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Exclusively
for ZSL Fellows

THE ZOOLOGIST

INSIDE:
Darwin Initiative,
Trawling in Greenland,
Ghana's rarest crocodile

A grass snake (*Natrix natrix*), one of the European species that tested positive for SFD

Dr Becki Lawson, research fellow, Institute of Zoology, ZSL

NEW THREAT TO BRITISH SNAKES DISCOVERED

Fungal pathogen found in wild European snakes

Europe's wild snakes could face a growing threat from snake fungal disease (SFD) according to an international collaborative study led by ZSL.

First discovered in North America in 2006 and caused by the fungus *Ophidiomyces ophiodiicola*, the disease can lead to skin lesions, crusty scales, dehydration, secondary infections and, in some cases, death of the infected animal. Of 336 samples analysed from across Great Britain and the Czech Republic, the fungus was detected in 26 specimens (8.6%). Of these, it was thought to be the direct or indirect cause of mortality in four of these animals.

However, it is unlikely that SFD is new to Europe. "DNA sequencing of the fungus strains from wild snakes in Europe showed them to be different to those from North America," said Dr Becki Lawson, research fellow at ZSL Institute of Zoology. "There is no evidence that the fungus has been introduced from North America into Europe, or vice versa. To the contrary, the research suggests that the disease has been present but undiscovered in European snakes for some time." Further research on the distribution, severity, host range, and epidemiology of SFD is needed to determine the significance of the disease to the health of wild snake populations in Europe.

Reptiles, particularly snakes, represent a massive challenge for conservationists – only approximately 52% of reptiles have been assessed by the IUCN, owing to a paucity of long-term monitoring data. This is partly down to their own reclusive behaviour, lack of funding and, in some cases, inaccessible habitats. Yet, in a rapidly changing world, it is imperative we develop our knowledge of reptiles before it is too late.

To tackle this, ZSL researchers have been pioneering data modelling and machine-learning techniques to predict species extinction risk where population data are lacking. "Certain species traits have been shown to correlate with extinction risk, and using this data and our knowledge about the distribution of species we can build a better picture of at-risk reptiles," says Dr Monika Böhm, postdoctoral researcher at ZSL Institute of Zoology. Current data collected by ZSL researchers shows that one in five reptiles is in danger of extinction due to threats from habitat loss and overexploitation. "In addition," adds Monika, "as ectotherms, most reptiles rely on their environment for heat. This could make them especially susceptible to the relatively under-studied threat of climate change."

To help learn more about the health of native animals, ZSL and several partners set up citizen-science project Garden Wildlife Health (GWH) in 2013, which investigates diseases that affect British garden wildlife species, including native reptiles such as grass snakes and adders.

To find out about getting involved go to **gardenwildlifehealth.org**, or **zsl.org/conservation/get-involved** to read more about our other citizen science initiatives. TZ

Prof Ken Norris, Director of Science, Institute of Zoology, ZSL

DEAR FELLOWS

Reasons to be cheerful

The challenges in conservation can sometimes feel daunting. We publish the *Living Planet Index*, which describes the changes in 10,000+ populations of more than 3,000 vertebrate species across the globe. It shows these populations have declined by about 50% in the last 40 years. A staggering change over a short time. How can we possibly make progress in the face of such huge changes? Don't give up hope just yet.

A few years ago, scientists showed that conservation actions had slowed down the rate at which species go extinct. To use a medical analogy, conservation is slowing down the progression of the disease. Conservation problems are not evenly distributed around the world, but actually concentrated in particular areas and countries. This helps us focus conservation resources in the places that need them most.

Interestingly, a few countries – mostly islands – have achieved improvements in the conservation status of their species. One of these islands, Mauritius, has shown dramatic changes – a 67% improvement in the conservation status of 17 target amphibian, bird and mammal species, compared with an expected 23% decline without conservation action.

Conservation can work, so what is the recipe for success? Remove the threats, acknowledge your uncertainties but don't be afraid to act, and stay involved for the long-term. The conservation challenge is immense, but we should be optimistic that by taking the right action and persevering, we can make a difference. TZ

DIARY DATES

14–15 September
Symposium: Bird behaviour in a changing world, Huxley Lecture Theatre, ZSL London Zoo

10 October 6pm
Science and Conservation Event:
10 years on the EDGE of Existence, Huxley Lecture Theatre, ZSL London Zoo.

14 November
ZSL Annual General Meeting

22–23 November
Symposium: Linking behaviour to populations and communities: How can behavioural ecology inform conservation? Huxley Lecture Theatre, ZSL London Zoo

28 November 6pm
Science and Conservation Event:
Reintroductions for saving species – meet the wildlife movers,
Huxley Lecture Theatre, ZSL London Zoo.

12 December 6pm
Science and Conservation Event:
What is the future for tropical coral reefs? – meet the wildlife movers,
Huxley Lecture Theatre, ZSL London Zoo.

13–15 December
Symposium: European Coral Reef Symposium (ERCS), University of Oxford

DEEP SEA TRAWLING

A 10-year legacy of damage

A new study led by ZSL has shed important light on the extent of damage caused to the seabed by deep-sea trawling in Arctic waters, providing guidance for future management of these vulnerable but economically-important areas.

The independent study, undertaken by ZSL at the request of Sustainable Fisheries Greenland as part of the MSC certification process for their West Greenland shrimp trawl fishery, was one of the first large-scale studies of its kind to look at benthic, or sea floor, habitats in this region.

The team from ZSL and the Greenland Institute of Natural Resources (GINR) found that deep-sea trawling poses particular threats to immobile and long-lived sea floor organisms, which form an integral part of marine ecosystems. These species, which include various cold water corals and sponges, are crucial to marine biodiversity as they offer shelter and feeding opportunities for other organisms.

Survey images of the sea floor in an area off Greenland's west coast – the site of the commercially-important shrimp trawl fishery – were compared with environmental conditions and historical fishing data, revealing that trawling has more influence on seabed species than natural environmental factors, such as sea temperature or scouring by icebergs. However, the softer sediment areas which are more widely targeted by the fishery showed greater resilience.

Lead author Dr Chris Yesson, research fellow at ZSL Institute of Zoology, said: "Our study not only shows just how damaging the practise of bottom-trawling is to seabed ecosystems, but how long this damage endures and indicates that the species most critical to these ecosystems are also those most severely affected.

"However, it is reassuring to see that the habitats most targeted by the fishery show greater recovery potential, indicating that fishing at these sites could be sustainable if managed appropriately.

"As the shifting climate makes formerly pristine areas of the Arctic increasingly accessible to commercial fishing, so it is vitally important that the scientific and fisheries communities work together to understand the likely impacts of practices such as bottom-trawling on these previously untouched ecosystems."

Sustainable Fisheries Greenland is already adapting its fishing methods to minimise the impact of trawling on the vulnerable benthic species found in the area, and ZSL staff and colleagues at GINR are in discussions with the fishing industry to ensure long term protection for vulnerable habitats. TZ

Research vessel Paamiut, used on ZSL's surveys

Slender-snouted crocodile (*Mecistops cataphractus*) © Vladimir Wrangel

ON A KNIFE'S EDGE

Conserving Ghana's slender-snouted crocodile

As ZSL's ground-breaking EDGE of Existence programme reaches its tenth anniversary, one researcher in the field has promising findings for Ghana's Critically Endangered slender-snouted crocodile (*Mecistops cataphractus*).

EDGE Fellow Emmanuel Amoah, who began working with ZSL in April 2017, has already recorded the first slender-snouted crocodile nest in Ghana – although sadly the eggs had not hatched – and identified 21 individuals, indicating a much larger population than expected.

"The slender-snouted crocodile faces severe threats from overfishing, agriculture, habitat destruction and pollution," said Emmanuel. "Finding a nest, even a failed one, indicates there are sexually mature adults in the survey area. This can help influence future development plans of the local communities and government in the area".

One of three crocodilian species native to Ghana, very little is known about them. Illegal gold mining is rife in the area, which has contributed to the pollution of waterbodies across Ghana, the depletion of fish – the crocodile's main prey – and reduction of nesting sites.

Initial reconnaissance is conducted by boat and foot to find basking crocodiles and plan the routes for the night surveys. At night, when the crocodiles are more active, Emmanuel and his team use boats to cruise waterways and high-powered torches to look for the tell-tale reflection of crocodiles' eyes. The project also involves the use of camera traps, radio trackers attached to several individuals and working with local government and communities to establish a conservation action plan.

EDGE of Existence is the world's only conservation programme to focus on animals that are both Evolutionarily Distinct (ED) and Globally Endangered (GE). The EDGE Fellowship is a mentorship programme that supports early-career conservationists in countries where priority EDGE species exist, building a global network of conservation leaders. Read more about the 68 Fellows supported by ZSL working in 36 countries at: **edgeofexistence.org** TZ

PRINCE PHILIP ZOOLOGICAL LIBRARY AND ARCHIVES

In honour of HRH The Duke of Edinburgh's longstanding support of ZSL, the ZSL Library and Archives has been renamed the Prince Philip Zoological Library and Archives.

An Honorary Fellow and the Society's President from 1960-1977, The Duke oversaw the creation of ZSL Institute of Zoology and the Prince Philip Award, which annually recognises school and college students for outstanding work in animal biology.

Professor Sir John Beddington said: "HRH The Duke of Edinburgh has made an invaluable contribution towards our aim of protecting animals and their habitats worldwide. His legacy of support will continue to inspire future generations to work for wildlife."

The Library and Archives, from which ZSL Fellows have exclusive borrowing rights, is a unique resource of zoology and animal conservation. Founded in 1826, it is one of the major zoological libraries in the world – containing more than 200,000 volumes dating back as far as the 1500s, as well as providing Fellows with on-site access to over 200 online journals. The Library is open Monday to Friday; for further details go to **zsl.org/about-us/zsl-library-collection** TZ

Net-Works volunteers collect discarded nets in the Philippines

FLAGSHIP PROJECTS RECEIVE UK GOVERNMENT FUNDING

Three ZSL projects benefit from Darwin Initiative support

The Darwin Initiative contributes to biodiversity conservation in developing countries while improving the livelihoods of people who depend on them.

Two projects to receive funding are based in the Philippines, where ZSL has been working with communities for over 20 years. The first will support the expansion of our successful Net-Works programme to develop new sustainable business models for conservation in addition to the collection of discarded nets. The second, a community-led management of the Cagayan River Basin – the largest freshwater body in the country – will establish no-take sanctuaries and implement land-use management to mitigate damage to aquatic systems.

The final project is based in Nepal, where ZSL has similarly been working for more than 20 years, and aims to ensure the protection of the Critically Endangered gharial and its freshwater habitat in Chitwan National Park. Since the mid-1990s the gharial's numbers have declined as much as 98%, making it one of the most critically threatened reptiles of the world. Alongside their protection the project aims to improve the conservation breeding centre established at the park headquarters, and engage communities in sustainable fishing and agro-biodiversity.

ZSL has received funding from the Darwin Initiative for 57 projects since the fund was established in 1992, making ZSL one of the UK's most active conservation charities overseas. TZ

All amphibians, including this Mallorcan midwife toad (*Alytes muletensis*), are under threat from chytridiomycosis © Ben Tapley

SCIENTISTS' CORNER

Q&A with Andrew Cunningham

Professor Andrew Cunningham is head of wildlife epidemiology at ZSL Institute of Zoology and specialises in wildlife population health. A global authority on disease threats to wildlife conservation, Andrew recently compiled and edited a journal issue for The Royal Society on zoonotic diseases, titled *One Health for a changing world*.

TZ: *Why are zoonotic diseases an issue?*

AC: In the past 25 years an increased emergence of zoonoses – diseases that can pass from animals to humans – such as SARS, Ebola and Zika, have threatened public health to epidemic proportions. Likewise, infectious diseases pose a growing threat to wildlife conservation, with human activities being an important way these diseases are spread. This applies to zoonoses and to diseases that only affect wildlife. A good example of the latter is amphibian chytridiomycosis, which has been implicated in the decline or extinction of over 200 amphibian species globally.

TZ: *How much is being done to address the problem?*

AC: For wildlife, not enough. The phrase 'one health' was coined to describe a holistic approach to mitigating disease, encompassing human, domestic animal, wildlife and ecological health across multiple disciplines. However, in practice, international policy makers focus on human and livestock health, with too little time and money devoted to the protection of wild species or environments. We are in the dark ages when it comes to this issue, and I am glad that organisations like ZSL shine a light on these problems.

TZ: *What action should policy-makers be taking?*

AC: The preventative measures already in place to stop the importation of diseases likely to affect humans or livestock via international trade, such as rabies or foot and mouth, do not exist for wildlife disease; it is imperative that they are created. Current restrictions are guided by the World Organisation for Animal Health but, whilst the organisation has a remit of protecting biodiversity, only two pathogens known to exclusively affect wildlife are on their list of notifiable diseases. Without international sanctions on the movement of wildlife pathogens from high risk areas, individual governments are reluctant to act in case they fall foul of World Trade Organisation rules.

TZ: *Several governments, including the UK in the case of badgers, have explored culling. Is this an effective solution to stop the spread of zoonoses?*

AC: ZSL's Professor Rosie Woodroffe has shown that culling badgers can result in the spread of tuberculosis rather than its control. This phenomenon has been shown in other situations, such as the culling of vampire bats to control rabies (which they can carry) in Peru. Bats appear to be unusually frequent hosts of diseases dangerous to humans, and are therefore often the target of culling. However, bats are keystone species – fruit bats are vital to the existence of rainforests because they pollinate flowers and disperse the seeds of forest trees. ZSL has been running a decade-long study into the ecology of pathogens carried by West African fruit bats and the hope is, by understanding the ecology of the pathogens in bats and the interactions between bats and humans, we can find ways of minimising public health risks without harming the bats – allowing us to coexist.

Read more about ZSL's work on diseases affecting wildlife here: **zsl.org/science/research/wildlife-epidemiology**

The One Health special issue of the Royal Society journal is freely available online at: **rstb.royalsocietypublishing.org/content/372/1725** **TZ**

We would love to get your feedback.

Go to zsl.org/thezoologist to send us your suggestions.

> **"International policy makers focus on human and livestock health, with too little time and money devoted to the protection of wild species or environments."**