



progress report



Stories from our partners around the world

June 2019

AMPHIBIAN SURVIVAL ALLIANCE

NEWSLETTER



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WHERE DID THE FROGS GO? AND WHY?

Stephen Fry lends voice to new frog conservation film

ZSL | **LET'S WORK
FOR WILDLIFE**

Comedian, author, writer and frog enthusiast Stephen Fry has lent his voice to an **emotive new animation** created by international conservation charity ZSL (Zoological Society of London), hoping to raise the profile of the deadly *Ranavirus* threatening UK common frogs.

Underlined by a decade of research from ZSL's Institute of Zoology, led by Dr Stephen Price – former UCL

student Samuel Pollard and student, Alice Oliver from Falmouth University collaborated to create the five-and-a-half-minute animation: '*Ranavirus* – Where did the frogs go (and why)?'

Research from ZSL, which formed the basis of the film's content, found that at least 20% of *Ranavirus* cases over the past 30 years could be attributed to human-caused introduc-

tions such as pond owners introducing fish, frog spawn or plants from other environments.

Stephen Fry said, "I remember as a child growing up, waiting excitedly until the day frogspawn appeared in my pond. I recall scooping up the eggs with unbridled joy as I watched them develop into tadpoles – sprouting back legs almost as quick as my eyes could blink.

“I’m sure I’m not the only one who has such fond memories of frogs as a child, but this joyful interaction with the natural world could soon be a thing of the past, with dreaded impacts of pollution and climate change exacerbating the spread of this virus in frogs. But there is hope, and everybody can help.”

Introduced to Great Britain by humans in the 1980s, *Ranavirus* mainly affects Common frogs (*Rana temporaria*) but could also affect other amphibians, fish and reptiles. The virus works by infecting its host’s cells, where it replicates, releasing huge numbers of new virus particles, killing the cells – and eventually its host in the process.

Stephen Price, amphibian disease expert at ZSL’s Institute of Zoology and UCL said, “We need to get people’s attention and alert them to this deadly disease unfolding in their back gardens – because they can do something about it.

“People can help stop the spread by avoiding moving potentially infected material such as spawn, tadpoles, pond water and plants into their own pond. Disinfecting footwear or pond nets before using them elsewhere will also help, while build-

ing wildlife ponds that mimic natural habitats with plants around the sides – will help frogs to keep cool which reduces the severity of the disease.”

Amphibians are vital to the world’s ecosystems, they are one of the most incredibly diverse forms of life, found on every continent except Antarctica. They are essential components of food webs; frogs and newts keep insect and slug populations in check and serve as prey for foxes and birds. Without frogs, localized ecological collapse could follow.

Former UCL-student, Samuel Pollard, who led on the animation added, “We wanted to use simple flat illustrations to portray complex and serious stories about the natural world, which meant condensing a decade of research into a five-and-a-half-minute long video, while retaining important statistics needed to stress the urgency of this issue.

“Viruses and frogs have been on the planet far longer than humans, and the video illustrates just how quickly humans have spread *Ranavirus* around the world. Amphibians have become the most threatened vertebrate group on the planet, in really no time at all.

“Frogs, and all amphibians, are facing one of the biggest wildlife health crises of our time. Unfortunately, they’re not as popular as some other species, so they don’t always get the attention they deserve. We’re hopeful that Stephen Fry’s familiar tones, combined with beautiful animation, will help us to shine a spotlight on these amazing animals.”

Members of the public can also assist by reporting sick or dead amphibians to ZSL’s Garden Wildlife Health Project, which helps track diseases affecting British garden wildlife. www.gardenwildlifehealth.org

Watch the animation narrated by Stephen Fry here: <https://youtu.be/Jg6IJUNffV4>

A Garden Wildlife Health factsheet on *Ranavirus* disease is available at <https://www.gardenwildlifehealth.org/portfolio/ranavirus-disease/>

Further information on preventing the spread of amphibian diseases can be found at https://www.gardenwildlifehealth.org/wp-content/uploads/sites/12/2019/02/Amphibian-disease-alert_June-2015.pdf



EDITORIAL

We start this editorial with an urgent call to help our partners in Ghana to protect the irreplaceable Atewa Forest – home to over 70 threatened species, including the Critically Endangered Togo Slippery Frog (*Conraua derooi*). Developments at the end of May suggest

that, despite a plea from concerned citizens and conservation scientists alike, the government may be set to approve a bauxite mine that will severely impact this Key Biodiversity Area. A protected Forest Reserve since 1926, Atewa provides vital services to surrounding settlements, including freshwater for an estimated 5 million people in Accra. Its value as a forest ecosystem protected in perpetuity far surpasses any short-term gain from a mining operation. Please learn more on page 4 and join ASA Partners such as Global Wildlife Conservation, Herp Ghana, SAVE THE FROGS! Ghana and Synchronicity Earth in protecting Atewa

Forest by signing and sharing this Change.org petition to urge the government of Ghana to convert it to a National Park.

In a typically packed and eclectic collection of stories from around the ASA partnership, we also share with you news about the *Atelopus* Survival Initiative (p.3), species assessments and conservation planning in Honduras (p.7), developing the KBA/AZE site identification process in conjunction with Red Listing (p.12), protecting the elusive Table Mountain Ghost Frog (p.10), a retrospective on the 30 years since the last Golden Toad sighting in 1989 (p.8), and the last 30 years

of the citizen science “Toads on Roads” Froglife project in the UK (p.6). Following on from a general call for more awareness-raising activities on amphibian disease at a recent major conference hosted by ZSL (p.13), Stephen Fry has lent his voice (perhaps most familiar in the context of the Harry Potter audio-books...) to the cause of teaching

the world about *Ranavirus* (p.1)! In a project lead by University College London and our partner ZSL, a short animated film has been released on the threat of *Ranavirus* to UK frog populations and what you can do to help. Finally, please visit the brand new websites recently launched for both Amphibian Survival Alliance and

Amphibian Specialist Group (p.14). ASA and ASG continue to work closely together and we hope you enjoy visiting our sites. Please get in touch with any feedback!

Helen Meredith, PhD
Executive Director
Amphibian Survival Alliance

Join the *Atelopus* Survival Initiative to help bring Harlequin Toads back from near extinction



© Fundación Atelopus

The beautiful and charismatic Harlequin Toads (*Atelopus*), which range across the Neotropics from Costa Rica down to Bolivia, are among the most threatened group of amphibians in the world. Despite their important role in cultures they touch across their distribution and their vital role in the ecosystems in which they live, entire species of harlequin toads have been vanishing since the 1980s. The deadly amphibian chytrid fungus (*Batrachochytrium dendrobatidis* – *Bd*), combined with habitat destruction and degradation, introduction of invasive species such as Rainbow Trout, and the effects of climate change, have left 80 of the 96 harlequin toad species Endangered, Critically Endangered, Extinct or, like the Panamanian Golden

Toad, Extinct in the Wild, according to the IUCN Red List of Threatened Species. As of 2018, 37 harlequin frog species had disappeared from their known localities and have not been seen since the early 2000s, despite efforts to find them. The *Atelopus* genus is in critical condition, and its rapid and poorly explained declines are driving the entire genus to extinction. Without a coordinated response of the most effective actions, we risk losing this incredible genus to extinction.

Global Wildlife Conservation, in partnership with the Smithsonian Conservation Biology Institute, Amphibian Survival Alliance, IUCN SSC Amphibian Specialist Group, Amphibian Ark, and others, is

spearheading efforts to develop and foster a coordinated harlequin toad conservation network committed to ensuring we don't lose these jewels forever.

We are calling for ASA partners to join a network of national and international conservation groups and zoos, academic institutions and governments working together to implement substantial, long-term, range-wide conservation measures for this unique group of amphibians. The *Atelopus* Survival Initiative and the members of the network together aim to:

- Unite and mobilize the harlequin toad community into a collaborative network.

- Develop a coordinated, standardized, and long-term conservation strategy to ensure harlequin toad survival inside and outside of their natural ranges.
- Identify and implement priority actions collectively at the national, regional, and international level to save this group of amphibians across the range countries in a cost-effective way.
- Promote the conservation of harlequin toads through education and communication campaigns.
- Provide capacity building and training to herpetologists and amphibian conservationists.

As a first step to accomplish this, we will conduct a 4-day workshop in Medellin, Colombia in November with key *Atelopus* experts and

conservationists working across range country and internationally *in-situ* and *ex-situ*. The workshop will establish the initiative's mission, vision, form, and function, update the current conservation status of the genus, share and standardize conservation actions, and formulate a roadmap of actions to be implemented collectively. This roadmap will form the basis of an action plan that will prioritize the conservation needs and strategies by site, country, and species, and will define the implementation of those actions based on the capacity and cost needs, as well as the opportunities present.

ASA partners can support these efforts in several ways. We're looking for your expertise and initiative partners and for funding to implement

the goals of the initiative. Together we can restore harlequin toads and protect their habitat. If you're interested in joining this critical initiative, please contact Lina Valencia at lvalencia@globalwildlife.org.



**GLOBAL
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Ghana set to sacrifice irreplaceable forest and water sources for 5 million people for bauxite mine



© Jeremy Lindsay / A Rocha International

Despite vehement opposition from local communities and international conservation organisations, the Ghanaian government seems determined to proceed with a destructive bauxite mine in the Atewa Forest – a globally important ecosystem that harbours extraordinary wildlife and

provides water for 5 million people. The recent decision to send bulldozers in to start clearing access roads shows that the authorities have decided to plough ahead with the controversial project. If completed, the mine would destroy the forest – one of the world's Key Biodiversity

Areas (KBA) and home to more than 100 globally threatened species. Designated as a Forest Reserve in 1926, the Atewa forest is also a critical water source, housing the headwaters of the Birim, Densu and Ayensu rivers, which provide water to local communities as well as mil-

lions of people downstream, including in the capital, Accra.

“Despite the government’s assertions, bauxite mining would forever destroy the Atewa forest, leaving extinct species and dried up water sources in its wake,” said Daryl Bosu, deputy national director of A Rocha Ghana, part of a coalition of conservation organisations with over 15 million supporters worldwide that are calling on the government to abandon plans to mine the forest and instead declare it a National Park.

Over 20,000 people have already signed a **petition** calling on the government to declare Atewa Forest a National Park.

“It is still not too late for the government to stop this disastrous mine in its tracks and instead champion Ghana’s incredibly rich natural heritage and the interests of the five million Ghanaians who depend on Atewa Forest for their water,” added Bosu.

Unlike Ghana’s existing bauxite mine at Awaso, which locals describe as a “desert of red mud,” Atewa Forest is teeming with life, home to at least 50 mammal species, more than 1,000 species of plants, at least 230 species of birds and more than 570 butterflies – some of which are found nowhere else in the world. Mining Atewa Forest for bauxite, the main ingredient in aluminium, would push a number of species even closer to extinction, including the endangered white-naped mangabey, the critically endangered togo slippery frog, and the Afia Birago puddle frog, which was only discovered in 2017.

The government’s decision to start tearing down the forest comes just a month after a landmark report by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which highlighted the threat posed to

humanity by the rapid loss of biodiversity and called for urgent global action to reverse the trend.

A recent Global Forest Watch report also estimated that there had been a 60% increase in Ghana’s tropical primary rainforest loss in 2018 compared to 2017, the highest in the world.

“The recent UN biodiversity report was crystal clear: protect wildlife or all life on Earth will suffer, including humans,” said Russ Mittermeier, GWC’s Chief Conservation Officer and chair of the IUCN SSC Primate Specialist Group. “The government of Ghana has a tremendous opportunity to demonstrate that it is committed to preserving the country’s natural life support system and ecosystems that are critical for the health of the global environment by preventing mining in the Atewa Forest and instead designating it a national park.”

In 2016, A Rocha and partners **published a report** that showed that protecting Atewa Forest as a national park with a well-managed buffer zone around it – rather than mining it for bauxite – had the highest economic value for the country over 25 years, with tremendous benefits to communities both upstream and down.

A recent US government report concluded that “given the scale, duration, and potential significant and permanent impact of Ghana’s Integrated Bauxite Plan, on the Atewa Forest Reserve and water supply of over 5 million people, it is critical to evaluate a range of development and management options (including ... alternatives to mining) to protect drinking water and other ecosystem services.”

Funds from the bauxite mine will be used to repay the Chinese company, Sinohydro, for infrastructure projects in Ghana. SRK Consulting, a global company with offices in Eu-

rope and the US, has been contracted to develop the mine plan, with initial reports due this month.

“The Ghanaian government must prioritize what is invaluable for the people of Ghana: Atewa Forest is the crown jewel of the country’s biodiversity and the water towers for three major river systems,” said Frederick Kwame Kumah, WWF Africa Region Director. “Bauxite mining in Atewa will cause unimaginable destruction to the forest and river ecosystems and directly impact people’s basic livelihoods.”

Simon Stuart, Synchronicity Earth’s Director of Strategic Conservation added “if mining proceeds in the Atewa Forest, not only will we seal the fate of several species, including two endemic frogs, but we also set the appalling precedent that mining can proceed in hugely important places for biodiversity without an Environmental Impact Assessment. We call on the Government of Ghana to cancel this project and to stop the damage before it is too late.”



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amphibian survival alliance

Toads on Roads – 30 years of citizen science

Toads on Roads is a long-term UK-based project coordinated by the charity Froglife. Each year hundreds of 'toad patrollers' go out in mild conditions after dusk in early spring to help toads that are trying to reach their breeding sites. Common Toads (*Bufo bufo*) breed in ancestral ponds and follow habitual migration routes to reach their breeding sites. Hundreds or thousands of toads may congregate at breeding ponds for just a few weeks each year. Unfortunately, migration routes often take toads across roads, and adults experience high levels of mortality. Toad patrollers are vital in helping the toads to reach their ponds safely. Since the first patrols were set up in the early 1980s, over 1.5

million common toads have been helped across roads by dedicated volunteers. Froglife has over 180 registered active toad patrols in the UK and in 2018 over 98,000 toads were saved from traffic collisions by volunteers. However, despite these huge efforts, Common Toads are in decline and research by Froglife and the University of Zurich has shown that this species has declined by 68% over the past 30 years across parts of England (Petrovan & Schmidt, 2016).

Froglife are committed to identifying the causes of the decline in the Common Toad. This year we are investigating the potential impacts of roads on juvenile Common Toads.

Each summer, hundreds of thousands of newly emerged juvenile toads leave ponds and disperse into surrounding habitats to seek suitable foraging areas. There is a high risk that juveniles encounter and try to cross roads. The degree of the problem is not yet known since juveniles are very small (less than 10 mm) and are highly secretive. However, if high numbers of juveniles are being killed on roads each year, this will have impacts on recruitment into the adult population and potentially lead to population declines. Currently, toad patrollers only help adult toads cross roads to reach breeding ponds in the spring. However, Froglife is carrying out a trial research project with toad patrollers to determine the risk posed to juveniles during summer dispersal. This July groups of volunteers are going to be walking around traditional toad breeding ponds looking for juveniles and monitoring their dispersal routes. This will provide valuable information on the movements of juveniles and will enable Froglife to develop further conservation actions for the common toad.

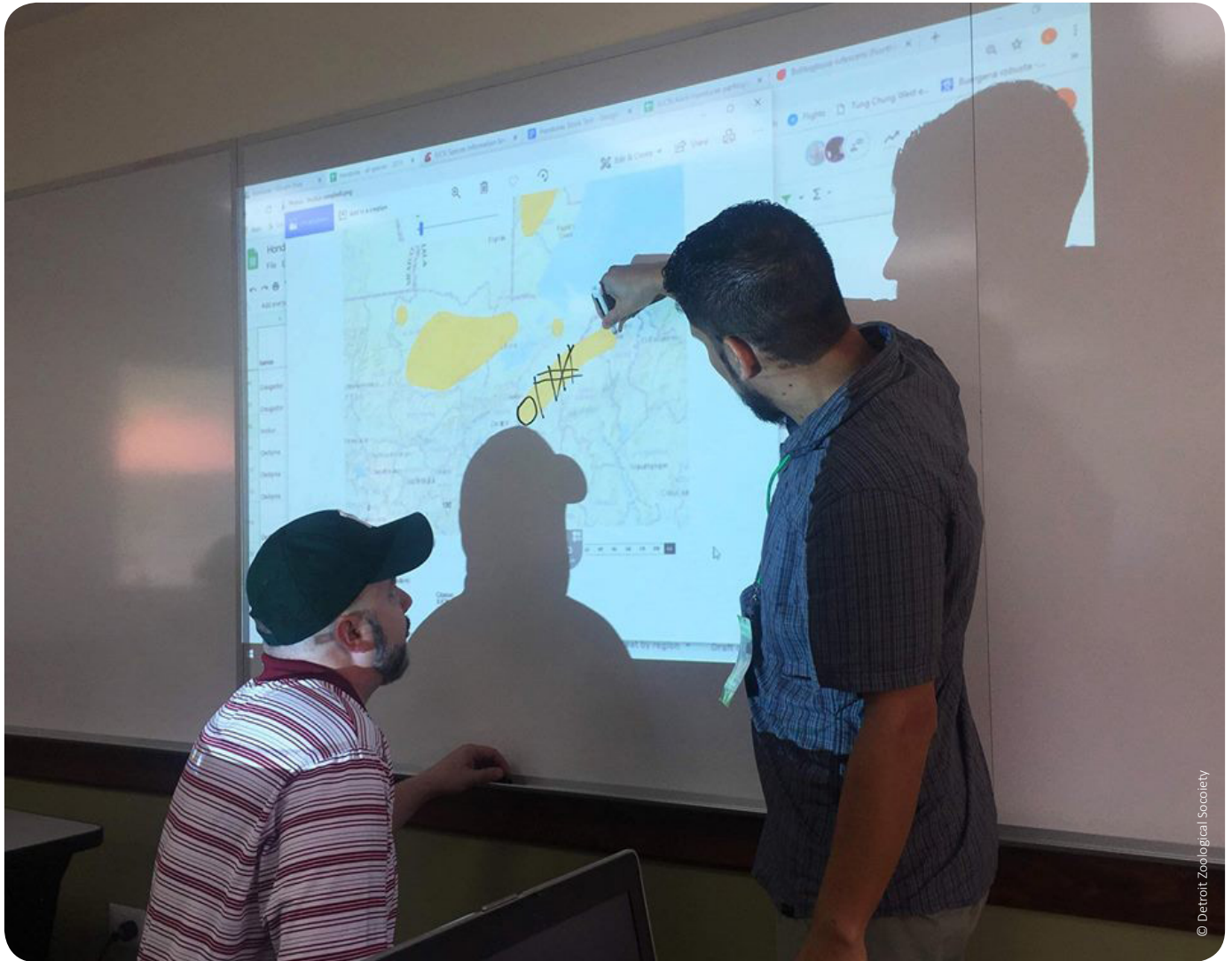
Reference:

Petrovan, S. P. & Schmidt, B. R. (2016). Volunteer conservation action data reveals large-scale and long-term negative population trends of a widespread amphibian, the common toad (*Bufo bufo*). PLOS ONE, 11 (10), e0161943. doi:10.1371/journal.pone.0161943.



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Amphibian Red List workshop in Honduras

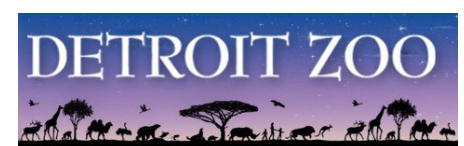
The Detroit Zoological Society is a supporter of amphibian conservation in Honduras, as it is a key biodiversity region, with many amphibians facing the threat of extinction. Recognizing this support, at the end of 2018, the International Union for the Conservation of Nature (IUCN) approached the Detroit Zoological Society and asked them to host an Amphibian Red List workshop in Honduras. The zoo was excited to help gain an understanding of the conservation needs of the unique amphibians of this country. This IUCN assessment of amphibians was the first assessment of the amphibian species in Honduras for over 15 years. The assessment was held in country, as it was critical for the participation of local experts with

intimate knowledge of the country's amphibians. Local experts' knowledge of current assets and constraints was also critical in discussion of future steps for protecting species in critical need. To assess the animals, the Honduran amphibian experts were assembled at la Universidad Zamarano outside Tegucigalpa for a four day workshop. Over the four days, data on 151 species of amphibians in Honduras were assessed to determine their IUCN red list categories.

Although there were more species assessed in 2019 than during the last Honduran IUCN assessment, the overall number of species that are now extinct, critically endangered, and endangered have increased in

the country. Armed with this new knowledge, at the end of the assessment workshop a meeting was held with officials from el Instituto de Conservacion Forestal (ICF) to discuss the results of the assessments and what next steps could be taken.

The Detroit Zoological Society is looking forward to participating in the actions that come from what we learned in this important assessment.





Thirty years after the last Golden Toad sighting, what have we learned?

The story of Costa Rica's Monteverde Cloud Forest is like so many other protected areas. First, biologists noticed incredible species in an ecosystem. In Monteverde's case, the forest contained tropical birds like the Resplendent Quetzal and amphibians like the Golden Toad. But then, like so many other protected areas, they also documented threats — in this case, habitat degradation from squatters and hunting. So, at last, they worked to protect the forest.

And thus, the Monteverde Cloud Forest Reserve came into existence in 1973. Soon after opening, it hosted tourists and researchers from around the world. The reserve grew over time, offering more and more protection for its species.

All went according to plan. Until it didn't.

The Golden Toad was endemic to the Monteverde Cloud Forest — found nowhere else on Earth. The species was a brilliant burnt-yellow, prone to easy spotting in its thick, green rainforest home. That's if you were around during the short time the toad was above ground. The species spent most of its life underground, emerging only for a few days at the end of the dry season to mate.

Spotting the frogs must have been an incredible sight to behold. In 1987, between April and July, researchers noted nearly 1,500 adult toads scattered between a few shallow pools around the forest. Imagine — these bright yellow toads, seen once a year, all converging on puddles to breed before retreating underground.

But in 1988, scientists found only one toad, a male, in the same area.

They documented nine more a couple of miles away.

And then in 1989, they spotted one male toad — and nothing else.

In 1990, they found none.

And so it's been ever since. Finally, in 2004, the International Union for Conservation of Nature declared the Golden Toad "Extinct."

From 1,500 to 10 in one year. From 10 to one in the next. That is, respectively, a 99% drop and a 90% drop. Of course, going from one to zero is a 100% decline.

What led to this precipitous drop? This question leads into a near thirty-year debate on why, exactly, the Golden Toad went extinct. A paper in 1992 (when researchers still hoped some toads were hiding somewhere) noted that in 1988-

1990, rainfall started later after the dry season. What's more, the rain came down heavier at first, instead of slow to start. The pools used for frog breeding filled faster, which may have removed the window of shallowness needed to breed.

They speculated that small changes in climate might lead to catastrophic collapse. With the scientific community now examining the effect of global warming on ecosystems, this was significant.

But around the same time, amphibian researchers discovered another, once-hidden threat. Researchers around the world found a striking similarity in precipitous amphibian population declines. It seemed amphibians were on the verge of collapse everywhere — and no one could figure out why.

In 1993, researchers first found a possible culprit. Fungi in the genus *Batrachochytrium*, also known as “chytrid” was causing a fatal disease called chytridiomycosis. After decades of research, we know that at least two chytrid fungal species can lead to the disease. Researchers today cite the chytrid fungus as the likely cause of extinction for the Golden Toad. And, I should add, dozens of other amphibian species. The crisis is still occurring. Amphibians are dying everywhere, with species clinging to existence. It's the most deadly threat to biodiversity you've never heard of.

But we're still uncertain of where chytrid came from, why/how it becomes fatal or how it spreads. Some scientists argue that climate change might alter the fungus's growth pattern, leading to disease. Others note that amphibians have a chytrid-fighting bacteria on their skin. But something in the environment — like chemical pesticides or other pollution — might impede their immune response to the fungus. The spores can spread through soil and water, but they might also spread through rain.

We also don't know how to stop it.

This threat doesn't bode well for the Monteverde Cloud Forest Reserve. In fact, this type of threat doesn't bode well for habitat protection at all. Climate change, fungal diseases — these won't stop at a fence. A forest guard can't stop these threats from passing into a reserve. Why even protect land if indiscriminate threats can still kill wildlife?

But while protected areas aren't catch-alls, they're not useless. As the world's ecosystems face a multifaceted barrage of threats, we need to keep habitats as intact as possible. Much like ecosystems, threats to ecosystems are interconnected. Climate change can reduce rainfall — leading to wildlife migration outside protected areas in search of water. But protecting more land increases the likelihood they can find drinking water within a reserve.

Poaching targets individual animals for meat. But if habitat degradation causes a decrease in pollinator species, crops may not offer enough food for a family anymore. They might poach to survive.

Habitat is the basis of ecological survival. Land conservation is the first step for any species facing extinction because any conservation program is useless without habitat. Intact ecosystems are their own support systems — the more of an ecosystem remains intact, the more resilience it has against threats. Habitat loss is the leading cause of extinction worldwide, so habitat protection is one of the leading necessities of preventing extinction. Fences may not stop killer fungi, but they do keep species happy otherwise — making them stronger in the face of killer fungi. We've also rediscovered species once thought to be extinct in protected areas — like the “golden wonder” salamander.

In the thirty years since the last Golden Toad sighting, scientists and amateur herpetologists alike have

searched in vain for the little, colorful amphibian. They've found zilch, nada, squat — every time. Over time, the Golden Toad has become a symbol of extinction and the amphibian biodiversity crisis. This week, many herpetologists mourn one of the world's most-analyzed and rued amphibian losses.

Thirty years later, amphibians are still on the edge of oblivion. But in those thirty years, we've discovered chytridiomycosis. We've developed more plans to build ecosystem resiliency in the face of climate change. We've expanded protected areas, including the Monteverde Cloud Forest Reserve. Rainforest Trust actually helped secure an additional 100 acres for the reserve in 1993.

The work we've done to prevent other frogs from the Golden Toad's fate hasn't been enough. But it's been a start. And you can't get anywhere without that.



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Table Mountains freshwater ecosystem – the elusive Ghost Frog



© Endangered Wildlife Trust

The Table Mountain Ghost Frog (*Heleophryne rosei*) is a Critically Endangered amphibian restricted to just six fast flowing perennial streams on Table Mountain, Cape Town, South Africa. Ghost Frogs are exceptionally well adapted to the unique freshwater ecosystems found in the Afromontane forested gorges and valleys of Table Mountain and act as early indicators of environmental change within the ecosystem. The Table Mountain Ghost Frog has a naturally small distribution and is entirely within Table Mountain National Park and the Kirstenbosch National Botanical Gardens estate. These cryptic frogs climb vertical walls and nestle in elevated cracks, preferring the steep, mossy cascades that have

historically been unaffected by human activity. Tadpoles of the species take over a year to develop into adults, relying on perennial flow and clear, sediment-free pools with an abundance of cobbles upon which they graze algae. Despite being essentially fully protected, the species has disappeared from two streams that have been directly impacted by alien vegetation encroachment and general habitat degradation due to heavy foot traffic along popular hiking paths that crisscross these streams, and windblown eroding sands originating in mountain dams that form part of the City of Cape Town's water supply. The remaining six streams are facing similar threats, all a direct result of human activity.

Despite these issues, very little is known about the ghost frog's habitat requirements, life history or population size. Nor is there adequate long-term monitoring of the perennial streams in which the species has evolved. However, we do know that their disappearance from several streams emphasises the impact that human activity has had on ecosystem function and integrity. In light of this, and thanks to funding from the Table Mountain Fund, a three-year project was launched in January 2019 dedicated to improving the freshwater ecosystems on Table Mountain. Headed by the Endangered Wildlife Trust (EWT) and the South African National Biodiversity Institute (SANBI), the project aims to implement long-term monitoring

protocols to assess trends in stream health, establish baseline data on key target species endemic to these streams, as well as identify and implement conservation interventions such as alien clearing to directly improve stream health.

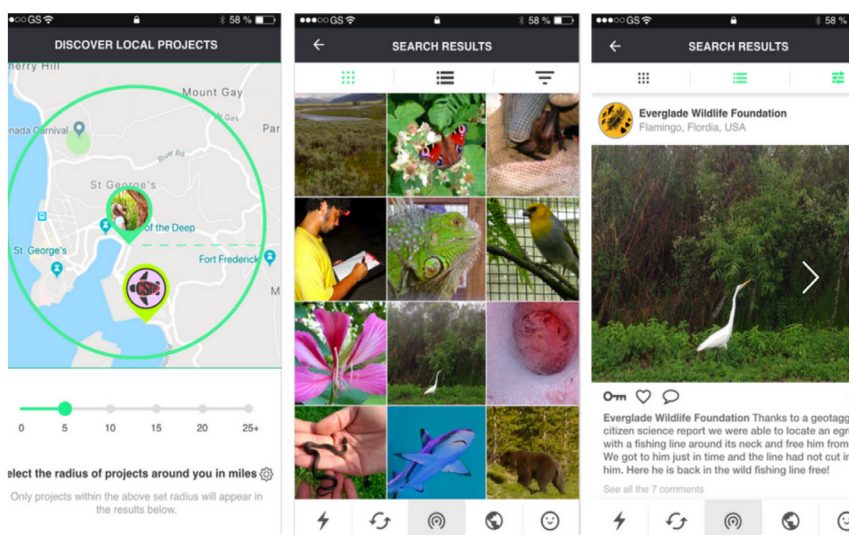
These streams are home to a variety of other endemic range-restricted species such as the undescribed freshwater fish (*Galaxias* sp.) and the possibly extinct Elusive Skimmer (*Orthetrum rubens*). The population of Rose's Mountain Toadlet (*Capensibufo rosei*) on Table Mountain has

also disappeared, almost certainly a result of anthropogenic influences. However, fully understanding the issues these freshwater ecosystems face and correctly identifying measures to address them is no easy task. This project aims to provide a solid foundation on which long-term conservation actions can be built, and cultivate partnerships and synergies to coordinate and strengthen these actions. It is time we learned more about these complex systems and initiate actions that will ensure their survival for future generations to come.



**ENDANGERED
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Protecting forever, together.

Key Conservation: Empowering hope



Key Conservation is helping conservationists receive critical funding and increased global support through a mobile app that provides real-time updates on day-to-day campaigns.

The mobile app will have a scrolling feed that will update as needs from conservationists occur globally. This new flow of real-time data allows for innovative approaches for assistance from supporters and mentors. The Key Conservation app provides three ways for conservation organizations to get help and three ways for supporters to give it.

The first way is through the feature called Skilled Impact which enables supporters to give their profes-

sional skills to help conservation projects. For example, a graphic designer could help with an outreach campaign or drone operator could help with collecting data on a remote study area. Tapping into these skills could save conservation organizations thousands of dollars while creating a lifelong connection with a supporter. The second feature allows supporters to give funds to a conservation project to help with issues happening in real-time or long-term goals. Lastly, the In-Person feature allows supporters to be alerted to real-time volunteer opportunities in their area through geo-based push notifications. This feature updates automatically as people travel around the world, alerting them to the work being

done within a customized range. For example, if a conservation organization needs help pushing their patrol vehicle out of the mud or they want to alert locals of a sea turtle hatchling release they can send out a push notification to supporters within a set radius.

After the contribution has been put to use the conservation organization will send a photo/video update to the supporter to show the outcome. Creating a transparent, stronger and more personal connection that supporters have been wanting.

We can stop global extinction if we utilize new technology and interact with supporters in ways that they want. We believe the Key Conservation mobile app will do just that.





© Brian Gratwicke, Smithsonian Conservation Biology Institute

Uniting amphibian IUCN Red List assessment updates and Alliance for Zero Extinction sites

ASA, Global Wildlife Conservation (GWC), and the Amphibian Red List Authority (ARLA) of the IUCN SSC are collaborating to update all amphibian Alliance for Zero Extinction (AZE) sites. Thanks to a grant from Synchronicity Earth—a fellow Amphibian Survival Alliance (ASA) partner—we are developing an approach that updates the AZE data in parallel with the IUCN Red List assessment process.

The latest iteration of the **AZE list** includes 344 sites that are triggered in part or in full by at least one amphibian species. AZE sites hold Critically Endangered or Endangered species restricted to a single site globally and are in urgent need of conservation to prevent imminent extinction. All confirmed AZE sites also qualify as **Key Biodiversity Areas**, sites that contribute significantly to the global persistence of biodiversity. The recent global AZE update took place before many amphibian species had been reassessed for the second Global Amphibian Assessment, requiring additional work to ensure that the amphibian AZE sites

are up to date in order to best guide conservation efforts.

For amphibian species reassessed in 2018 or earlier, we are using the updated IUCN Red List assessments and range maps to assess whether current AZE trigger species still meet the criteria and to identify potential new AZE trigger species. We are contacting local experts to confirm or reject these initial assessments, resolve any outstanding questions, and seek feedback on site delineation. For species reassessed in 2019 and 2020, we are folding the review of AZE sites into the Red List workshop or process for a given country or region.

By preparing extensively ahead of the Red List workshop, including an initial assessment using the draft Red List assessments and preparing maps of current and potential trigger species in relation to AZE and other KBA boundaries, we are able to quickly review the AZE data during the workshops in a way that adds value to, rather than detracts from, the reassessment process.

We recently tried this approach in Honduras in March and will replicate it in the following countries and regions over the next 1-2 years: Central America, Caribbean, Brazil, Venezuela, Europe, Mainland South-east Asia, Melanesia, South Asia, Sri Lanka, East Asia, and USA.

The full update of amphibian AZE sites will be completed along with the second Global Amphibian Assessment at the end of 2020.

We are proud to be part of the Alliance for Zero Extinction, which brings together organisations such as American Bird Conservancy, IUCN, GWC, Synchronicity Earth and ASA to pinpoint and drive the protection of the Earth's most irreplaceable places to safeguard endangered species.



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CONSERVATION**

Symposium: Mitigating single pathogen and co-infections that threaten amphibian biodiversity

The Zoological Society of London recently sponsored a symposium, dedicated to Tim Halliday, on mitigating amphibian diseases, which took place in London on the 24th and 25th of April 2019. Invited speakers came from around the world, and there were a number of contributed posters. Speakers focused on three amphibian diseases (*Bd* and *Bsal* chytridiomycosis and ranavirosis), the threat these diseases pose to amphibians and how to mitigate the threats. Considerable progress has been made in understanding the biology of the pathogens, the epidemiology of the diseases and potential mitigation techniques. However, there is currently no silver bullet that can control the pathogens.

The meeting began with overview talks by Phil Bishop and Reid Harris, both of the Amphibian Survival Alliance (ASA). These talks described how ASA, the Amphibian Specialist Group, and Amphibian Ark work together to conserve amphibians. Of note are the ecological consequences of amphibian population declines. For example, woodland salamanders prey on leaf-shredding insects, keeping their abundance down and allowing leaf matter to accumulate. This amounts to carbon being stored in the fallen leaves, however carbon would be released into the atmosphere as CO₂ should salamanders disappear with likely effects on global warming.

A few talks will be briefly described here, and the abstracts of all of the talks and posters are available at the link below. The role of trade in pathogen movement across large geographic areas was highlighted. Richard Griffiths noted that about 12% of consignments of amphibians arriving in the UK contained *Bd*-positive animals. And since trade in

live amphibians is not as lucrative as other taxa, it might be challenging to find funding to construct bio-secure facilities necessary to conduct a “clean trade” program. It is becoming clear that *Bsal* was introduced into Europe in the pet trade, and there is evidence that *Bd* has been moved by humans around the world. Thus, biosecurity protocols are essential to prevent *Bsal* from being established in North America and to keep all known and currently unknown pathogens from coming into contact with naïve and susceptible amphibian species.

Mitigation efforts include probiotics, and several talks addressed this option (Molly Bletz, Xavier Harrison, Benedikt Schmidt). To date, efforts at adding anti-chytrid bacteria to amphibian skins have led to mixed results. One field study on the California Yellow Legged Frog (*Rana muscosa/sierrae*) showed that probiotics increased year to year survival by 39% over untreated controls. Evidence was presented that the diversity of the skin microbiome could mitigate the effects of ranavirus. The emerging evidence that microbiome manipulation can be effective suggests that further research in this area will be fruitful. Other areas of research include vaccinations and biocontrol of *Bd* and *Bsal* using micro-predators.

The role of aquatic community structure in disease transmission was highlighted in a talk by Jason Hoverman. Using a series of experiments, his group found that predators, by reducing host population density, reduced ranavirus infection prevalence within amphibian communities. These results suggest that incorporating the role of predation in management and conservation strategies could be effective.

Should *Bsal* arrive in North America, it will infect amphibians already infected with *Bd*. Ana Longo showed through experiments in the laboratory that co-infections of *Bd* and *Bsal* can be worse for eastern newts (*Notophthalmus viridescens*) than infections with *Bsal* alone. Therefore, it appears that prior infection with *Bd* in salamanders tolerant of *Bd* did not cause any cross-immunity to *Bsal*, unfortunately.

The symposium ended on a positive note with talks by Roland Knapp and Cori Richards-Zawacki on recovering amphibian populations. It may be that under some circumstances natural selection for disease resistance will lead to population recovery. If so, it could be argued that mitigation measures would be counterproductive since mitigation “rescues” individuals from natural selection. However, until more is known the consensus is to continue to research mitigation methods since some species may not be able to respond to selection for a variety of reasons including limited genetic variation for resistance. In addition, there is evidence that even when some populations do respond to selection for resistance that they decline anyway, again suggesting that research into mitigation measures is imperative.

The abstracts of all the talks are available at this link: <https://www.zsl.org/science/whats-on/mitigating-single-pathogen-and-co-infections-that-threaten-amphibian-biodiversity>

Reid Harris, Director of International Disease Mitigation, Amphibian Survival Alliance



New amphibian conservation websites launched

The IUCN SSC Amphibian Specialist Group (ASG) and the Amphibian Survival Alliance (ASA) are both proud to launch their respective new websites, www.iucn-amphibians.org and www.amphibians.org!

The ASG and ASA have shared the same domain, amphibians.org, since 2013. Originally ASG's home, the intent behind this was to show the close collaboration that exists between both groups. Over the years, however, we found that this was leading to some confusion regarding the identity and functions of both groups and was not serving our different audiences to the best of our ability. After a period of consultation with communications experts and website users, we decided to estab-

lish separate online homes for each group so as to better serve our respective audiences and to minimize confusion between ASG and ASA.

Please note, however, that we continue to work very closely together and will continue to link extensively between both groups. As you browse through the websites, you will notice that there is some common content; this is because we have and/or continue to work on joint programs and projects.

We invite you to visit both websites and to provide feedback so that we can better serve you as a member of the amphibian research and conservation communities!

