn to nature, and in particular to Africa, birthplace of the human race. It is the kind of book that is, itself, an endangered species, with lavish photographs and an indulgent text, but entirely justified by the juxtaposition of pictures, some of which are beyond sublime. Great photographs possess not just shape and design but texture. The best pictures here have exactly this quality, especially the wonderful black and white dramas involving elephants. And, of course, from Jonathan and Angie Scott you would expect lions. Their image of three heavily maned males pulsing towards the camera is unforgettable.

The authors extoll nature's healing power, believing it derives from instincts we have inherited from our hunter ancestors. This may be a little idealistic – perhaps early man, cold, weary and scared, hated nature, and our history has been a battle against it. Whatever the case, we *need* nature now, and a beautiful book like this can offer trememdous solace.

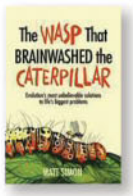
Stephen Mills Writer and film-maker

Remarkable Birds

By Mark Avery
Thames & Hudson **£24.95**

Hard-hitting conservationist Mark Avery has stepped away from the polemical world to play an uncharacteristically subordinate role in his latest publication, playing the accompanist to a pictorial feast of iconic illustrations. The book is adorned with artwork from some of the biggest global names in art history, from Audubon and Gould to Hokusai and Gustave Doré, their approaches ranging from paintings and book plates to sculptures and wood blocks. Avery provides solid, informative, complementary text.

Derek Niemann Ornithologist



The Wasp that Brainwashed the Caterpillar

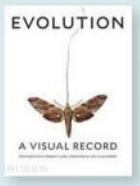
By Matt Simon
Headline **£12.99**

Evolution is a relentlessly slow process played out over unimaginable timescales. By contrast, Matt Simon's book on the subject skips along at a great pace. His window onto evolution is the bizarre ways animals have solved life's challenges – such as the flatworms that fence with their penises. The result is light-hearted but not simplistic, and offers an entertaining way to understand how the process of natural selection produces such complexity, beauty, variety and downright oddness.

Stuart Blackman Science writer

Recent discoveries indicate that jellyfish could be the first active swimmers.

Cheetah: Ange a Scott; jellyfish: Robert Clark



Evolution: A Visual Record

By Robert Clark and Joseph Wallace
Phaidon **£24.95**

This book has been crafted perfectly. I say 'crafted' because it is laid out in exquisite detail and clearly portrays the author's love of the topic. It is a celebration of both the natural world and the biological processes behind it. Covering both old favourites (natural selection and domestication) as well as more complex topics (extreme sexual selection and gynandromorphy), *Evolution* lays nature bare through a series of short written pieces and detailed images. Some of these have been captured in the subject's natural setting, but the majority are either preserved specimens or live animals set against black or white backgrounds, an approach that leaves you feeling as if you've just been on a behind-the-scenes tour of a natural history museum, with the added twist that many of the specimens are still breathing.

Ben Garrod Evolutionary biologist

The Zoo: The Wild and Wonderful Tale of the Founding of London Zoo

By Isobel Charman
Viking **£16.99**

London Zoo underwent a roller-coaster ride after its genesis in the late 1820s. Isobel Charman vividly recreates the zoo's formative years through the eyes of eight influential figures, including Sir Stamford Raffles, who fought to convince sceptics that the Capital needed a zoo. We enter the minds of key players in the zoo's history, including vet Charles Spooner, designer Decimus Burton and a certain Charles Darwin, who visited to back up an idea he was evolving.

Brett Westwood Broadcaster

Where Song Began

By Tim Low
Yale University Press **£20**

I thought I knew a fair bit about Australian birds, but I discovered revelations in each of these 12 chapters. The book is written by a biologist with a gift for translating complex scientific research into riveting prose. Tim Low explains how ornithology's historic concentration on northern birds obscured the important role of the great southern island continent in the story of bird evolution. Encounters with Australia's birdlife convinced me that it was special, but this account told me just how vital it is to understand its uniqueness.

Jonathan Elphick Ornithologist

MEET THE AUTHORS

Christina Harrison & Lauren Gardiner

Two botany experts unravel the most quirky and extraordinary stories from the incredible world of plants.

What made you decide to write *Bizarre Botany*?
CH: I come across amazing stories about plants all the time for my day job at *Kew Magazine*, and wanted to pull the best of them together in one place. There aren't many books purely about how amazing wild plants are, and we wanted to fill that gap.
LG: I'm always telling weird and wonderful stories about plants, and everyone loves them. The nasty, scary, extreme and wacky traits they have evolved are fascinating.

What's the message of the book?
CH: That plants are more important than you could ever imagine. They can shelter, feed, clothe, kill and cure us. All life on Earth ultimately depends on plants.

What do you find most fascinating about plants?
LG: The extraordinary array of adaptations that plants have evolved – and continue to evolve – in response to the environment and organisms around them.

What species do you find particularly remarkable?
LG: *Gingko biloba*. After the atomic bomb exploded above Hiroshima at the end of the Second World War, six of these trees were found alive less than 2km from ground zero and are still growing today. Almost every other living thing this close to the blast died instantly.
CH: The orchid family has some incredible stories. Many have evolved to mimic fungi or one of a vast range of insects to attract specific pollinators. They are the ultimate exotic flower.

> "ALL LIFE ON EARTH ULTIMATELY DEPENDS ON PLANTS."

What has been your most memorable encounter?
LG: On a recent trip to Madagascar I got my first sighting of the staggeringly huge and Critically Endangered *Tahina spectabilis* palm. It's dubbed the 'suicide palm' due to its strategy of saving all of its reproductive energy to flower in one enormous burst, then die after it has (hopefully) produced seed.

What are the unsung heroes among UK plants?
CH: The cryptogams – algae, mosses, lichens, ferns and fungi, which reproduce using spores. They make up a tremendous amount of our biodiversity, but are nearly always overlooked.

● **BIZARRE BOTANY** *offers an A-Z of the world's most quirky and extraordinary plants, from the tallest to the smallest, the smelliest to the deadliest (Kew Publishing, £10):* **www.kew.org**

TV CHOICE

Gordon Buchanan travels to Arctic Norway to unravel the science of winter survival.

Sophie Meyers/BBC

A WINTER'S TALE

A look at our most familiar snow specialists and how they survive life in the deep freeze.

Life in the Snow

TV BBC One
Due to air late December. See *RT* for details

The shivery season is here – so while you're cranking up the central heating, throwing more logs on the fire and rediscovering your warmest coat, spare a thought for those animals left out in the cold.

Life in the Snow, a one-hour special for BBC One, sees presenter Gordon Buchanan head to the northern reaches of Norway to encounter our best-known 'Christmas card' animals and uncover the behavioural and physiological adaptations that give them the best chance of seeing out the winter.

"The species featured are all highly specialised to their environments," says producer Mark Wheeler, who collaborated with producer-director Sally Thompson to make the film. "They all have an iconic association with ice and snow, and an impressive range of biological tactics to cope with the cold."

> "THE SPECIES FEATURED ARE ALL HIGHLY SPECIALISED TO THEIR ENVIRONMENTS

Male polar bears, for instance, enter a state of energy conservation, slowing their metabolism and changing the way they use their reserves, while reindeer benefit from an ingenious system of heat-exchange that warms incoming air before it enters their lungs, as well as sporting specialist hooves that double up as snowshoes.

As it's Christmas, the production also embraces the theme of seasonal goodwill, with a look at some of the effective partnerships that exist in the animal kingdom. Robins, for example, are provided with foraging opportunites by moles, whose strong, shovel-like paws are capable of digging through frozen soil that a robin's tiny beak can't hope to penetrate, and wolverines are alerted to carcasses by raven calls, leaving the birds to enjoy the leftovers once they've had their fill. "These are rather sweet and comical relationships that play well into a festive film," says Mark.

Less festive, perhaps, but no less captivating are the great grey owls that are able to detect prey under a thick blanket of snow, the emperor penguins that famously huddle in their thousands to conserve warmth, and the Weddell seals that can survive winter under the ice.

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Q&A

Mark Wheeler

What's the challenge with a programme like this?
Selecting individual animals for their adaptations to life in the snow and telling the story from their point of view.

How do UK species compare to polar species in terms of survival strategies?
They are many similar adaptions. Like Arctic foxes, ptarmigans, stoats and – to a lesser extent – weasels, lose their pigmentation and turn white to blend into snowy environments, which help them to hide from predators. Their coats also become much thicker – the Arctic fox's winter fur is 200 times thicker than its summer fur.

What did you learn that most surprised you?
That a wolverine's dentition is adapted so that it can consume frozen carcasses, something that other carnivores can't do. Its upper molars point inwards, allowing it to crush bones and eat very hard tissue. This, combined with its incredibly thick coat, make it one of the few Arctic species that doesn't need to hibernate. It's also fascinating that reindeer can see in UV light. This is crucial to their survival, as it enables them to pick out lichen against the snow.

What does Gordon bring to the film?
He's great at undressing the science. For instance he looks at the insulating properties of snow, which mean that the temperature inside a polar bear's snow den can reach a surprisingly cosy 30˚C.

MARK WHEELER *is producer on* Life in the Snow.

W debeest: Theo A ofs/Getty; po ar bear: Er c Baccega/naturep .com; cheetah: K m Wo huter

DIGITAL HIGHLIGHT

THE HUNT

Pull up a seat for the high stakes game between predators and prey.

Revealed: the predatory prowess of the wild dog.

There's more than one way to skin a cat, so the saying goes, especially when it comes to bagging a meal. And the wide range of strategies employed by the predators in the 2015 series *The Hunt* demonstrate this perfectly.

Specially developed filming techniques for this seven-parter take you closer to the action than ever before. Elephants, for example, which tigers don't see as a threat, were used as camera rigs to capture an individual tracking its prey through the forest. At the opposite end of the size scale, miniature minicams mounted on tiny booms allowed the crew to join army ants on the march and witness the insects overwhelming their quarry with strength in numbers.

Perhaps the most surprising message from the series is how the success or failure of any hunt can be decided by the smallest factor: despite the predators' guile and ingenuity, more often than not their efforts come to nothing and they're forced to go home hungry.

WILD FAMILY LIFE

Cheetahs: Growing up Fast

TV BBC Two
TX: Catch up on iPlayer.

Part of the new *Natural World* series and narrated by Sir David Attenborough, this film follows the fortunes of a wild cheetah family in the wilds of a Zimbabwean forest. For almost two years, conservationist and cameraman Kim Wolhuter spent nearly every waking moment getting to know the family, from the moment he first discovered the three-month-old cubs. The family became so comfortable with Kim that he was able to follow them on foot, even when they were hunting.

"Kim's extraordinary relationship with these cats has allowed us to reveal the lives of a wild cheetah family with astonishing intimacy," says producer Robyn Keene-Young. "He has captured incredibly close-up footage that provides a truly unique perspective of these graceful, threatened animals."

One of the cubs investigates Kim's camera.

Your friendly neighbourhood polar bear.

LIVING WITH BEARS

Polar Bear Town

TV BBC Two
Due to air in January. See *RT* for details.

In this follow-up to *Arctic Live*, Gordon Buchanan investigates life in the town of Churchill, Canada. Every autumn, polar bears descend upon the area as they migrate from their summer grounds on the tundra back to the coast of Hudson Bay, where they wait for the sea ice to form. Gordon goes on patrol with polar bear cops, works alongside the binmen who dodge bears at the dump, and meets a young woman who was mauled on the main street. As he learns the challenges of keeping everyone safe, he asks whether bears and people can ever make good neighbours.

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KAZIRANGA NATIONAL PARK

Kaziranga National Park is a true highlight of your visit to Assam. Home to the largest population of Greater One Horned Rhino in the world, you may also be lucky enough to come across the beautiful Bengal tiger.

The park was declared a Tiger Reserve in 2006 yet is also home to as many as 180 more mammals, including wild elephants, deer, buffalo, and a rich variety of birds including Jungle fowl, Bengal florican and the crested serpent eagle.

Your time here will include a once in a lifetime chance to experience an open top jeep safari, accompanied by a local guide who will take you deep into the jungle on your search for hidden treasures.

Keep your eyes peeled for signs of tiger tracks and your cameras at the ready to capture the abundance of wildlife you will encounter along the way.

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A journey on board the 46 passenger MV Mahabaahu is a journey of great discovery, friendly smiles, and unrivalled sunsets.

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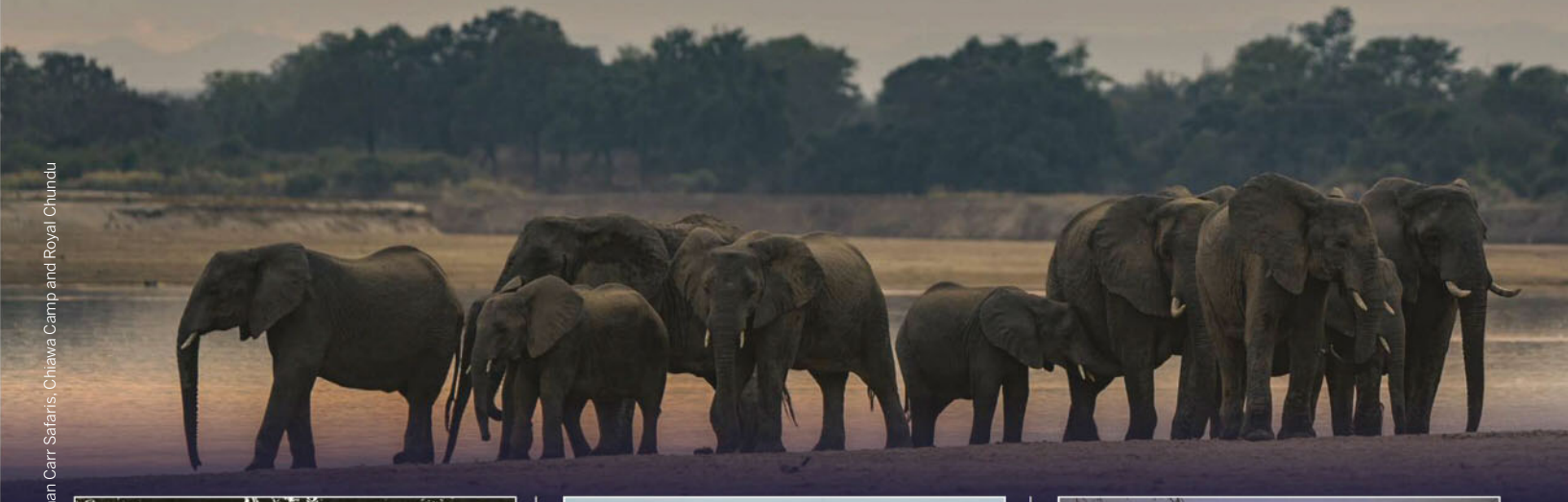

Images courtesy of Bushcamp Company, Norman Carr Safaris, Chiawa Camp and Royal Chundu

THE SOUTH LUANGWA NATIONAL PARK

Widely regarded as one of Africa's finest Parks, the South Luangwa has a rich diversity of flora and fauna. A few permanent camps in the central part of the Park are supplemented by a network of small seasonal camps in remote areas typically catering to a maximum of six or eight guests. Walking safaris were pioneered here back in the 1950s by the legendary conservationist Norman Carr and there is simply no better way to experience the African bush. The quality of guiding in Zambia on the whole is exceptional but the guides in this Park set the standards.

Night-drives provide visitors with excellent opportunities to see predators hunting, but with one of the densest populations of leopard in Africa, daytime sightings of this cat are almost as common.

Safari operators such as Norman Carr, Robin Pope and Derek Shenton have all helped to put the Luangwa and Zambia on the map and the companies that bear their names today are all leaders in their field.

THE LOWER ZAMBEZI NATIONAL PARK

Possibly one of the most beautiful Parks in which to enjoy your game-viewing. There are open plains, huge baobabs and large stands of winter thorn, the waters of the Zambezi are ever present and the back-drop is a stunning escarpment of hills.

The Lower Zambezi offers visitors one of the most well-rounded safari experiences in Africa. Day and night game-drives as well as walks are offered by all camps, as are a variety of river activities. Imagine floating silently with the current in a boat or canoe past a herd of elephant drinking at the water's edge, seemingly not even noticing your presence, such are the wonders that await.

The Park is only half an hour's flight from Lusaka so easily accessible and with very few camps inside the Park it is unlikely that you will encounter other tourists during your stay.

Chiawa Camp, Old Mondoro, Sausage Tree and Chongwe are all small privately owned camps that have helped to build the strong reputation that this Park now enjoys.

LIVINGSTONE & THE VICTORIA FALLS

One of the seven natural wonders of the world, as the mighty Zambezi River plunges over 100 metres into the gorge below it forms the largest waterfall by volume in the world. Livingstone Town has become known over years as the adrenalin capital of Africa but one does not need to bungee jump or swing across the gorge in order to enjoy the spectacle, there are plenty more sedate ways of taking in the scene. Livingstone Island sits in the middle of the river perched at the top of the Falls and affords its few guests a unique vantage point whilst the historic Royal Livingstone Express steam-train stops for a while on the bridge between cocktails and a six course dinner complete with all the finery of years gone by.

The Royal Livingstone Hotel commands one of the finest views in the area but the private camps, up-stream away from the hustle and bustle of the Falls themselves, offer tranquility and personal service beyond compare, Tongabezi and The River Club being but two of the finest.

A 12 night itinerary combining the more cost effective camps in the Luangwa, Lower Zambezi and Livingstone will start at £4,850 per person in 2017. A more luxurious 12 nights in these three destinations will start at £5,500. Costs include everything except international flights.

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Q&A

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OUR EXPERTS

RICHARD JONES is a writer and entomologist with a fondness for dung beetles.

MIKE TOMS is an author and associate director at the British Trust for Ornithology (BTO).

SARAH MCPHERSON edits the monthly Q&A pages. Send her your questions.

CAT GORDON is a marine biologist and is conservation officer at the Shark Trust

JAKE STONE is a research biologist and county terrestrial mollusc recorder for Norfolk.

Q INSECTS

Why do horseflies have such pretty eyes?

A Blood-sucking horseflies are renowned for their bright eyes, marked with contrasting coloured dots, bars or zig-zags. Like most insect eyes, those of horseflies are packed with hundreds (or thousands) of individual light-sensitive columns known as ommatidia (only the near-circular lens facets on the outside are visible). These combine to create the broad 'compound eye' that covers most of the sides of the creature's head.

Though some males have zones of enlarged facets along the top of the eyes, thought to help with hovering behaviour, the colour patterns are independent of these and occur in both sexes. These hues are created not by pigments but by the light-refracting qualities of neighbouring groups of facets, determined by the densities of the lens cuticles.

So, an individual may be able to detect more subtle contrasts in its field of vision by effectively giving different optical properties to different parts of its eye. **Richard Jones**

Horsefly eye colour patterns are species-specific, so may assist in mate recognition.

EMAIL YOUR QUESTIONS TO

wildquestions@immediate.co.uk

or post to Q&A, *BBC Wildlife Magazine*, Immediate Media Company, 2nd Floor, Tower House, Fairfax Street, Bristol BS1 3BN

Male house sparrows display a black bib, a signal of quality to the females.

Q BIRDS

Is it normal for house sparrow bibs to vary?

A Yes – the black 'bibs' sported by the males do vary in size. Researchers have found that bib size is linked to social status, age and sexual behaviour. Males with larger bibs obtain mates earlier in the breeding season, copulate more frequently and engage in a greater number of extra-pair copulations (matings with females that are not their partner). Their breeding territories have a bigger proportion of breeding sites, and they participate more often in communal displays.

Since female house sparrows actively select males with larger bibs, size does seem to provide an honest signal of quality, though there is still uncertainty over which aspects exactly. Investing in the black (melanin-based) plumage carries a cost for the male, so males that can afford to cover this outgoing are perhaps signalling that they are more fertile or will father better quality offspring.

Smaller-bibbed males end up occupying poorer quality territories and may be forced to feed in riskier locations than their larger-bibbed rivals, who dominate the best sites. **Mike Toms**

Q RECORD-BREAKERS

What's the world's fastest snake?

A This title goes to the black mamba, a snake that occurs in the dry bushlands of eastern Africa and is well known for its neurotoxic venom. A largely terrestrial species that can reach approximately 4m in length, the black mamba has been recorded travelling at speeds of up to 15kmph on open ground. It moves using 'lateral undulation', which essentially involves moving in an 'S' shape and pushing off objects in its path, such as trees, rocks or even piles of soil or dirt, to gain momentum. This is an agile and aggressive snake, readily entering burrows and climbing trees when chasing down its small mammal prey. It's strong, too, able to lift one third of its body vertically off the ground to look you (almost) in the eye. **Sarah McPherson**

The black mamba is actually grey – it's named for its black mouth lining.

Q SHARKS

Do threshers use their tails to hunt?

A They do. Working alone or in small groups, thresher sharks corral small to medium-sized schooling fish, then stun and disorientate them using their long, scythe-like tails. To initiate a strike, a shark accelerates towards the fish, puts the brakes on by pulling its pectoral fins together, then delivers the powerful tail-slap, either from the side or overhead. These strikes can be highly effective, as several fish can be stunned with one slap. There are three thresher species – the pelagic, common and bigeye. All are widespread and found in tropical to cold temperate seas. **Cat Gordon**

A thresher's tail accounts for half its length.

Horsefly: K m Tay or/naturep. com; sparrow: S mon L tten/FLPA; mamba: Je ger Herder/Bu ten-beeld/Minden/FLPA; thresher: Doug Perrine/naturep. com


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WHAT IS IT?

A male giant water bug and his offspring.

There aren't many species in which fathers care for their young single-handedly. There are sea horses, of course, a smattering of other fish, frogs and birds, and 150-odd insects – almost all of which are giant water bugs. These fearsome freshwater predators – known in the US as 'toe-biters' – reach 12cm long and can tackle fish, amphibians and baby turtles, sucking out their innards through syringe-like mouthparts.

The eggs develop only if they are exposed to oxygen-rich air at the surface. Keeping them there requires time rather than effort – time that the females, who must feed regularly to fuel egg production, don't have. So the males are left quite literally shouldering the responsibility. **Stuart Blackman**

Water bug: Jaki Good photography/Getty; owl: Paul Hobson/NPL; shrew: Klein & Hubert/NPL

Distinctive ear tufts make the long-eared owl easy to identify.

Q BIRDS

What are owl ear-tufts for, if not hearing?

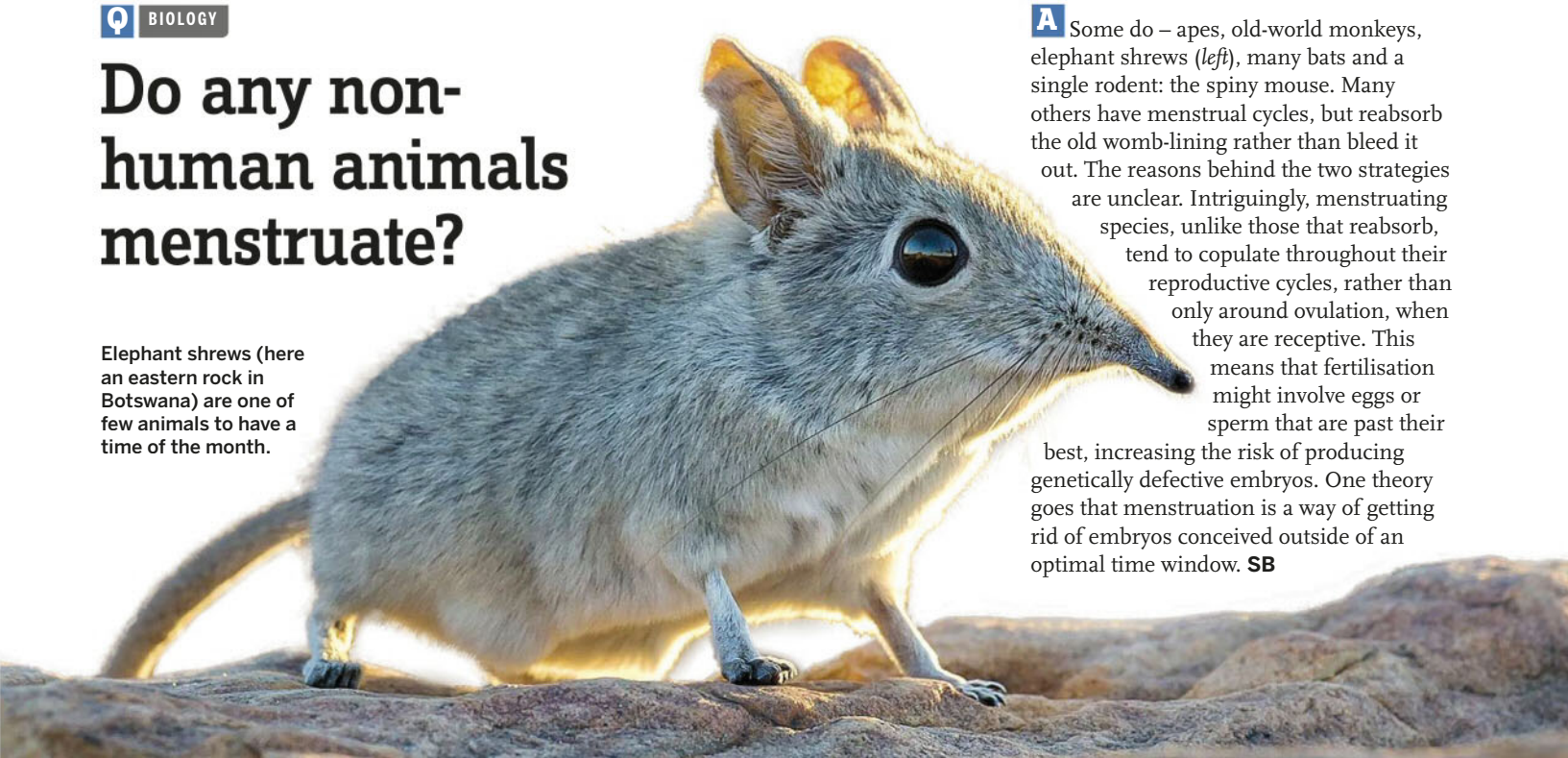
A Roughly a third of owl species worldwide have ear tufts or 'horns'. These appendages are mainly used for display and visual communication, but are also thought to play a role in camouflage, breaking up the bird's outline against its background.

Each tuft is comprised of one or more feathers (those of the long-eared owl have 6–8). These are usually flattened against the head and thus difficult to see, but are swiftly raised when an individual is agitated by a potential intruder and needs to carry out its threat display. Owls will sometimes raise their ear tufts at human observers, and long-eared owls are also known to raise theirs during the display-flight used to advertise ownership of a breeding territory.

Ear tufts play no role in hearing – an owl's ears are located lower down on its head, on the margin of the facial disk. In fact, there are no obvious external signs of their presence. **Mike Toms**

Q BIOLOGY

Do any non-human animals menstruate?



Elephant shrews (here an eastern rock in Botswana) are one of few animals to have a time of the month.

A Some do – apes, old-world monkeys, elephant shrews (*left*), many bats and a single rodent: the spiny mouse. Many others have menstrual cycles, but reabsorb the old womb-lining rather than bleed it out. The reasons behind the two strategies are unclear. Intriguingly, menstruating species, unlike those that reabsorb, tend to copulate throughout their reproductive cycles, rather than only around ovulation, when they are receptive. This means that fertilisation might involve eggs or sperm that are past their best, increasing the risk of producing genetically defective embryos. One theory goes that menstruation is a way of getting rid of embryos conceived outside of an optimal time window. **SB**

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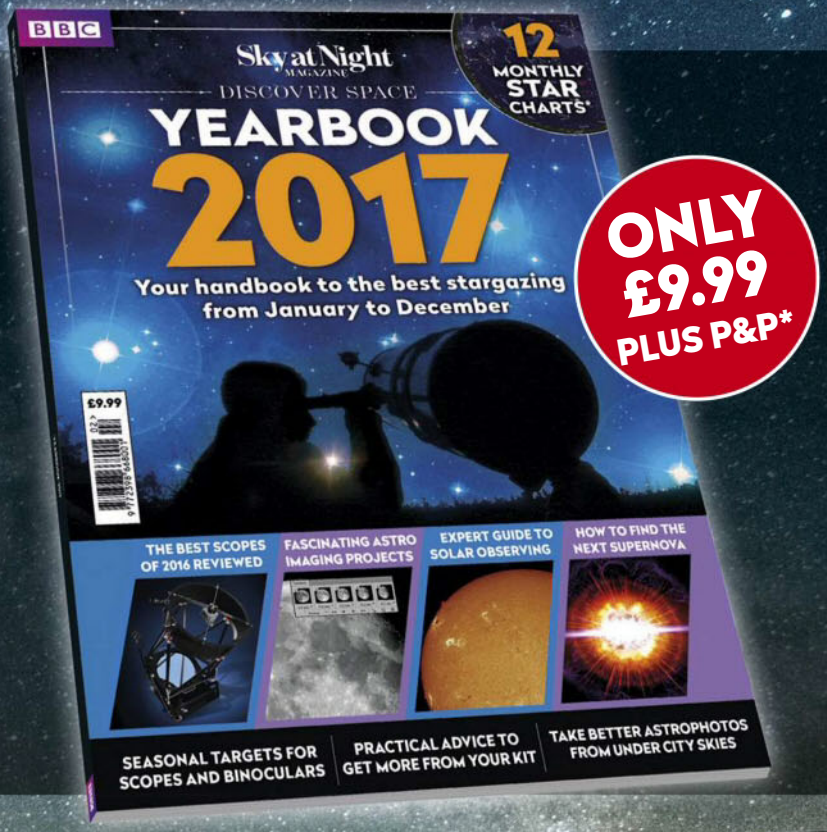

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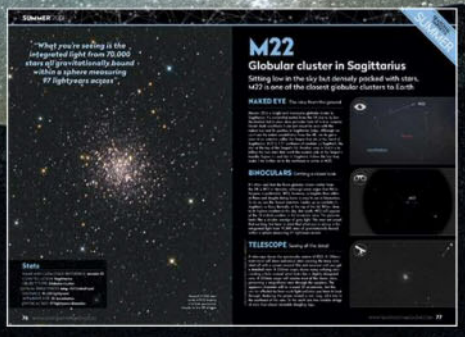

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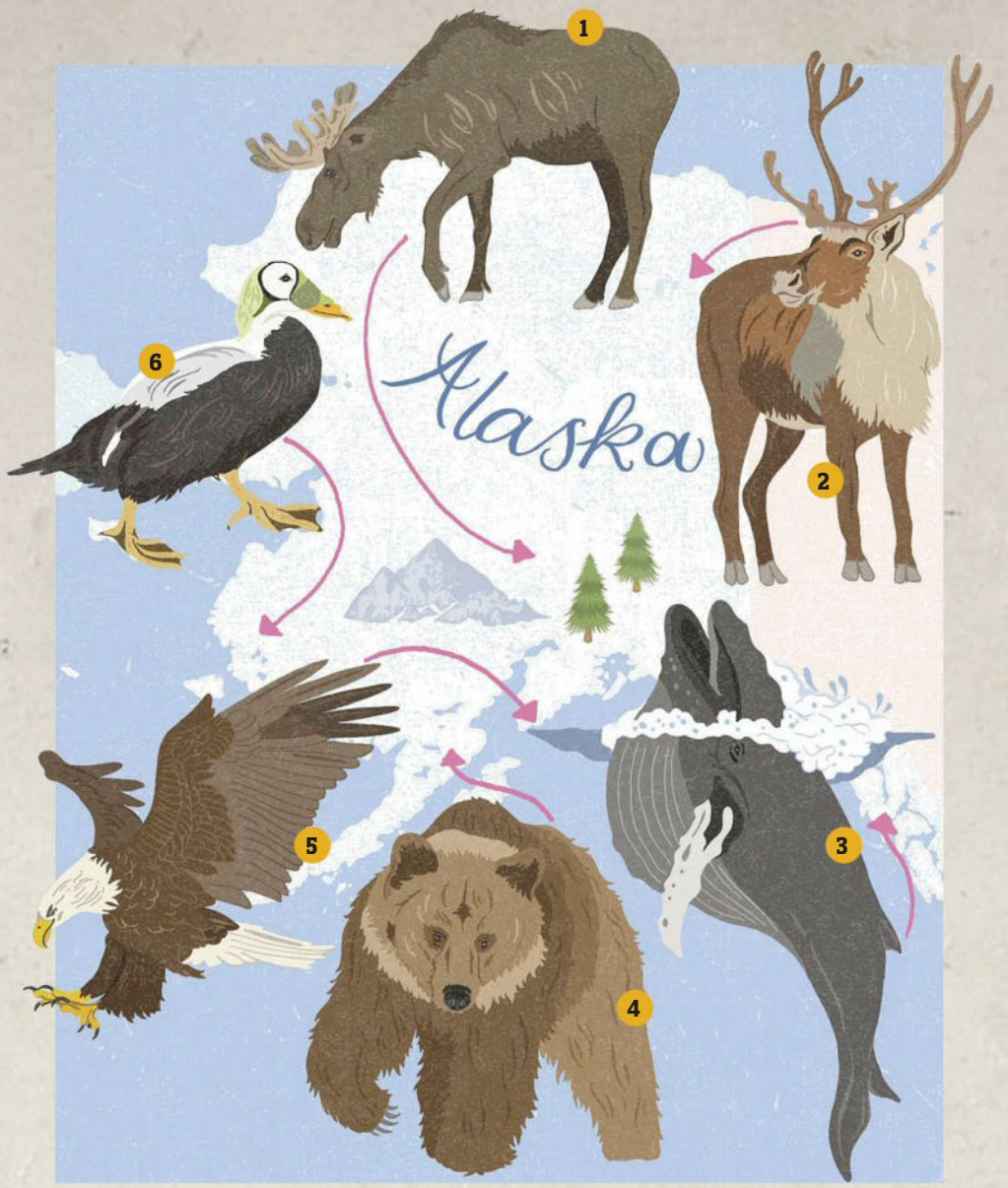

Illustrat on by Dawn Cooper; volunteers: Frog fe

WHAT CAN I SEE IN...

Alaska

If you can withstand the cold, this sparsely populated US state is known for its diverse terrain and abundant wildlife.

1 MOOSE
Denali NP
The big open spaces of Denali NP don't always make for easy wildlife viewing, but standing – as they can – up to 2.3m at the shoulder, moose (close cousins of our European elk) are hard to miss.

2 CARIBOU
Arctic NWR
With its famous Porcupine caribou herd some 150,000 strong, the Arctic NWR could justifiably bag the label as America's Serengeti. Perhaps a little chillier, but you won't see as many 4x4s.

3 HUMPBACK WHALE
Chatham Strait
These are not just any humpback whales – they are bubble-netting humpback whales, and they have been the subject of a unique scientific study stretching back 20 years.

4 BROWN BEAR
Katmai NP
The sight of dozens of brown bears lining up for a salmon supper is one of the world's great wildlife spectacles – Brook Falls in September in Katmai is the place to go.

5 BALD EAGLE
Homer
Bald eagles, it has been remarked (in this very magazine), inhabit the small city of Homer in a density akin to the pigeons of Trafalgar Square. This is one raptor you won't need the spotting scope for.

6 SPECTACLED EIDER
Yukon Delta NWR
You could go to Yukon Delta to get a glimpse of its millions of waterbirds, but the rarer spectacled eider duck – yes, a relative of our own common eider – would make for an unusual tick.

VOLUNTEERING

HOW CAN I HELP...

Froglife

What does the charity do?
We are committed to the conservation of amphibians and reptiles and the habitats they depend on. *Dragon Finder* (funded by the Heritage Lottery Fund) is our flagship volunteer project, bringing together a mix of practical conservation, surveying, data collection and educational activities. It takes place in London; the River Nene area (Cambs, Northants, Huntingdonshire and Lincs); and also in Scotland.

What do volunteers do?
Lots of activities, from helping at events to getting stuck in with spades at pond-sites and creating hibernacula (hibernation sites made of dead wood, stones, rubble or soil).

What's a recent achievement?
Our volunteers have achieved a huge amount. Those involved in the Scottish *Dragon Finder*, for instance, have dug or improved more than 30 ponds, created 11 hibernacula and helped to deliver 30 events across the country. Together they've contributed more than 1,100 hours since the project began in 2014.

How much time do you request from volunteers?
There is no minimum time commitment – our events and volunteer sessions usually run for 4–5 hours on the day.

What do your volunteers enjoy most?
Working in nature and making a positive impact on our wildlife. They are creating fantastic habitat and there's a very positive community spirit.

● **James Stead www.froglife.org**

Many hands make new homes for native frogs and amphibians.

INSECTS

How can plume moths fly on such narrow wings?

The white plume moth flies June to September.

A Plume moths are named for their slim, feathery wings, which they hold out almost at right angles to the body when at rest. This makes them twiggy and un-moth-like; it also makes them rather feeble fliers. They can fly, nevertheless, and the aerofoils of the wings are wider than they first appear because they are furled closed at rest.

Insect flight is not just a matter of flapping broad wings to get airborne. Many moths are broad-winged, but hawkmoths, which are incredibly agile fliers, have narrow, slim wings. Some of these are long-distance migrants, able to negotiate mountain ranges and the open sea, and their wing shapes mirror those of bird aeronauts such as swallows and swifts. Plume moths might be less fast and furious, but their wing shapes are perfectly adequate for a life of fluttering in the herbage, woodland edge or meadowland hedge. **RJ**

MOLLUSCS

Do slugs freeze in winter?

A Some do, but slugs are surprisingly adept at surviving freezing conditions – very low temperatures do not have a particularly negative impact on overall numbers for the following year.

In winter, slugs seek out thermally buffered hibernation sites where temperatures rarely dip below 0°C. These are usually underground and provide protection from the worst winter frosts.

Studies also show that even if slugs are directly exposed to frost crystals, both juveniles and adults of most species are able to withstand the formation of extra-cellular ice in their tissues for a limited time. Slug eggs also overwinter in large numbers, probably surviving the chill by 'supercooling' – lowering their normal freezing points. **Jake Stone**

Slugs can keep out the cold.

FISH

Why do mirror carp lack scales?

A Mirror carp are a domestic breed of common carp that bear just a few large, mirror-like scales, which leaves much of their underlying skin exposed. Today they are prized by anglers, though they were originally bred for ease of preparation for the table. The lack of scales makes them vulnerable in the wild. The descendants of mirror carp introduced to Madagascar in 1912 have already re-evolved full body armour. Intriguingly, though, these fish still carry the mirror mutation. Unable to reverse the genetic changes that breeders had made, evolution found another mechanism to re-scale the fish using different genes. **SB**

Valued by anglers: mirror carp have irregular and patchy scaling.

Plume moth & slug eyes: Imagebroker/FLPA; slug body: Jeger Herder/Buiten-beeld/Minden/FLPA; carp: Colin M Kris/Getty

YOUR FEEDBACK

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LETTER OF THE MONTH

Otters must eat almost a fifth of their bodyweight each day to keep warm in cold waters.

SATURDAY IS OTTER DAY

My normal Saturday suddenly became unusual a few weeks ago when I spotted something trembling by the wall of my house. It was covered in mud but eventually I could see that the creature was an otter. I gave it some dry dog food in water. It seemed tame and would mew in response to me talking to it, but the long, sharp incisors in its mouth ensured I kept my distance. Gaining strength quickly, it inspected the garden, excreted, and cleaned itself, which allowed me to admire its beautiful form. Once recovered from whatever ordeal it had been through, the animal found its way back to the River Frome, Dorset, while I followed at a distance. For two hours I had a very privileged afternoon.

Ruth Lanigan, Dorset

Ruth's visitor recovers before returning to the river.

BE A WINNING WRITER

The Letter of the Month wins a pair of HI-TEC Altitude Lite I waterproof boots, worth £59.99 and perfect for hiking. They are available in sizes 7–13 for men and 4–8 for women. For more information visit www.hi-tec.co.uk

A bird's-eye view

I thoroughly enjoyed October's issue of *BBC Wildlife Magazine*, especially the gelada feature 'King of the Mountains' and Mike Toms's piece on tawny owls. However, I would question whether it's a 'cost' for a tawny owl to have a "visual field 40° narrower than that of a European starling". Surely this is an advantage? Most predatory species have binocular vision – it's important for good aim and direction. An owl with a field of vision the same as a prey species, such as a starling, would undoubtedly have fewer successful kills.

Brendan Walsh, Dublin

Mike Toms replies: *Binocular vision is an important component of the owl's armoury, enabling the bird to judge the distance to a prey item more accurately. The 'cost' that comes from having the eyes located at the front of the head, which enables binocular vision, is a reduction in peripheral vision, something that's useful for spotting predators and other dangers. In fact, owls compromise on both peripheral and binocular vision by having their eyes angled outwards by about 55°. Human eyes diverge by just 10°, giving us a binocular field of roughly 140°, much bigger than the 50° achieved by owls.*

Mysterious digging

My front lawn is regularly being peppered with squirrel-like holes, although they are slightly larger and they're left

BLOGGER OF THE MONTH

This month's winner is CharoftheShire whose trips around Salisbury and the New Forest give her plenty to write about. Read her blog at **wildsalisbury.blogspot.co.uk**. Visit **www.discoverwildlife.com** to find out how you can join our Local Patch Reporters project.

Otter: James Warwick/Getty; humpback: Barrett & MacKay/Getty

ONLINE PHOTO CONTEST
THEME: ISLAND WILDLIFE

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1 MALDIVIAN HOUSE CROW, Maldives, by Jonathan Proud
2 ISLAND FOX, Santa Cruz Island, California, by Ben McBee
3 HERMIT CRAB Koh Lipe, Thailand, by Emma Johnson

uncovered. It happens at night and a neighbour has also heard squealing sounds made by more than one animal.
Derek Thorpe, Abbots Langley

Features editor Ben Hoare replies: *I can't be sure, but I suspect these are badger 'snuffle holes'. Badgers often visit soft lawns (including mine) to look for earthworms. Badgers aren't the noisiest of mammals, though, so the noises you heard might suggest something else is also visiting your garden. Search for audio clips of their vocalisations online and you might get a better idea of whether it's badgers or some other mammal.*

Lady birders

I'd like to thank you for the excellent 'Wonder Women' feature in the November issue. Ornithology needs a real push to encourage girls to take up this enjoyable hobby. Jo Wimpenny's story acquainted me with women I'd never heard of, yet they'd all played such varied and valuable roles.

I find it strange that as a woman in my thirties, I still have to battle my way into some male-dominated bird hides. That needs to change, but how can it when mainstream advertisers insist on using male models to promote binocular and camera products. It would be nice to see both genders demonstrating equipment to encourage more women to go bird watching.
Kate Moreton, Leicestershire

Women play a vital role in ornithology.

Birds seeking seeds

I recently watched a pair of rooks repeatedly tearing cones off the top of a Corsican pine tree and flying away with them. Are these birds known to eat the seeds of cones?
Isabel Noel, Isle of Man

Jo Wimpenny replies: *Rooks, like other corvid species, are omnivorous and their core diet consists of grain, earthworms and insects. However, they will eat other things, such as root crops, peas, seeds, eggs, spiders and acorns. While they're not known for eating pine cones, they have been seen burying whole cones during the autumn, along with acorns, walnuts, scraps of human food and earthworms. Unfortunately, although there is good evidence for rooks digging up and eating acorns in winter, we know very little about what happens to the buried pine cones. It's possible they feed on them at a later date, but more evidence is needed.*

Humpback heroes

Thank you for the 'Humpback Help at Hand' story in the November issue's Discoveries' section. It proved I'm not going mad. I kept telling people I'd heard about whales rescuing seals from orcas a while ago, but all I ever got in response were pitying looks! I was beginning to think I'd dreamt it until your story appeared.
Laine Eastabrook, Cornwall

Humpback whales will chase off orcas.

Happy 50th

The Bristol Ornithological Club is 50 years old in 2017. It has been producing a monthly newsletter that logs the city and surrounding area's bird life since 1967. It also posts daily sightings on avonbirding.blogspot.co.uk. Our birthday celebrations include a dinner with writer, campaigner and former member Mark Avery as guest speaker, and the publishing of a book on the birds of Avon (free to members). The club has a thriving group of Tuesday morning walkers, and birding holidays are scheduled throughout the year. *BBC Wildlife* readers are welcome to join in so just search for BOC online to find out more.
Alison Levinson, BOC committee member

Corrections

'Giant Steps' in September stated there are about 700,000 African elephants. Numbers are actually about 415,000 elephants, although there may be 117,000–135,000 elephants in areas not systematically surveyed. Also, the link to October's blogger of the month in the digital iOS edition was not correctly activated. Read it at jiainmac.wordpress.com.

QUIZ ANSWERS (see p129)
The Wild Words are: 1B, 2B, 3B, 4C, 5A, 6B

INSIDE THE IMAGE

GREAT CRESTED GREBES POYNTON, CHESHIRE

The great crested grebe's elegant shape and elaborate courtship behaviour make it one of Britain's most fascinating birds to photograph – it's one of my all-time favourites. I'm lucky enough to live close to a lake that is home to two or three breeding pairs each year. Such proximity means I can be there at a moment's notice to take advantage of the beautiful and fleeting light that occurs in late winter.

EARLY MORNING COURTING

This image was taken during the first stages of courtship, when the birds are pairing up. I arrived at the lake well before dawn so I had time to wade into the water and settle into my floating hide – a contraption I made from planks of wood and polystyrene blocks. It's buoyant enough to support a 600mm lens, and has a camouflage canopy that I can hide behind when standing in the water at chest height.

A thin veil of mist hung in the air, and the first rays of sunlight burst into pools of gold as they hit the water. I knew the conditions were special and prayed that the birds would perform.

At first they were too far back, lurking in the shadows and barely visible through my viewfinder. Eventually, they drifted towards the light. I kept my distance to keep the birds small in the frame and show a hint of their environment. As they engaged in their head-shaking display, their elegant forms became beautifully rim-lit.

On golden pond: great crested grebe courtship at first light, captured using a floating hide (*above*) and an endurance of ice-cold, waist-deep water.

Ben Hall

DATA FILE

CAMERA Canon EOS 1D Mk II

LENS Canon 100-400mm L IS

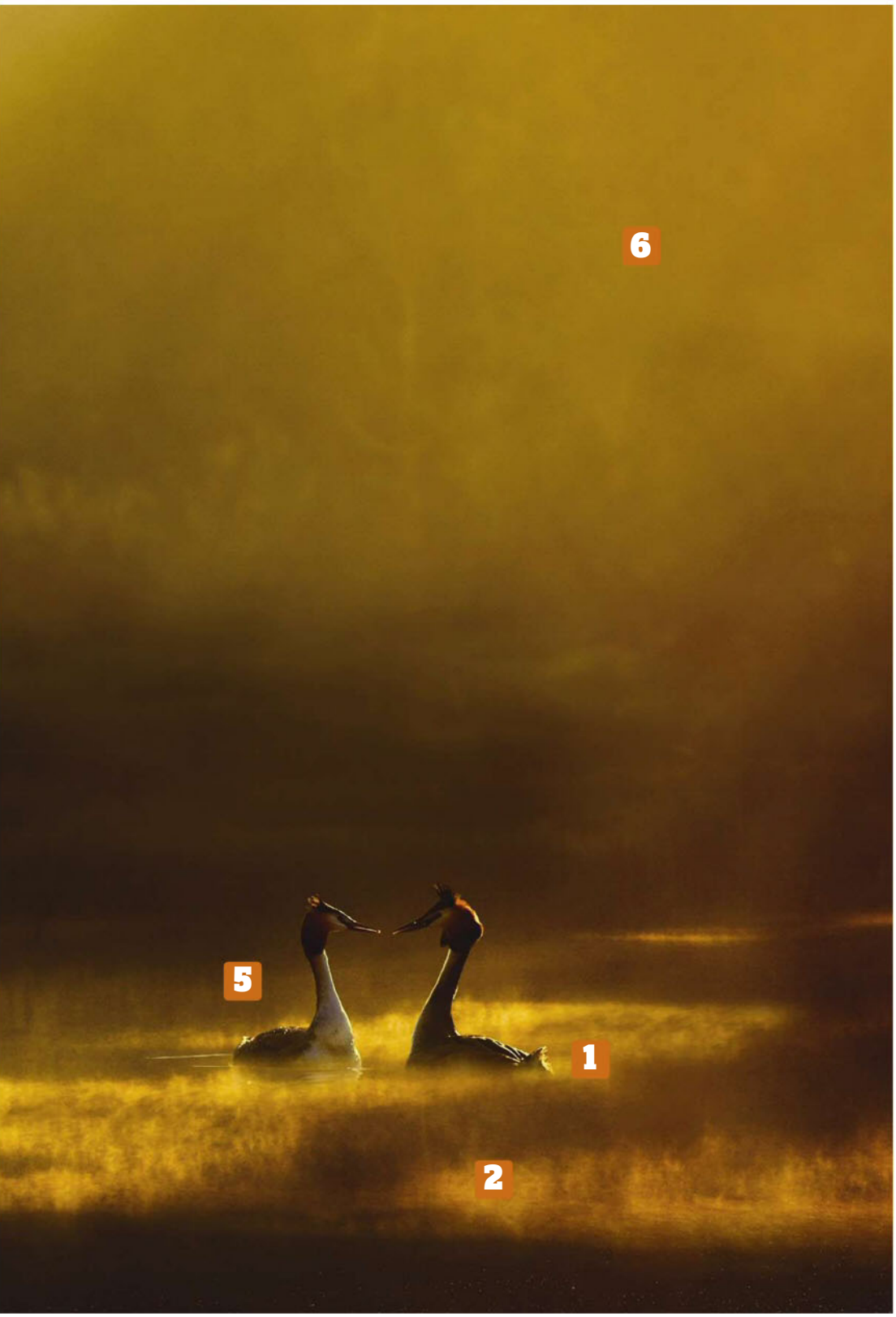
FOCAL LENGTH 130mm

EXPOSURE 1/400th sec, F5.6, ISO 100

NOTES I used a floating hide and made sure I had my neoprene waders.

THE PHOTOGRAPHER
BEN HALL

Ben is one of Britain's foremost professional wildlife photographers. He has won numerous awards and runs photography workshops in the UK and overseas. He lives on the edge of the Peak District National Park.



1 DIVIDE IT UP
I used the rule of thirds here, and positioned the birds in the bottom right-hand corner of the frame to create an effective and balanced composition.

2 LET THERE BE (A LITTLE) LIGHT
The quality of light can make or break an image. Here, the low angle of the sun has given the picture a golden hue, while shooting towards the light has captured the rim-lighting around the birds, highlighting their breeding plumage.

3 BRING IN THE BACKGROUND
I stopped the aperture of the lens down to capture some definition in the reedbed in the background. It doesn't distract from the grebes, but is enough to hint at their environment.

4 DARKEN THE SHADOWS
I dialled in some minus exposure compensation in order to preserve the detail in the highlights. This creates dark areas of shadow, adding to the depth and atmosphere.

5 FIND THE RIGHT FOCUS
As the birds were constantly moving, I switched my camera to the predictive focus mode and moved the focus point onto the bottom right intersecting third. I could then track the birds as they moved, while having the correct composition in-camera.

6 LET YOUR IMAGE BREATHE
I've allowed plenty of room at the top of the frame to show the rays of light filtering through the trees. This not only creates atmosphere, but also helps to draw the viewer's eye towards the main subject.

FIND OUT MORE
For more photo advice visit **www.discoverwildlife.com/wildlife-nature-photography/tips-and-techniques**

YOUR PHOTOS

PHOTO CHOICE

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1 OUT TO PLAY

For a long time I've tried to take a decent photo of a badger with varying amounts of success. But one summer a couple of years ago, I became aware of a pair of adults that had a set near Trondheim, Norway. They started to take their cubs out for brief periods in the early afternoon. For three days I had half an hour to catch them in good light as they played and explored. I took advantage of this fantastic chance and was delighted with the results.
Odd Larsen, Leinstrand, Norway

2 GLASS HOUSE

Encased in its glass-like egg, this Amboli bush frog can be seen clearly. I found it on a nature trail in Sawantwadi, Maharashtra, India, and returned the next day to take some photographs. Minutes after getting this shot, the amphibian and I were caught in a monsoon downpour – one that maybe encouraged it to emerge.
Shubham Kamlakar Alave, Maharashtra, India

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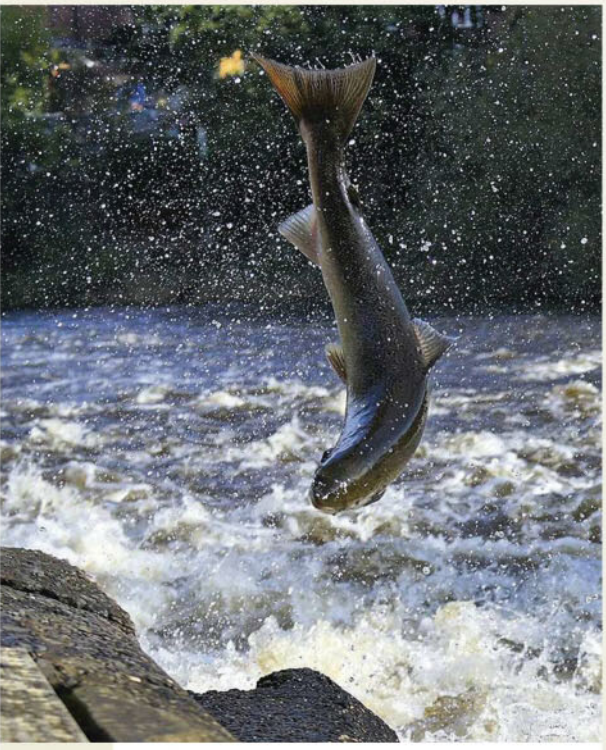

3 MOOSE ON THE MOVE

After three days of scouting the area around Jackson Hole, Wyoming, USA, I heard that some moose were visiting a nearby campsite. As soon as I arrived there I spotted some photographers huddled together and looking in one direction. I was speechless with anticipation as I set my camera up and began shooting. I'm very pleased with this picture but can't wait to try and photograph the species again.
Troy Doney, California, USA

4 AQUA-BATIC

I really enjoy watching the salmon run on the River Severn. The 2016 run seems to have been quieter than previous years' but I was still able to witness some spectacular leaps. This female Atlantic salmon was huge and the splash she made as she hit the water was enough to soak me and my camera!
Robin Bennett, Shropshire, UK

5 COMING UP FOR AIR

My wife and I love wildlife photography and spent five days at Bempton Cliffs, Yorkshire, specifically to get some photos of northern gannets. This was one of about 5,000 shots as there was so much action to capture. I was lucky to get this picture just as the seabird broke the surface of the waves with its catch.
Simon Jenkins, Hertfordshire, UK

6 ON THE ROCKS

My partner and I headed into Corsica's Bonifatu forest, but it was getting late so we decided to turn the car around after stopping to stretch our legs by some boulders. That was when I noticed a movement by my feet, looked down and saw a conehead mantis camouflaged beautifully against the rocks. The only camera I had on me was my phone, but I still managed to get this great picture of the predatory insect.
Jen Adams, Isle of Man

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Top left: Chris Breen; top right: Renato Granieri

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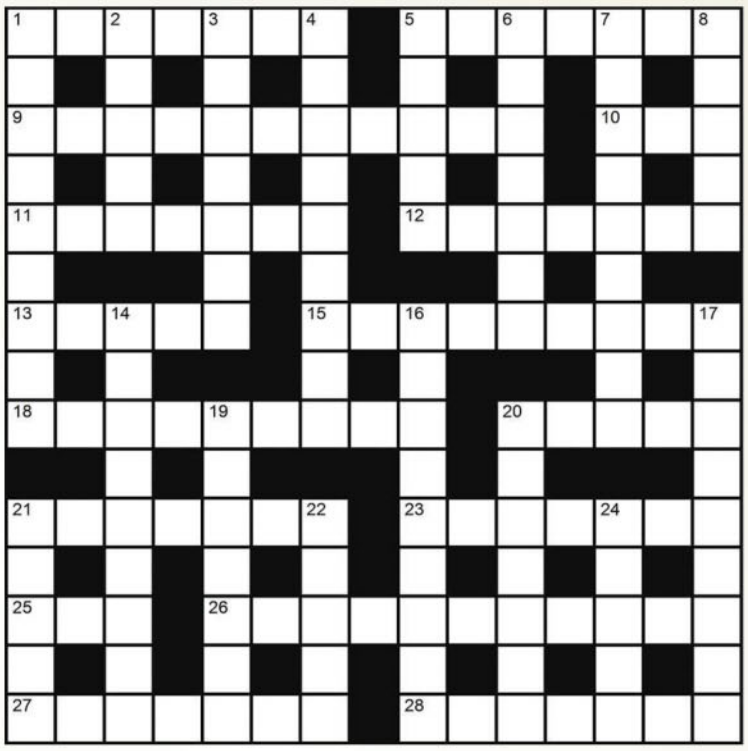
Compiled by RICHARD SMYTH



Answers in our March 2017 issue

NOVEMBER ANSWERS

Across: 8 Kakapo, 9 Moa, 10 Utah, 11 Thekla Lark, 12 Hops, 13 Tyrant, 16 Collared, 17 Skylark, 18 Panther, 22 Pangolin, 25 Jerboa, 26 Goat, 27 Oahu Thrush, 30 Pear, 31 Eel, 32 Nectar.
Down: 1 Wash, 2 Hawk, 3 Bog Aster, 4 Ambatch, 5 Baikal, 6 Bushmaster, 7 Magpie, 14 Yak, 15 Alligators, 19 Adjutant, 20 Eco, 21 Anthill, 23 Avocet, 24 Looper, 28 Rice, 29 Shag.

NOVEMBER PRIZE WINNER

Susan Rugg, Southsea

ACROSS

1 Prickly grass of the genus *Cenchrus* (7)
5 Songbird of the Indian subcontinent that can be white-bibbed, chestnut-rumped or snowy-throated (7)
9 Order of insects that includes moths and butterflies (11)
10 *Birds and* ___ is a 1920 book by William Henry Hudson (3)
11 Invertebrate such as a snail, mussel or cuttlefish (7)
12 Plants that in some cases have the ability to move when touched (7)
13 Plant diseases caused by pathogenic fungi of the order Pucciniales (5)
15 Pollinating insects of the genus *Osmia* that build nesting compartments using mud (5, 4)
18 The ___ ladybird is considered an invasive species in much of Europe (9)
20 The ___ bear, *Ursus maritimus*, is one of the world's largest land carnivores (5)
21 Butterfly of the family Hesperiidae – chequered or Lulworth, possibly (7)
23 UK island territory in the north Atlantic to which a rare species of petrel is endemic (7)
25 Carp kept in ornamental ponds (3)
26 Fast-moving ground cuckoos of Mexico and south-western USA (11)
27 ___ Moor is a stretch of Highland wilderness in Scotland, noted for its wildlife (7)
28 Species of kelp, native to the rocky western shores of North America (3, 4)

DOWN

1 Sensitive wetland habitat, important for many wading birds (9)
2 Mountainous home to the clouded leopard, corsac fox and marbled cat (5)
3 Bloodsucking parasitic insects of the family Cimicidae (7)
4 Local name for the Royal Society for the Protection of Birds in Wales (4, 5)
5 Deep-bodied freshwater fish (5)
6 The water ___ is an aquatic insect known in the USA as a backswimmer (7)
7 Name of filter feeding marine worms of the phylum *Brachiopoda* (4, 5)
8 Fairy ___ are patterns created naturally by mushrooms (5)
14 The ___ warbler is a Mediterranean bird with a black head and red eyes (9)
16 Another name for passerines (9)
17 Genus of seaweed, some kinds of which float freely on the ocean (9)
19 Species of grey-green needlegrass from around the Mediterranean, used in making fibre (7)
20 Carnivorous fish of South America (7)
21 Falcon of eastern Europe and Asia (5)
22 Small fish similar to the rudd and dace (5)
24 Ornamental plant, commonly known as caesarweed (5)

WILD WORDS

Maas van de Ruitenbeek/Minden/Getty

1) the definition for brills

A twin lambs
B the hair on a horse's eyelids
C the traces left by a stag in the underwood through which he has passed

2) the animal you associate with the adjective musteline

A a finch
B a badger
C a mouse

3) the offspring of a hawk

A a squeaker
B an eyas
C a fledgling

4) the sound made by badgers

A a grunt
B a cry
C a growl

5) the name for a male ant or male bee

A a drone
B a king
C a drake

6) the collective noun for nightingales

A a tiding
B a watch
C an exaltation

Find out the answers on p123

Questions set by ADAM JACOT DE BOINOD

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Tales from the bush

A WILD WORLD OF RIPPING YARNS

WHO?

BARBARA MEARNS
works as the editor of A Rocha International and an avid recorder of birds, dragonflies and moths

WHAT?

BEAN GEESE

WHERE?

EASTERN MONGOLIA

Bean geese pass through the vast Mongolian grasslands on their way to Siberia, where they spend the summer.

I MARKED A BLOCK OF 500, THEN DIVIDED THE REST INTO BLOCKS OF ABOUT THE SAME SIZE, AND REACHED 14,000.

Citrine wagtails foraged at the lake's edge, and avocets yelped overhead, while I kept my telescope on a flock of some 100 marsh sandpipers feeding in the water.

It was May, and I was with the Mongolian Ornithological Society on a holiday scheduled to coincide with the peak migration season. As ever, Bayanaa, our guide, was scanning the area to make sure we didn't miss anything. "Look at all the geese!" he said. Beyond the far shore were thousands of birds, blurry in the heat haze. But what were they?

We made our base near another shallow lake amidst the vast arid steppe, surrounded by goose droppings and light brown feathers that suggested the flock had been around here for a while. Bayanaa went to investigate. He returned triumphant: "They're bean geese!" he exclaimed, pulling out his big red book, the *Mongolian Red List of Birds*. It told us that migrating bean geese move through in parties of between three and 20 birds, but we had just seen a flock of thousands. I wondered how so many birds could be overlooked.

"Easily," said Bayanaa. "Few people live out here and there aren't any resident ornithologists to record them."

That afternoon, a skein of bean geese flew over us. Then another, and another. There was a brief pause before the next wave appeared in long, rippling lines. I simply watched, entranced by the ravellings and unravellings of the dark strings.

After an hour and a half it was over, but I felt as though I'd had an extraordinary glimpse into the experiences of mid-19th century naturalists who described Eskimo curlew and passenger pigeon movements by the acres they covered, or the hours it took for a flock to pass. Even so, I regretted that I hadn't tried to count them.

It was near dark when the geese began to return – they had gone only a short distance to feed and would spend the night beside the lake where we were camped. But it was too dark to get any idea of numbers.

I went to sleep listening to their soft murmurings, and woke at 5am to their escalating volume. There was just enough light to see that the lake was black with the birds. Moments later the clamour peaked and, with a sudden roar of wings, a great mass of birds rose to the sky.

I marked a block of 500, then divided the rest into blocks of about the same size, and soon reached the staggering number of 14,000. Another tight mass arose, which I calculated at being 6,000-strong, then another 500 and, after a few minutes, 5,000. And so it went on.

After just half an hour they had all gone. Trembling slightly, I totted up my list, and arrived at the remarkable figure of 27,000 bean geese. It was time to rewrite that book on Mongolian birds.

MOMENTS LATER THE CLAMOUR PEAKED AND, WITH A SUDDEN ROAR OF WINGS, A GREAT MASS OF BIRDS ROSE TO THE SKY.

● Do you have a tale that you would like to share? If so, please email a synopsis of your idea to **james.fair@immediate.co.uk**

Mongolia flocks: Richard Mearns; goose: Chris van Rijswijk/Buiten-Beeld/A amy

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