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Promoting Conservation, Research and
Education for the World's Amphibians



**SPECIAL EDITION:
Remembering Phil Bishop**

Amphibian Reintroduction Guidelines Are Here!

**The Giant of the Pampas: Conserving Amphibians
in a Global Pandemic Context**

... and so much more!

FrogLog

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Editorial

Dear friends,

I met Phil back in 2011 at the first meeting of the Amphibian Survival Alliance in Washington, D.C., in his then new capacity as Chief Scientist of the ASA. Shattering all stiff upper-lipped British and professorial stereotypes and social conventions Phil greeted everyone warmly, like a friend you hadn't seen in a while, and proceeded to hand out T-shirts that read "FACT...The Survival of the EARTH depends on FROGS". That indelible mark was set right there, but we did not know then how much he would come to shape us as people and our global amphibian conservation community.

Since then, Phil remained involved with the ASA but was also appointed as Co-Chair of the IUCN SSC Amphibian Specialist Group in 2012 and as Steering Committee and Executive Committee member of the Amphibian Ark in 2011, working his way towards becoming a prominent, articulate and much needed spokesperson for global amphibian conservation. And Phil did all of this in a voluntary capacity, which speaks volumes of his passion and commitment to the cause.

We have been incredibly fortunate to work alongside Phil when he wore his ASG and ASA hats. Phil was a natural leader and a doer, and even if he was buried in work he always found a way to surface and support the task at hand – with brilliance, wit and good humour, we may add.

His diagnosis and passing in January caught us all off guard and to this day it still hurts, and will continue to do so for the foreseeable future. But his legacy is vast, and though he may no longer be physically among us his teachings are very present. We often find ourselves thinking "what would Phil do?", or "what would Phil say?" – an indication of both Phil's reach and the respect that he earned through his actions.

We don't know if Phil realized how much he was admired and loved. This became apparent to us upon news of his diagnosis and then at his service, where folks were tuning in from every corner – and time zone - of the world. As the contributions to this special issue will clearly attest to, Phil was an extraordinary human being, and his personality and spirit shine through the stories that are shared by colleagues, students and friends alike.

This special issue also sees the return of *FrogLog* to hosting an ASA news (formerly a part of *FrogLog* but later turned into the *Frogress Report* for ASA partners), ASG news and amphibian conservation community news sections. It seems fitting that news from the two groups that Phil helped lead and shape return to sharing the same umbrella publication with this special issue.

Phil, we miss you so very much. Please take this little offering of ours as a token of our gratitude for everything that you selflessly gave us and the amphibians we love. You made us want to be better people; you made this world a better place.

Debbie, Adam and Luke, please take this special issue as our effort to honour Phil and you, too. You are all incredible (no wonder you are Phil's family!), and will always be in our hearts.



Ariadne Angulo

Chair, IUCN SSC Amphibian Specialist Group

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froglog@amphibians.org



Master of ceremonies Jean-Marc Hero calls proceedings to order as chef Richard Griffiths presents Phil Bishop with a cake at their joint 60th birthday celebration (ACRS, 2017). Photo: Richard A. Griffiths.

The Amazing Frog-Fingered Phil Bishop

By Richard A. Griffiths

It is difficult to imagine the world of amphibians in a world without Phil Bishop. Born and raised on the 'English Riviera', the mild, damp climate of south-west England provided an ideal environment to nurture an interest in amphibians in a country that otherwise contains a paucity of species. So, like many aspiring herpetologists of his era, Phil spent much of his boyhood pursuing amphibian life in the numerous ponds that (at the time) were common in the lush pastures and woodlands of the Devon countryside. Paignton Zoo, with its sub-tropical house full of luxurious vegetation and colourful frogs also inspired the budding herpetologist. Already mindful that studying frogs requires careful management of limited budgets, he reduced the cost of admission fees by slipping in through the delivery gate whenever a vehicle left the zoo grounds!

I first met Phil in 1996, at a symposium on African amphibians at the University of Bristol in the UK. Phil was a researcher at the University of Witwatersrand in South Africa, where he had completed his PhD in 1994. Sharing a similar sense of humour, with both of us being at the same career stage, and around the same age (we later worked out that we were nearly twins, as we were born just two weeks and 200 miles apart) we hit it off immediately.

Securing a Teaching Fellowship in Zoology at the University of Otago in 1997, Phil started turning his attention to the intriguing frogs of New Zealand, and launched the New Zealand Frog Survey. This was followed by the annual New Zealand Frog Week, which was subsequently adopted by the national government's Department of Conservation, and provided a model for similar

initiatives around the world. On top of a busy teaching load at the University of Otago, Phil steadily accumulated numerous conservation leadership roles both in New Zealand and internationally.

In 2009 Phil and I found we were room mates at the 'Amphibian Response to Climate Change' workshop organized by Jean-Marc Hero in the delightful surrounds of Springbrook, Australia. Following the workshop, Phil and I piled into Jean-Marc's Toyota truck for a field trip north to Great Sandy National Park to search for acid tolerant frogs. It was a long drive to Great Sandy, and when we had exhausted conversations on all things froggy, the chat inevitably turned to comparing notes on supervising students, sharing tips on how to handle difficult University administrators, and our common interest in exploring the potential relationship between beer diversity and amphibian diversity. We never wrote that one up...

Between all of the demanding commitments of co-Chairing the IUCN SSC Amphibian Specialist Group and acting as Chief Scientist to the Amphibian Survival Alliance, in 2017 Phil somehow squeezed in a trip to England with Debbie on sabbatical. The timing could not have been better, as we were hosting the Amphibian Conservation Research Symposium in Canterbury in June of that year, so Phil was our star attraction. As always, he gave a presentation that was a masterclass in how to balance excellent science with passion and humour, typically laced with a healthy dose of self-deprecation. However, Phil never preached in his presentations – he said things how they were through his eyes, in a way that left the audience feeling upbeat and optimistic. To students and the wider public alike, he made frog conservation cool.



Photo: Richard A. Griffiths.

With no serpents occurring in their homeland of New Zealand, Phil and Debbie were keen to see some snakes, so after the conference I took them on a tour of our local reptile sites. We managed to find a young adder that posed obligingly for photographs. However, it was Phil's uncanny ability to unearth amphibians that was impressive. Within a few minutes of log-flipping, Phil had found a great crested newt in an area I had never found them in 10 years of searching. He therefore proved that amphibian-divining skills honed on frogs in the southern hemisphere still worked on caudates in the UK. These skills were put to further good use when Phil and Debbie spent several days working at the pool frog reintroduction site in eastern England. The pool frog went extinct in England early in the new millennium, and a partnership led by the Amphibian and Reptile Conservation Trust has successfully re-established the species at two sites. One of the frustrating things about pool frogs is that they lay small clumps of eggs hidden in dense aquatic vegetation. Finding the eggs is therefore akin to finding the proverbial needle in a haystack. Inevitably, frog-fingered Phil found eggs with comparative ease.

Phil's service to the global herpetological conservation community is unsurpassed. His engaging personality could win over a high-profile celebrity or politician just as easily as it could enthrall a diffident student. His legacy will therefore live on through the many lives he touched. Whether it is Phil performing the New Zealand Haka, covering himself with frogs for a photo opportunity, or telling outrageous tales from the field, memories of his life will

always raise an appreciative smile. Thank you, Phil, for what you gave to us all: the world always seemed a better place when you were around.

Memories of Phil From His Time in South Africa

By Les Minter and Neville Passmore

Phil spent 15 years (1982-96) in Neville Passmore's Communication Biology Research Group at Wits University, where he helped to plan and execute numerous demanding field studies on the Painted Reed Frog, *Hyperolius marmoratus*. Towards the end of this time he and Les Minter initiated the Southern African Frog Atlas Project and he remained an active participant until its completion and publication in 1994. Phil's passion for frogs, his capacity for hard work and his unique character and personality traits, which included his entertaining habit of bestowing irreverent epithets on certain individuals, will long remain in our memories.

GLIMPSES OF "THE ESSENTIAL PHIL":

Phil sometimes employed an amusing and effective diversion to enliven first meetings: on approaching the unsuspecting person to whom he was about to be introduced, he would dive into a nearby bush, emerging triumphantly with a snake in hand, successfully diverting their attention away from him and onto the potentially venomous, and therefore infinitely more interesting, reptile and leaving them with an unforgettable "first impression".

Although he was not inclined to adopt a morally superior attitude with respect to dalliances within his own species, Phil was most upset when he discovered Gertrude, his pet *Bufo bufo*, in amplexus with a local toad, *Sclerophrys capensis*, regarding this as a clear case of rape and refusing to consider the suggestion that the liaison may have been consensual.

Phil was a field biologist extraordinaire, able to maintain focus and motivate his companions during long, arduous periods in the bush. His attitude to fieldwork was expressed in an adage he often used: "we're not here to horse around, we're here to work!"

Not content with inspiring students in the field, he set up elaborate terraria in the lab and Departmental corridors, to introduce all and sundry to his favourite amphibians.

While Phil immersed himself fully in typical amphibian environments, he had an aversion to mosquitoes, wearing thick, protective clothing and liberally applying insecticide to his head and other exposed parts, before entering the swamp. After a night in a reed-bed or vlei (shallow, marshy wetland, usually seasonal) he would head for the shower, emerging freshly scrubbed, and presentable. He was always impeccably clean, never allowing mud, sweat and humidity to become part of his field persona.



Phil delighted in buying the best and latest frogging gear, such as Drizabone oilskins, Aigle waders (he called them his silk stockings), torches, tape recorders and other paraphernalia, and loved to be well organised. Les remembers him setting up a "quick-response" box of equipment for the Giant bullfrog, a species given to explosive breeding events that tend to be very short-lived. On receiving the news that bullfrogs were breeding, no time was wasted in putting together equipment – one just grabbed the box and headed out to the pan!

Apart from the significant contributions Phil made in amphibian research and conservation, he will be remembered by his friends and colleagues as a friendly, unpretentious, good-natured bloke, with a great sense of humour, who could be relied upon to get things done.

Memories of Good Times With Phil Bishop

By Ben D. Bell



Phil Bishop on an April 2013 trip to Coromandel Peninsula, NZ, to locate Archey's frog. Photo: Ben Bell.

I have so many good memories of Phil Bishop from the years that he was in New Zealand. Phil was a great friend and colleague with shared research interests in the country's threatened Leiopelmatid frogs (*Leiopelma* spp.). We were also both members of the New Zealand Frog Recovery Group run by the Department of Conservation (DOC) and fellow delegates at many conferences, which he often attended with his wife Debbie. Phil's warmth, wisdom, humour and knowledge are sadly missed by us all. He excelled as a lecturer, researcher, supervisor and as an advocate for amphibian conservation at the local and global levels. In his

memory, I shall present a selection of activities that I've shared with Phil over the years and for which photos are available.

Phil and I were two external university members on the Frog Recovery Group. His contributions to the group were substantial, including serving a period as group co-leader and being lead author of DOC's current Native Frog Recovery Plan. More recently, Phil and Debbie reared and trained "Holly", a Nova Scotia Duck Tolling Retriever, as a DOC-certified 'frog dog', being schooled to eventually locate endemic frogs in New Zealand.

Phil's prime conference achievement was his outstanding leadership of the 9th World Congress of Herpetology, held in Dunedin in January 2020 - one of the most enjoyable and successful World Congresses that we have held and an enduring testimony to his contribution to international herpetology.



Richard Wassersug being shown captive Hamilton's frogs *Leiopelma hamiltoni* by Phil Bishop in the Zoology Department at Otago University during the 9th World Congress of Herpetology, January 2020. Photo: Ben Bell.

Attending other conferences with Phil also holds many good memories. For example, in December 2018, we travelled together to the Joint Meeting of the Australian Society of Herpetologists (ASH) and the Society for Research on Amphibians and Reptiles in New Zealand (SRARNZ) held in Redland Bay, Queensland. I recall getting back to our motel at a rather late hour and finding an Australian green tree frog *Ranoidea caerulea* feeding on moths under lights. Out came Phil's camera, then placing the frog in a bush, Phil took some fine shots - never an opportunity missed!

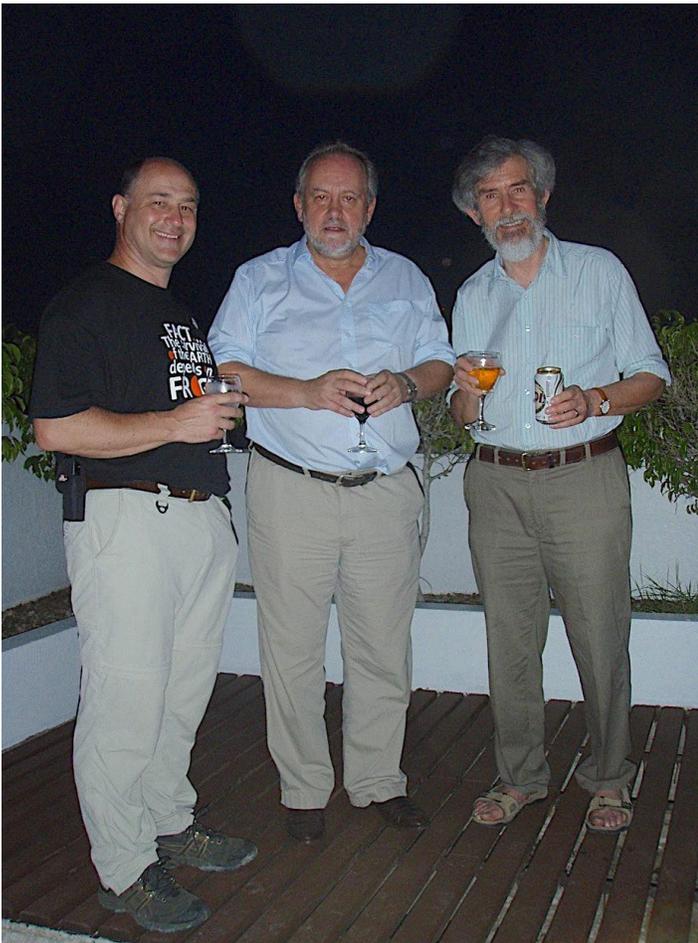
The 5th World Congress of Herpetology in Manaus in 2008 provided further memorable encounters with Phil and Debbie.

With Phil, Debbie and other delegates, we went on to thoroughly enjoy a post-Congress boat cruise, spending several days investigating the Amazonas river and rainforest wildlife along the Rio Negro and within the Parque Nacional do Rio Jaú.

After arriving in New Zealand from South Africa, Phil took up a position at Canterbury University with Bruce Waldman, co-authoring with Bruce and others the first reports of chytridiomycosis in New Zealand. Very soon he was widely recognised for his passion for frogs and their conservation. He secured a teaching position at Otago University where he steadily rose to the position of Professor and he was due to become Head of Department at the time of his



New Zealand Frog Recovery Group at Auckland Zoo, December 2019. From left: Jen Germano, Rhys Burns, Amanda Haigh (obscured), Phil Bishop and Lynn Adams. Note the Kaka, an endemic parrot, investigating Phil's left hand! Photo: Ben Bell.



At the 5th World Congress venue in 2008. Ian Swingland (centre) kindly organised a reception for Australasian herpetologists in the Presidential Suite, an event thoroughly enjoyed by all. Phil's t-shirt reads "FACT...The survival of the EARTH depends on FROGS". Photo: Debbie Bishop.

death. Most appropriately, he has been recognised as an Emeritus Professor by Otago University.

Phil and I collaborated on many research projects, often associated with our postgraduates, with over 20 co-authored research outputs, including in 2018 a chapter on New Zealand frogs in the Amphibian Biology volume Status of Conservation and Decline of Amphibians: Australia, New Zealand, and Pacific Islands edited by Hal Heatwole and Jodi Rowley.



Phil and Debbie in a motorised river canoe on the Rio Negro, Brazil. Photo: Ben Bell.



Phil on the Rio Jaú , Brazil, with Sue Keall, Ben Bell, Jen Moore, David Moore and Kim Miller. Photo: Debbie Bishop.



Phil Bishop and SRARNZ members at an informal AGM of the Society held outdoors during the Joint ASH/SRARNZ Meeting at Redland Bay, Queensland, December 2018. Phil was a past-President of SRARNZ. Photo: Ben Bell.



With Phil at one of the Hamilton's frog breeding pens in the Zealandia ecosanctuary, Wellington, October 2008. Photo: Debbie Bishop.

Dame Jane Goodall was presented with a picture of a Hamilton's frog by Phil at Wellington Zoo, October 2008. Note that he is wearing that t-shirt again! Photo: Debbie Bishop.



Phil at my long-term study site in the Coromandel ranges, April 2013. Note his much travelled Archey's frog mascot (left foreground), somewhat larger than the real Archey's frog obligingly sitting on a digital balance alongside! Also in the picture (but obscured) are, Patty Ramirez (left), Kevin Carter (rear) and Ashwika Kapur (filming, right). Photo: Tanya Cornwell.

Phil had the foresight and enthusiasm to set up the NZ Frog website, used widely to report progress on frog research and conservation and to inform the wider NZ public of frog-related activities. He inspired the production of a t-shirt with the slogan "FACT...The survival of the EARTH depends on FROGS", which many of us are proud to wear. More widely, his leadership brought frogs and their conservation to a much wider audience through radio, TV and social media and through his high profile on the international stage. He made lasting friendships with world conservation luminaries, including Dame Jane Goodall, who presented a video tribute to him at the very moving celebration of his life held in Dunedin last February.

In losing Phil we have lost one of New Zealand's finest herpetologists, a friend and a colleague to so many, and one who inspired us all. We miss his passion, dedication, modesty and fun. His legacy will live on through the many people that he knew and influenced, not least his postgraduate students who learned so much from him, many still involved in amphibian research and conservation.



Phil Bishop Tribute

By The Orana Wildlife Trust Team

At Orana Wildlife Park (an open range zoo in Christchurch, NZ) our friendship with Phil Bishop first began back in 2008. Our CEO Lynn Anderson, who was the Chair of the Zoo & Aquarium Association NZ (ZAA NZ) at the time, invited Phil to present at the ZAA NZ Conference as the keynote speaker for ZAA NZ's launch of the *Year of the Frog* campaign. Phil's presentation on the global amphibian extinction crisis enthused all Conference attendees to do more for our precious amphibian species. Lynn and Phil began chatting and formed a friendship and collaborative partnership as they discussed ways in which Orana could contribute to protecting New Zealand's endemic frogs from the threat of extinction.

Working together with Phil, a decision was made to develop a state-of-the-art breeding centre for native Maud Island frogs. Plans were drawn up and the construction of the centre commenced in 2010. It was over 50% complete when the Christchurch earthquakes struck. Numerous unexpected events followed that delayed the project including three significant gale-force storms, 2 major floods and a lightning strike! The delays meant that priority had to be focussed on the Great Ape Centre for a trio of gorillas arriving from Australia, meaning that it wasn't until 2018 that construction of the Amphibian House could finally proceed towards completion. At this point, we looked again at the design and made the decision to install significant technology to allow us to perfectly replicate the natural habitat of the species including temperatures, seasonality, photo period, rainfall and even moon phase!

One of the things about Phil that we were most struck with was his incredible patience and ongoing support despite the series of unexpected delays that pushed the project back longer than had initially been planned. Phil's steadfast belief in the importance of the project and his willingness to wait patiently until the timing was right were incredibly appreciated. On top of all that, his eagerness to share his time and expert knowledge with us was invaluable in ensuring that the Frog House was the best habitat possible for the Maud Island frogs in order to ensure their ongoing survival and to have the best chances of achieving captive breeding. Some of our team visited Maud Island with Phil and this is an experience that will always be treasured.

In early 2020, Orana's brand new exhibit was finally ready to house the Maud Island frogs, but disaster struck once again with the Covid-19 national lockdown putting things on hold the very day before the frogs were scheduled to arrive. Finally in May 2020, once the country came out of lockdown, Phil and Debbie were able to resume the transfer and brought seventeen of the precious Maud Island frogs up from Otago University to their new home at Orana (with an eighteenth frog arriving four months later).

We received considerable media interest due to the arrival of the native frogs and had news teams on site for the auspicious occasion. A rather funny moment occurred that day. One reporter told us privately (or so he thought, not realising that Phil's wife Debbie was standing beside us) that he would prefer not to interview Phil. He said in his experience Professors tended to be very dull and dry when talking on camera. The reporter ultimately *did* end up interviewing Phil for the news story and he later mentioned how blown away he was by the succinct, passionate, and engaging manner in which Phil was able to convey the importance of New Zealand's native frogs. We feel like this story sums up Phil's character pretty well. He broke the mould of the 'stodgy' professor and was a heartfelt and vocal advocate for our somewhat under-appreciated native frogs that badly needed a PR lift. Phil was incredibly good at shining a light on our native amphibians and had perfected the art of describing the species in a way that people from all walks of life found engaging and exciting. It's definitely thanks to his incredible dedication and commitment that our native frogs are no longer a lesser known and less appreciated group.

All of the animal keepers and management staff who were lucky enough to work alongside Phil on the Frog House found that his passion and enthusiasm rubbed off on all of us. He was an absolutely stand-up guy and we consider ourselves very lucky that we were able to form a great friendship and successful working partnership with him. We sincerely miss Phil and are privileged to carry on his great work.

Counting You In

By Avi Holzapfel

I got to know Phil in my time as leader of the Native Frog Recovery Group, an expert advisory group within the New Zealand Department of Conservation (DOC). My role was to coordinate and facilitate the group's advice, and as a botanist I was uniquely qualified to rely heavily on experts in the group, which has, as long as I remember, included Phil alongside Ben Bell.

One of the first recovery group meetings I coordinated was at the height of declines in New Zealand frog populations, potentially due to chytrid fungus. This drew the attention of a reporter with a national current affairs TV show, who considered that frog disease was a good hook for a lighthearted spoof interview (where do they find these people?) involving a live pet frog with eye problems. When the media team turned up unannounced I had no idea how to deal with the situation and cowardly pretended to be busy in some back-room, hoping they would leave. They did not (of course), but Phil took control. Cool and collected, he met the joke head-on, answering silly questions with sincerity as if he was talking to a person with a genuine interest. As a result, he turned the potentially embarrassing situation into an opportunity to talk about the frogs, diseases and conservation. He showed me how it could be done, from a position of professional unflappability. I was left to write a furious letter to the producers of the Holmes Show, and they apologised. I did the formal thing, Phil seized the moment. I know which was more effective.

Phil understood people and the need to make frog conservation an exciting and even entertaining topic. Taking a live frog to an interview on national radio for the ultimate show and tell, or hiring himself out (Phil referred to himself in this capacity as a member of the oldest profession on earth) to whoever was willing to create an opportunity to raise the plight of frogs in New Zealand. During one national advocacy event, Phil had the genius idea to secure the services of a much-loved children's TV show presenter, calculating

that she would draw in the kids and with them their parents. It worked better than he expected, but it was the fathers, it seemed, that were even more attracted and pulled their kids (and probably slightly suspicious spouses) into the venue.

Despite his ability to insert frog conservation into mainstream popularity, Phil maintained his personal integrity and strong moral compass above any group mentality or majority opinion. As a conservationist, he looked for the right path (right for frogs) even where political risk and opportunities were so close that it was difficult to navigate. He worked with mining companies in their effort to understand more about NZ frogs when that information could also aid in conservation.

He was clear about what he saw as priorities and not afraid to argue for these. He rallied against the sometimes short-sightedness of systems, policies, bureaucracies and yet, in the next breath, would support their intent and where these provided opportunities for progress. He did this with a strong scientific foundation, an ability to reason well and with such a cheeky sense of humour that even a controversial argument was (nearly always) greeted with smiles or more often roaring laughter.

My last conversation with Phil was just before Christmas 2020, asking for his support as an expert advisor for what could become a very public, sensitive project impact assessment. He was busy, just having been appointed Head of Department. He sounded tired, irritated even, which I thought unusual and put down to perhaps a recent run-in he had with DOC bureaucracy. And yet, he ended our conversation with 'Count me in'. I was happy to have his support, and was looking forward to working with him, knowing that I could trust in his judgment. It was not to be. 'Count me in' is a fitting end to our last exchange. It describes Phil well for me - he was there when and where it counted. Thank you, Phil.

Phil, Bishop of the Frogs

By Jane Goodall



Photo: Debbie Bishop.

Phil Bishop – or Phil Frog, as I called him – was an extraordinary human being. A true scientist in his quest for understanding frog behaviour, a fantastic conservationist in his determination to find and help protect threatened frogs, and at the same time a man who was a great teacher and supervisor, beloved by his students (I met several), the perfect husband and father, and a wonderful friend. I first met Phil in 2008 when I happened to be in New Zealand during the year of the frog when he was an ambassador for NZ frogs – and he invited me to be a fellow ambassador – what an honour. “What!” you think. “But she is the one who studies chimpanzees, not frogs!” Indeed, but I have had a fascination for frogs, their gradual metamorphosis from tadpoles, their croaking love calls, ever since I was a child. It was the start of our friendship. It was Phil who introduced me to some of the wonders of New Zealand wildlife: he took me to Orokonui Eco-sanctuary in Dunedin, where I left a mark of my visit by planting a tree. He arranged a trip by boat to meet albatrosses and a variety of marine life. And thanks to Phil I was introduced, close up, to a tuatara and a giant weta.



Photo: Debbie Bishop.



Photo: Debbie Bishop.

Phil helped to launch the Jane Goodall Institute – NZ and served on the board for several years. He helped to grow our program for youth, Roots & Shoots. But every time I met Phil, it was his passion for frogs that shone through. He was even involved in assisting with the training of the first frog-sniffer dog, Holly, to help find threatened NZ frogs in the wild.

Phil was so full of life (and fun) that it is almost impossible to believe he is no longer on this planet. But his scientific contributions and his indomitable spirit will live on in the scientific literature, and in the hearts of all who knew him.

Tribute to Phil

By Gino Acevedo

Unfortunately, I did not have the great pleasure of knowing Phil for a long time like some of you, but the time that I did know him, only makes that time so much more special.

I first came to meet Phil a few years ago through our mutual friend Jane Goodall. We were at a friend's house for dinner and Jane walked in with a gentleman who right away reminded me of the actor Bob Hoskins! Jane introduced me to Phil and said, "Gino, this is one of my very best friends, Phil Bishop", then she whispered into my ear, "and he's into frogs"! At that point I noticed his very colourful tie which was covered with printed frogs!

That's when I said to myself, I think I'm going to like this guy! We spent most of the evening chatting about reptiles and amphibians as I told him that when I was younger growing up in the deserts of Phoenix, Arizona, I collected anything that crawled, slithered, or jumped, much to my mother's disgust. We compared stories of the different species we collected throughout the years, but his stories were far more interesting than mine, as he had some amazing adventures all over the world. He was like an Indiana Jones, but shorter.

A couple of years ago, my wife Liz saw that Fleetwood Mac were coming to NZ for a concert and we thought that it would be cool to take our 12-year-old daughter at the time to see her first concert. The concert was in Dunedin, so I contacted Phil to say that we were coming down there for the concert and that we wanted to catch up with him and Debbie. He replied with a very warm email inviting us to stay with them, and so we did! They picked us up from the



Photo: Gino Acevedo.

airport, had a wonderful breakfast and a tour of Dunedin. What a fantastic city, it was my first time there. He then took us to the university and to his office, which was covered with photos of frogs, and some real ones in a terrarium. I was in Heaven!

They ended up getting tickets to the concert as well and together we had an amazing time.

On our last night there I suggested that they allow Liz and I to cook them a real Mexican feast by a real Mexican, which was me! We did, and filled our bellies with plenty of spicy tacos and Mexican rice and of course plenty of beer and vino. That will be a weekend that we will never forget.

Thank you, Phil, Debbie and Holly, for your warm hospitality and true friendship.

Until we meet again, lots of love,
Gino, Liz and Ruby



Photo: Gino Acevedo.



Photo: Gino Acevedo.

In Memory of Phil Bishop

By Jaime Garcia Moreno M

Fact is, the survival of the Earth depends on Frogs. That was the legend he had printed on t-shirts. And that is also what Phil strongly believed. In the summer of 2011 I became the first director of the Amphibian Survival Alliance (ASA). The post came with a “right hand”, based in New Zealand: Phil Bishop. We did not know each other before, as I was coming from the conservation NGO world, whereas Phil came from the amphibian scientific community. One day we both woke up with nothing less than the responsibility to mobilise and galvanise the world to avoid the extinction of amphibians.

It was a couple of months later, in Minneapolis, during the American Society of Ichthyologists and Herpetologists meetings, when we finally got to meet each other. Contrary to my initial impression after weeks of telephone calls, it took just a few seconds in person to realise he was a calm, witty, smart and passionate colleague with whom I shared the ups and downs of setting up the ASA. The late George Rabb introduced us then and helped us navigate through what was the first public appearance of this new initiative.

A few weeks later we were on the road again, making ASA visible in Europe. And this became the pattern of our interaction: months with nothing but Skype and email contact, then intense face to face interaction on the road, meeting other colleagues from the Amphibian Ark or the Amphibian Specialist Group, the Board members of ASA, and many other people concerned about the fate of amphibians. But at the end of the day it was Phil and I that stood there trying to digest the day and extract the lessons for ASA. It also gave us some nice moments to cherish or to laugh about: we got lost in Germany after taking a wrong turn on our way to the University of Trier; we found time to stroll through Prague; we got a tour behind the scenes at London Zoo or the National Zoo in DC; and many more.

We once took a course together in Durrell. It started with an exercise describing a plane-crash accident and the steps to be taken

in order to survive. The highest score – by far – was Phil’s. Besides demonstrating that he would be the only one in the class that could survive such a situation, it was a vivid example of the way he could carefully and thoughtfully analyse an issue, following a systematic approach. This same approach also won him a pint of beer on the house, after guessing correctly in a restaurant what beer was the sample he was given to taste. I still don’t know which of these two examples was more astonishing.

Phil was a good support in the early days of the ASA. He had a far deeper knowledge about amphibian issues that I did, and a broad network in the scientific community. Not for nothing he was ASA’s Scientific Director. He was creative, as his t-shirts show. He cut a deal with an airline company to sponsor part of his travels for amphibian conservation. Phil also got someone in New Zealand to make a few stuffed Archey’s frogs (quite cute, believe it or not!), which we were to take along in all our travels and photograph in all kinds of situations and people, as the basis for a communications campaign.

I last spoke to Phil when the late George Rabb passed away – Phil wanted to let me know about this, as we worked so closely with Dr. Rabb and I was then a bit further away from the amphibian world. It was yet another example of how he cared: in the three years we worked together, pretty much anywhere we went we would meet someone who knew and would approach Phil. So many positive words about him!

Setting up the Amphibian Survival Alliance was an exciting period. Phil and I were both enthusiastic and convinced that ASA was the way forward to improve the condition of amphibians. The task was, and remains, daunting, and I appreciate having had a fine colleague with whom to share such responsibility. The good memories of those early years as the ASA-duo will remain for many years to come.

Phil in Madagascar

By Franco Andreone

I had the great occasion to personally meet Phil when I organized the second meeting dedicated to the conservation of Malagasy amphibians. This was named ACSAM2, “A Conservation Strategy for the Amphibians of Madagascar” and was held in Ranomafana National Park, 18th-22nd November 2014. As chair of the workshop I invited major amphibian conservationists to be present at that event and Phil was on the frontline, since he was Co-chair of the IUCN SSC Amphibian Specialist Group. It was a great honor for me to know him. When I shook his hand I immediately perceived great empathy and natural modesty. I have always taken these sentiments into great consideration, as for me they make the difference when we study animals and wish to conserve them. It is always important to take into the highest consideration the human beings and the stories behind them. In Madagascar, talking about frog conservation is often difficult, and maybe sometimes “embarrassing” since most of the people earn no more than a dollar a day. So far, conserving amphibians is important because human beings matter. We left Antananarivo to reach Ranomafana and the ValBio

Center where the meeting was held. Phil was extremely kind to me and listened with great attention to all the talks and issues related to Malagasy amphibians. He gave a wonderful talk and we also discussed the possibility of launching an awareness program. I will personally miss him.

Remembering Phil

By Christoph Matthaei

As Director of the Ecology Programme, Phil designed and ran the highly successful Tropical Field Ecology paper that involved an annual three week field trip to the ancient Ulu Temburong rainforest in Borneo. I was lucky enough to join Phil on two of these trips, in 2018 and 2020. Without Phil's extraordinary enthusiasm, drive and commitment, this course would have never happened. It took three years of planning before it could be run. During the field trips, we all saw Phil in his element, and he loved every minute of it. He was a passionate field biologist who loved not just frogs, but all sorts of weird and wonderful wild creatures.

He also loved teaching students, and excelled at it. I'll never forget the sight of him holding a highly venomous pit viper, which he had caught in the rainforest (it almost fell on his head when he knocked it off a tree where it had been perched) and brought back to the field station. Our students were all standing around him (though at a respectful distance), taking photos of the snake, but mainly looking at it in awe. Phil had a big smile on his face and looked extremely happy. This is the way I will always remember him.

Memories of Phil Bishop

By Kath Dickinson

Phil was a very talented, committed, outstanding teacher - and he never stopped learning himself. He was always keen to try new things and to keep up with the latest IT developments that he could incorporate into student learning. We worked together for many years as co-teachers and co-learners - sharing in the actual teaching itself but also having regular conversations about how we could develop our own teaching practices and student learning. We also talked of encouraging students to come to lectures, and discussed the research that emphasises the value of listening in lectures and the skill of taking good handwritten notes. It was in all of these contexts that we talked about 'back to basics' - the value of students learning from first principles. Sometimes it is a bit too easy for the rapid advances in technol-

ogy to leapfrog (thanks Phil!) over understanding of the core data or the process involved in deriving results, or your location. For example, we would talk about the value of knowing how to use a compass and a map - becoming a lost skill amongst students in field-related subjects, but if the batteries give out on a GPS unit or the smart phone loses charge - then what? The importance of understanding data and recognising whether the calculator or the software or the high tech equipment are giving correct readings or not is fundamental. *Back to basics* became a bit of a mantra for us. Phil was always ready to talk about teaching, how we teach, what we teach, and share the joy and fascination of learning. Thanks so much, Phil.

Fond Memories of Phil

By Lloyd Spencer Davis

I have so many memories of Phil - all of them fond memories; not a single bad one. Almost all of them involve me laughing, either at something outrageous he has said or something outrageous he has done. Phil had a special common touch: he could say things and do things that the rest of us would be fired or fined for even contemplating. It was, at least in part, because he was so genuine, and behind his words and actions it was always obvious that there lurked a massive heart. He cared. It didn't matter if you were a poorly performing student, his colleague, his friend, the world's most prominent anthropologist, a prime minister, or some super-threatened amphibian: Phil cared about us all.

He derived pleasure from opening people's eyes to the wonders of amphibians and their plight in the world. He didn't just popularize science - conveying it in ways that made it understandable - he made it popular. He turned the public and politicians into a frog's best friend.

One memory I have is sneaking up behind Phil and putting my arms around him while he is talking to Ronda, the Department of Zoology administrator. I cannot provide a word-for-word transcription of what he said, for fear of being fined - or worse, but it was something to the effect that I should watch out for his "man

breasts."

In a way, that sums up Phil. Outwardly, he projected an image of being rough and ready, but, really, he was a kind soul who loved the world and did all he could to nurture it. We are all better off because of his love, but I miss it.

Thanks, Phil, for Everything

By **Javiera Cisternas**

Phil was my PhD supervisor, but also one of the nicest and funniest guys I have worked with. I met him in 2013 at a conference in Chile. Like many people before and after myself, I approached him and asked if he would like to be my PhD supervisor. In addition, I gave him a booklet about an outreach amphibian programme developed in Patagonia during 2011 that I led. What I confessed to him later was that I didn't have any available copies for him, so I begged one of the conference attendants (Andrés Charrier) to please give me back the booklet I had just given him so that I could give it to Phil! I confessed this story to Phil two years later and long after I was his student, and Phil thought this was so hilarious that every time he needed to introduce me to any conference or public presentation he would start telling everyone about this story and showing this booklet.

Similarly, I have countless other stories with him, as we used to meet weekly for the last six years and shared more than ten field trips around New Zealand to study *Leiopelma* species. For instance, in my PhD's first year we were preparing for a field trip in which I was responsible for launching eight dataloggers that we were going to install in the forest. Suddenly, the dataloggers were not working, the reading device wasn't recognising them, and I panicked and got really nervous, as we were leaving for the airport in a couple of hours. I started writing emails asking for help from everyone at the Department of Zoology, I searched on Google for tutorials and read manuals; in short, I was doing everything I could to solve the problem. But I was unsuccessful, so, desperate, I went to Phil's office and told him what had happened. He looked at me very calmly and accompanied me to the lab where I was trying to launch the dataloggers. He picked one up, looked at it, opened it, and told me: Javiera, put a battery and check if it works. OMG, did

I feel stupid that day! But despite my sheepishness, I was amused by how Phil never got angry, never lost patience, kept a cool mind, thought rationally, and solved the problem. I always appreciated his excellent mood as a supervisor.

I'm also very grateful to Phil because he was always very supportive of my crazy innovative ideas. He supported me when I wanted to work side by side with *tangata whenua* (the Māori indigenous communities of New Zealand), even though we needed to learn everything together, what to do, what to say, how to do it, etc. and we ended up very successful: we developed a beautiful and strong relationship with two *tangata whenua* groups related to the two frog populations we were working on. In addition, he supported me on my idea of monitoring oviposition sites inside hollowed tree-ferns. He advised me that Ben Bell, a *Leiopelma* species expert, had monitored these species for more than 40 years and never described this relationship so he advised me to work on alternatives to this idea in case it didn't work. I did find several oviposition sites inside tree-ferns, and Phil accompanied me to the field to see this. When we were there he confessed to me that this was his first time seeing *L. archeyi* over eggs in the field.

Together we co-authored one paper in a peer-reviewed journal, three papers in non-peer-reviewed journals, nine conference presentations, and currently we have one more paper in review and another one in preparation. Furthermore, we had several philosophical conversations about how to work for effective conservation. We agreed on the need for sharing results, publishing, and creating networks. We also agreed on the importance of incorporating the human dimension into conservation. Thanks, Phil, for your lead working for amphibian conservation.



Phil with his last graduated PhD students: Luke John Easton and Javiera Cisternas Tirapegui. Photo: Deberah Bishop.

The Gift of Opening Minds

By Ashwika Kapur

Back in 2014, I was a young girl with a head full of dreams, ready and eager to learn the ropes of being a Natural History Filmmaker. And that's why I travelled all the way from India to New Zealand to find myself in a large hall at the meet and greet gathering of the Science Communication department in Otago. I stood there earnestly telling my new faculty and colleagues, all about the latest successes of Tiger conservation in India. That's when a gentleman in a crisp blue shirt interrupted to say - "Well, that's just great, Ash, but what about the frogs in India? How are they doing?" And that was the unsuspected beginning of a most delightful friendship with a professor who will always remain a favourite.

To answer his rather unexpected question, the frogs weren't doing too good! Widespread habitat loss meant that the familiar cacophony of frog calls from the Indian monsoons of my childhood was all but gone, and for a little girl who was famously known for walking around with a pocket full of toadlets, the fate of the frogs was a very big deal. Never mind the big cats, the frogs were in trouble, we promptly agreed, and that was the first of many passionate discussions Phil and I had about the troubled lives of amphibians.

In the months to come, Phil and I often caught up for regular frog-talks, and it wasn't long before our plans for saving the critters began taking definite shape. Top of the pops, for Phil, was the Archey's Frog - a 150 million year old evolutionary riddle that Phil described in a way that made it sound like the most intriguing creature that ever walked the earth. His voice would change and the look in his eyes would turn bright and focussed when he began to talk about his favourite frog. "It's got muscles to wag a tail that it doesn't possess, and it cannot croak, so it uses scent, not sound, to communicate, and it is so prehistoric that it was probably hopping around at the feet of dinosaurs, except that it cannot really hop without landing on its face. But then it gives its newborns piggy-back rides, so it is basically awesome". Jaw wide open, I was in a matter of minutes convinced by that vividly painted picture that Archey was a living legend that deserved to star in its own movie. So just like that, off we went to the Coromandel Peninsula, to look for Phil's favourite frog and make a movie.

To the uninspired observer, of course, Archey could well be just

another brown frog under yet another rock, had its story not been told through the eyes of a man like Phil - eyes that sparkled in awe and amazement as he spotted magic and mystery in places where others wouldn't think to look. And that's the special thing about Phil Bishop. He had the most remarkable, rare capacity of bringing out the extraordinary in the seemingly ordinary - a lesson, I believe, I took away with me for life.

If my track record of films since then is anything to go by, Phil's infectious enthusiasm for the underdogs of nature has had a lasting effect on me. While most of the natural history film world chooses to point their cameras at the obvious stars of nature, the sure-shot box office hits, the big, the fluffy, the charismatic and the well-known, I decided to be a little brave and go the Phil way. If I have chosen to tell stories that are different and give a voice to the little heroes that are just as wonderful and important, it is because Phil taught me it was possible. It is largely thanks to the continuing influence of Phil that I have in the last few years gone looking for the rarest of turtles in the heart of tiger reserves. I have spent long, arduous days filming mudskippers instead of big cats in the Sundarbans. I have ventured deep into leopard country in the Himalayas in search of prehistoric salamanders and filmed the lives of the most common urban wildlife in my city only to discover what extraordinary, heroic lives they actually live. And of course, I filmed frogs - from the tiniest to the rarest to the biggest and the loudest and there has been nothing quite as fulfilling as watching an auditorium full of 8 to 80 years olds cheering a tiny leaf frog named Thumbelina on an adventure to find her Frog Prince in the heart of a great big city. In my endeavour to find and tell the stories of the forgotten members of the animal kingdom, the small, the dull, the unsightly, I have felt a fulfillment like none other. Taking a leaf from Phil's book, I have tried my best to open the eyes of children and adults alike to a wonderful world of those animals that are neglected and overlooked. And each time I have helped change indifference to love and concern for an unlikely hero of nature, I have thought of my friend and teacher Phil. And what greater gift in life can a teacher give a student than to open their mind and teach them to think out of the box.

Remembering Phil Bishop

By Ulmar Grafe

Frogging was in Phil Bishop's DNA. He travelled many roads, but the one he will be remembered for most is the road that led to him being a passionate conservationist of amphibians. He picked this road early in life, and he stayed on it. His love of amphibians, toads in particular, inevitably brought him, and his wife Debbie, to Borneo. He visited the Kuala Belalong Field Studies Centre in Temburong, Brunei between 2015-2020 several times with students from the University of Otago, NZ, to assess the long-term health of amphibians in tropical rainforest environments.

Phil would pick up toads along the rainforest stream, which we would survey twice a year, and look at them carefully, even lovingly. Some toads he would give names, as he did his first toad

Gertrude as a boy in the UK. Phil was a champion of amphibian conservation and he much enjoyed working in a pristine rainforest environment in which the extinction threats to amphibian survival, seen elsewhere, are not (yet) discernible. Wearing his iconic t-shirt with the logo 'Fact.. the survival of the Earth depends on frogs', Phil inspired students to look beyond the daily news sound bites to view the larger tangled web of life, most apparent in the wet tropics.

Phil was a powerful communicator and his interests were very broad. Why does the yellow color rub off in the leaf-litter frog *Chaperina fusca*? How can tadpoles of *Microhyala borneensis* thrive in the digestive juices of carnivorous pitcher plants? Why does *Zhangixalus dulitensis* have this anal flap? And, how can we design a tropical



Photo: Ulmar Grafe.

field ecology course to inspire the next generation of conservation biologists? Always on the move, he was also a good sport. He enjoyed a good prank, even at his own expense, like when the digestive juice of a carnivorous pitcher plant was poured over his

head to “cure” his baldness. These are a few of the things that I remember and I cherish the moments that we travelled on the same road together. He was a dear and long-time friend who will never be replaced.

The Bishops in Borneo

By Indraneil Das

It was not the first time Phil and I met (that was at the historical 1st World Congress of Herpetology, in Canterbury in 1989, when we were both grad students), nor was it the last (the 9th version, in Dunedin in 2020). Here, I shall recount Phil’s and Debbie’s visit to Sarawak, for the Sixth International Bornean Frog Race, in 2017, a memorable event for all of us.

The International Bornean Frog Race is annually organised by Universiti Malaysia Sarawak’s Institute of Biodiversity and Environmental Conservation. Its aim is to draw public attention to the region’s rich amphibian fauna, and at the same time, to deliver messages on nature conservation and amphibian protection. Since 2012, the Race is traditionally celebrated on the last weekend of April, and eight editions have thus been held, coinciding with the annual ‘Save the Frogs Day’, a global event celebrated via hundreds of events in over 50 countries worldwide, to highlight conservation issues facing the world’s amphibians. The Race includes a number of amphibian-related activities, from talks and workshops (photography, drawing, painting, talks, demonstrations), to mini-teaching

modules on ecology and conservation for children, exhibitions of frog-related memorabilia, live-painting and art, screening of short documentary films, and an auction of frog-related merchandise. The highlight of the event is, of course, a photographic competition that pits competitors from up to 17 countries to capture images of the most number of amphibians (within the time limit and locality mentioned) as well as the best imagery using mobile phones, compact cameras, mirrorless and DSLR cameras. The generous cash prizes are provided by the many sponsors of the event, chief amongst them being the Ministry of Tourism, Arts and Culture Sarawak.

Over the years the event has gone from strength to strength, exposing the general public, particularly the urbanites of Sarawak and Borneo, to the sights and sounds of a rainforest by day and night, and showcasing the diversity of amphibians and other life in a convivial atmosphere. Many come with their entire families. Promotional activities undertaken include a dedicated website, a [Facebook page](#), and other social media accounts that target inter-



Participants of the Indo-Pacific Amphibian Symposium, Universiti Malaysia Sarawak 2017. Photo: Mohamad Hasri Al-Hafiz.

national as well as local participants, particularly students from Sarawak and elsewhere. At every Race, we invite prominent local and international amphibian biologists and other conservationists to deliver talks on amphibian biology and conservation. And every year, many cool items are produced for the participants, from attractive certificates for winners and participants, to field guides, car stickers, button badges, T-shirts, medals, notebooks, mobile apps, postcards and personalised postage stamps, with the frog motif.



With the late Dr. Lim Boo Liat at the Kalimantan View Point, Borneo Highlands. Photo: Indraneil Das.

At the 6th International Bornean Frog Race 2017, held at Gunung Gading National Park, our speakers were Phil, all the way from the UK (where he was on sabbatical), and Dr. Lim Boo Liat, Malaysia's foremost biologist. We were all excited both with the speakers and the venue, Gunung Gading being a dome-shaped granite massif, clothed with hill dipterocarp forest. The Park is a two-hour drive from home, where we had never had the event before. It has a wonderful fauna and flora, including both a rich diversity of frogs and *Rafflesia*, the world's largest flower, and a cooperative and friendly Park staff of the Sarawak Forestry Corporation.

Phil came highly recommended by the speaker from the previous year's event, Jean-Marc Hero, who must have also provided a good word about us to Phil, and in no time the response to an invitation letter (with a request to stay for a week and give several talks!) was received:

"It would be fantastic for Debbie and I to spend a bit of time with you and we would love to see the interesting sites in that half of Borneo ... of course I'd be happy to give a talk at your institute on frog locomotion or NZ frog conservation or NZ frog biology or all three!"

All were thrilled, and plans were drawn up.

Phil and Debbie arrived on a long-haul flight from London on 26 April, and we, wearing Frog Race T-shirts, received them at the Kuching International Airport. We put up Phil and Debbie at the Century Hotel, located a 5 minute drive from the airport and from my own residence. Phil arrived with a bad cold, which had us worried but recovered in time for his first speaking engagement, which was the next day, 27 April, at a mini meeting (with a grand name: the Indo-Pacific Amphibian Symposium), and several Racers (from India, South Korea, Brunei Darussalam, Malaysia, and of course, New Zealand) presented papers at the campus of Universiti Malaysia Sarawak. Phil's was the inaugural talk, entitled "The Biology and Conservation of the Unique and Ancient New Zealand Frogs". To use a cliché it was an eye-opener for many of us, particularly the grad students, and even members of the audience representing conservation agencies, all remarking of the long-road ahead of us for amphibian conservation in a high diversity country as compared to the advancement made in New Zealand. Certainly coming from Phil (the lead author of the New Zealand Native Frog Recovery Plan), and with the visuals of wooden plank walks ('least frogs get crushed underfoot'), the message to us was stark. A philatelic exhibition was also arranged in conjunction with



At our drift fence in Sama Jaya Nature Reserve, where Phil discovered that the water-filled buckets had become a breeding centre for *Chaperina fusca*, a new record for the site. Photo: Indraneil Das.

the Symposium, showing frogs as depicted on postage stamps and first day covers.

On the morning of 28 April we took the Bishops to Gunung Gading National Park, the Race venue. The Sarawak Forestry Corporation had kindly arranged for accommodation for all of us, including renovating the guest quarters for our speakers. After settling in Phil and Debbie looked around the Park Headquarters in the company of fellow herpetologists Ulmar Grafe and Amaël Borzée, familiarizing themselves with the local frogs.

The big day, 29 April, started early for all with a junior Race event, where the Bishops were left to their own devices, while we frantically swept away cobwebs, unpacked boxes, set up stations and signages, arranged chairs and tables, checked electrical connections, attended to 1001 queries by our guests and participants, and made sure there were no slip-ups when the Minister arrived. The first half of the day engaged all in the Junior Race, an event where local school children are invited and one which I personally felt was the most satisfying part of the event in terms of reactions and potentially long-term effects of the Race. One particular activity involved hiding tiny microphones in forested situations and asking children to recover them, as this requires finding them by listening to the calls. Both having spent time in Puerto Rico working on the Coquí, *Eleutherodactylus coqui*, a native to that particular part of the Americas and an invasive elsewhere, Ulmar attempted to pull Phil's leg, playing the 'co-kee' call on one of his microphones, clearly unsettling Phil!

The 'adult' portion of the Race started right after lunch, and Phil's talk was at 5:45PM, where he spoke on global amphibian conservation. Wearing multiple hats (ASA Chief Scientist, IUCN Amphibian Specialist Group Co-Chair and Executive Committee Member of the IUCN Amphibian Ark, besides Conference Direc-

tor of the upcoming 9th World Congress of Herpetology, 2020), his voice was heard by all those who mattered, from young graduate students to conservationists and governmental agencies, the event being covered in the print media and on social media sites.

After spending the next day at Gading the party moved to Kuching, where we did the usual tourist things for the Bishops (sightseeing, shopping, eating and drinking). In the midst of these activities we managed to whisk Phil away to one of our study sites, the Sama Jaya Nature Reserve, a tiny protected area within the city limits and home to several health and blackwater specialist frogs and to the very touristy Semenggoh Wildlife Sanctuary, where busloads of tourists arrive daily to have a peek at rehabilitated Orangutans, *Pongo pygmaeus*. On 2 May, Phil and Debbie visited the Kubah National Park, one of the premier frog-watching sites in this part of Borneo. As many as 72 species of amphibians have been recorded in the mountain range, and the Bishops got to see over a dozen in and around the famous 'Frog Pond'. One frog Phil and Debbie were particularly intrigued in was described by us in 2010 as one of the smallest in the world, the Matang Narrow-headed Frog, *Microhyla nepenthicola*, which breeds exclusively in the pitchers of the Pitcher Plant, *Nepenthes ampullaria*. Here Phil was briefed on the long-term ecological studies on frogs being conducted by our students and collaborators using automated sound recorders and other techniques. The Sarawak Forestry Corporation had requested Phil to interact with the Park staff, and a talk on the frogs of New Zealand was promptly agreed to. However, the speaker was a bit delayed on account of the untimely appearance of a coral snake outside the venue, causing cameras to be pulled out and wild scenes of herpetologists sprawling across the road trying to photograph it, much to the exasperation of the VIP guest from the Ministry.

On 4 May 2016, after an early lunch we started a 2 hour journey from Kubah to Gunung Penrissen, a submontane forest listed as an Important Bird Area. Conditions were perfect for the main quarry: the Bornean rainbow toad, *Ansonia latidisca*. This was one of 10 'Lost Frogs' in a campaign by Conservation International about a decade ago, that was rediscovered at this mountain summit and extensively covered by the media for its wildly colourful appearance and backstory of not being seen for nearly a century. We stayed for the nights of 4-9 May at the Jungle Cabins of the Borneo Highlands Resort, a series of cosy wooden cabins on low stilts with warm beds, running hot water and great views of the mountains. The presence of my graduate student, Pui Yong Min, improved our ability to find frogs and not get lost, and long and pleasant conversations were had into the night with Ulmar and Dr. Lim. And yes, the Rainbow toad did reveal itself to our most distinguished guests.

Finally, it was time to let go of the Bishops. On the morning of 9 May we had an early breakfast, departed the cloud-swirling Borneo Heights at Penrissen and arrived at the airport in Kuching in time for the flight back to cloud-swirling London.

Our last meeting was in Dunedin, at the wind-swept restaurant by the beach, where Phil congratulated us for winning the right to hold the 10th World Congress of Herpetology, to be conducted here in Kuching, Sarawak, Malaysia in 2024. As I reflect back, Phil was the picture of good health and positivity. The news of his illness and the rapid decline of his health were thus completely unexpected to us.

Phil was no regular professor of zoology, but had a variety of interests outside of his specialized field. We bonded on various levels: of course amphibian diversity and conservation, as well as

John Cleese trivia and the enjoyment of beer production and consumption, and a valued contributor till the end to our 'Beer Diversity' WhatsApp Group.

The State of Sarawak will be indebted to Phil and Debbie for their participation at the Frog Race and for their huge support to Kuching as the host of the 10th World Congress of Herpetology, to be held in August 2024.

In preparing this piece remembering Phil and Debbie's visit to

Sarawak, their warmth and friendship, I thank Mohamad Hasri Al-Hafiz Bin Haba, Rahah Binti Mohamad Yakup and Pang Sing Tyan for helping with the images, and Amaël Borzée and Genevieve V.A. Gee for their comments.

Treasure Hunting With Legends

By Jude Hooson & Sara Smerdon

Mahakirau Forest Estate is a mainland sanctuary located on the backbone of the Coromandel Range, on Aotea-roa's north island. It's our privilege to be the guardians of many endangered species, including two of only three extant species of frog endemic to New Zealand; *Leiopelma archeyi* and *Leiopelma hochstetteri*. We have many partnerships in place to research, protect, restore and advocate for the wonders this forest holds.

Our relationship with Prof. Phil [and the University of Otago] began in 2015, but immediately he felt like a lifelong friend. Phil was one of those special human beings with deep intellect and highly specialised knowledge that could connect with people from all walks of life and sweep them into his orbit with his enthusiasm, charismatic personality and good humour. How could you not love someone who arrives to dinner bearing gifts of a t-shirt proclaiming "FACT... The survival of the earth depends on frogs", and a bottle of Arrogant Frog Cabernet Sauvignon?!

We love to share the beauty of our forest, especially the nightlife with keen nature lovers as well as specialists in the field of conservation. Many a zoologist, ecologist and herpetologist have joined us over the years for a hunt for the rare critters that call this little piece of paradise home. Only one of our guests has ended up with a highly endangered Archey's sitting on his lapel, completely by accident, and as if whispering in his ear. Welcome, Phil, to the project, literally a magnet for amphibians! We knew from this initial encounter that our relationship would be spiced by adventure, intuition, passion, serendipity, a lot of fun and most importantly with the approval of the critters we aim to protect.

In October last year Phil, Debbie and their amazing canine companion Holly spent a week with us. Holly is the first conservation dog to be trained to indicate the presence of Archey's frogs. She had already aced her studio work and city park exercises, and Debbie was ready to test her performance in true Archey's habitat. Mahakirau seemed a perfect location to undertake this course. We happened to be surveying for geckos in the same period with our research partners from the Auckland Zoo and were able to mark observations of endangered Archey's the night before Holly's daytime drill, an aid for Phil to confirm a successful find. It took Holly less than ten minutes on the job to find her first wild frog. She made it look way too easy!

Holly - the world's first 'Archeyi Sniffing Dog' - is a mascot for the many decades of work carried masterfully by the Bishops. Her success represents the great knowledge, discipline, passion, innovation and courage fundamental to her trainers' lives. She also inherited that same joyful glee in the eye, only ever evident in individuals who do what they love and accomplish miracles through purity of vision and utter determination.

One of our last conversations with Phil was on a visit to our

newly constructed field base that he had so generously endorsed in funding applications and social media for us. An inspiring discussion took place about a potential Hochstetter's frog longitudinal monitoring study here at Mahakirau, with Phil animatedly pointing out the fascinating discoveries that could be made over time and envisaging what the outcome would be in 20 years. It was so heart wrenching and incomprehensible to hear a couple of months later that he had passed away.

We look forward to working further with Debbie and Holly and know that Phil will be with us, looking over our shoulder, offering advice and murmuring encouragement, just like his first Mahakirau frog had done when welcoming him to this enchanted forest.

We are certain a little piece of Phil's soul will be ever present, here and in all the special places he has left his legacy around the globe. We only need to care for the frogs to remain close to him.





Remembering Professor Phil Bishop

By Helen Meredith

I first met Phil over email in 2007 when, much to his excitement, Archey's Frog topped ZSL's list of Evolutionarily Distinct and Globally Endangered amphibian species. However, it was a wet evening in Dunedin in 2011 that sticks in my mind. I was in the passenger seat of a car following Phil's Land Rover, and through the pouring rain caught sight of his number plate. It read "NZFROG", confirming my deep suspicion that Phil was, indeed, the real deal. I like to think I never took him for granted – his countless acts of kindness and reassurance, his dependability, his sense of humour and knowledge – but over the past few months I have thought time and again how special he was to our community, and to everyone who knew him. How fortunate I was to have known him and worked with him, and that something profound is now missing that cannot be replaced. He was the ultimate amphibian ally. Determined, honest, eager for change and impatient for action. He was always the perfect antidote to a dreary, meandering meeting, as well as being an open person capable of blending his family life with his professional passions. Whether it was touring the world with Debbie, or being a father and friend, he showed me that life can be full, respectful and inclusive of those you love. You don't have to choose career or family, stress or peace. You can be more than one thing, and this enriches the life of your colleagues, just as it gives others the opportunity to experience your vocation. Phil was always capable of putting my own frustrations into context. Although I respected him tremendously as a colleague, I felt I could be myself with him. He didn't hold me to any impossible standard, but worked with me as the kind of mentor with whom you could have a beer and a vent. I think I understood his views on matters of amphibian conservation pretty well, but he was also capable of being completely apolitical and non-egocentric whenever the situation demanded. His goal was to make the world a better place for amphibians, which helped him navigate the human terrain with great skill and charm. Gone too soon, I never had the chance to compile a memory bank of all his finest moments.

I did not know I had to do so. But since his departure, my mind has raced with memories of him in locations all over the world, from Manaus to Manchester, New Zealand to Tonglu, Vancouver to London, Hawaii to, well, Skype. He was always magically there. Seemingly never jetlagged or weary, bringing a beam of familiar sunshine to proceedings and an attitude of "let's just get this done". If I ever took him for granted, I know now that he was a one-off. I will continue to apply what I learned from him, and wonder about the things I never had time to ask. As I wrote in a message that Debbie kindly read to him during his final days in hospital: *"You have been there informing me, encouraging me, steering me and making me laugh at the absurdity of everything throughout my time as part of the amphibian conservation community. You have helped validate my thoughts, correct my assumptions, challenge me, encourage my progress and commiserate over my stresses, losses and misgivings. You have stepped in to help me on so many occasions. Your ability to be in so many places – always with the same energy, tenacity and ease – has inspired me greatly. Your dedication to your family and friends, communities and country just as much. Although there are no words to convey the magnitude of my gratitude, I want to say a deeply heartfelt "thank you"."* I know this message must sadly slip into the past tense, but every sentiment it contains remains the same. Whatever I do, I will always be informed by knowing Phil and thinking of the example he set. Just as Phil had enormous respect for other great pioneers of amphibian conservation who we have lost over the years, he now stands side by side with them, most likely surrounded by crowds of revelling amphibians. He has left a vast number of us ready to build on his momentum and celebrate his memory in the years to come. Thank you Phil, and cheers to you.

In Memory of an Inspiration and Hero



Phil was a great inspiration and an even kinder person. I only had the opportunity to meet him quite recently (in 2017), but beginning then I have many fond memories of him. These include being in attendance to hear Sir David Attenborough give an address in Cambridge and a number of conferences, such as the World Congress of Herpetology held in Dunedin in 2020. As an early career researcher, having someone like Phil to act as a source of inspiration and guidance, was invaluable in helping to shape my progress through those early stages of academia. Phil will be sorely missed by us all, his warm smile and firm handshake now greet us in our memories as we look back and reflect on the legacy that he leaves. I am certain that the amphibians of the world would be in a far more perilous state without the actions of Phil.

~ Steven Allain

I first met Phil when I was in high school and was visiting the University of Otago to see whether I wanted to study there. He was a guest speaker and asked the audience: "Can anyone name our native frogs?" I recalled reading about them and spouted off their names. Phil was astounded. I had merely read a book. But that moment started a bond we shared that lasted a decade, where he supervised me and supported me during my working career as a conservation ranger. Losing Phil has been the second hardest thing I've ever had to deal with. Phil was one of the champions who pulled me through the most difficult time of my life where, to be frank, I had wanted to end it. He was more than a supervisor. He was an inspirational leader, mentor, and life-long friend. Working on frogs will never be the same.

~ Luke Easton

I did not work much directly with Phil, but the little work interactions I had with him I was impressed by his commitment to conservation and amphibians even since I heard of him around 10 years ago! I followed the great work that he had been doing at the ASA and the ASG and it was an honour to meet him in person a couple of times. I just want to say thanks so much for your leadership, passion, enthusiasm and love for your work. I am sorry for your departure.

~ Alejandra Goyenechea

There are some mentors we pick, and other we meet by chance and they change our lives for better. Thank you for being such a person to me Phil. The frogs, and I, miss you.

~ Amael Borzée

Phil was and continues to be an inspiration and hero - to me, and to so many people around the world. Phil was a major force in global conservation, a much-needed and powerful ambassador for amphibians and their conservation. But more importantly, Phil was one of the most intelligent, lovely, generous, kind, down to earth and funny humans on the planet. He is so missed by so many and I feel so blessed to have crossed paths with Phil during our brief walks on this earth.

~ Jodi Rowley

As an ASG member, I corresponded with Phil and, although we did not know one another initially, he was always friendly, professional, and quick with a response. As Book Review editor for Herpetological Review, I once tried to get him to review a guide to New Zealand herps (consisting mostly of lizards), but he deferred, as "he was a frog man." He was kind enough to give me one of his treasured t-shirts (Fact: Survival of the Earth Depends on Frogs), and in return I sent him a copy of my box turtle book (no doubt invaluable on New Zealand's South Island!). That shirt has now traveled around the world and went back to NZ for the World Congress. Phil will certainly be missed for his leadership, enthusiasm, and dedication to amphibian conservation.

~ C. Kenneth Dodd, Jr.

Phil Bishop was a collaborator, friend, and advocate of AmphibiaWeb, and we miss him. He delighted us with his whimsical tweets (#frogOTD) on amphibians, which he was determined to seek out wherever he traveled. We even sought out salamanders on campus during his winter visit to Berkeley many years ago! His humor and optimism infused all our interactions with him. However, Phil was serious about amphibian conservation. He understood the mission of AmphibiaWeb and supported the conservation bibliography, so when Tim Halliday passed in 2019, Phil took over and shared those efforts with us. To honor Phil's and Tim's dedication to enabling amphibian research and conservation, we are collaborating with ASA and IUCN ASG to update the conservation bibliography and renamed it the Halliday-Bishop Conservation Library. Despite his valued titles and accolades, we will remember Phil as a generous, humorous soul, who was passionate about amphibians and saving them.

~ Michelle Koo



Photo: Indraneil Das.

Phil radiated love for his family, respect for his colleagues, and passion for protecting the world's most vulnerable creatures. I miss his kindness, wisdom, and most of all, infectious sense of humor. He inspired me to get involved with ASA and working with him has been one of the great privileges of my life. Phil will be forever remembered as a conservation hero and a wonderful friend.

~ Penny Langhammer

The best of life is often when we make the acquaintance of someone who is just an exceptional person. This was certainly true for every encounter I had with Phil Bishop. He was always kind and thoughtful. The fact that Phil had a deep commitment to conservation biology that was truly admirable was a bonus. He will be missed.

~ James Collins

The world lost a conservation hero, a biologist and a truly great friend, and it is certainly a worse place without him around. We started at the Department of Zoology, Otago at the same time and quickly bonded, with his sharp dry wit, how couldn't we? His pioneering and dogged determination to put NZ and global frogs on the conservation map earned him well earned international accolades, but he never forgot the need to educate the next generation and was keen to get his students out to the last wild places, including where I ended up in Panama. His support and guidance on our amphibian projects on endangered frogs was spot on and we'll miss him for that.

The image that sticks in my mind the most (and there are many!) is during his visit to Panama in 2002. We visited Nusagandi, a well known amphibian hotspot in a highland region in central Panama. We went out at night, pitch black into the thick jungle, searching for amphibians and came across a small pond, where the cacophony was ear piercing. Phil was in heaven! No sooner had I turned away I heard a splash....Phil had dived in and pulled out a central american bullfrog, and was bouncing around and hooting like a small boy who had just scored the winning goal in a football match, soaking wet.

I hope that wherever he is now, there's a tropical pond with an ear piercing cacophony of frogs....

Cheers mate.

~ Michael Roy

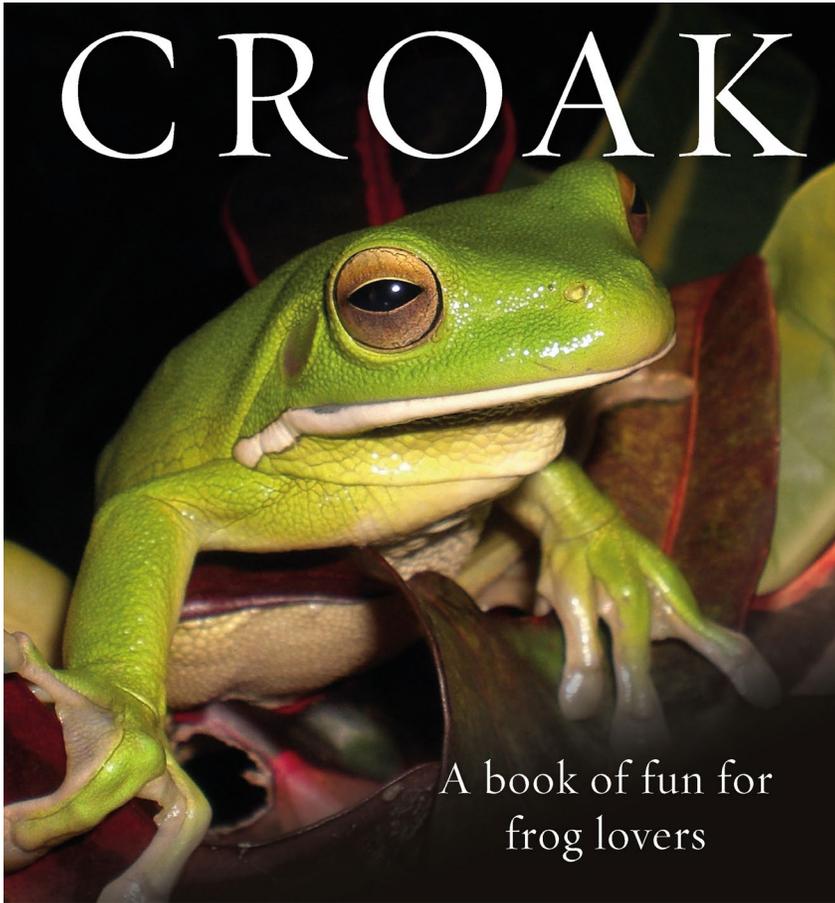


Photo: Gino Acevedo.

Phil Bishop, or "Dr. Phil" as I often affectionately called him, was an amazing man, not only for his life-long dedication to amphibian conservation, but equally as importantly, for the way he treated people. When I first became involved with the amphibian conservation community, I knew almost nothing about amphibians, and had never worked with them. On many occasions, I would call or email Phil to seek advice on things, to pick his brains, and sometimes, just to learn more from him. I always knew that Phil would never make me feel silly due to my lack of knowledge, and he was always so willing to share his time and expertise with me. He was always the same, whether he was chatting with fellow scientists, students, or members of the public. This was just one aspect of Phil's personality which I have always admired and respected. I was lucky enough to travel with Phil on a couple of occasions, and I always enjoyed his cheeky sense of humour and his friendship. Our community has lost a truly wonderful man.

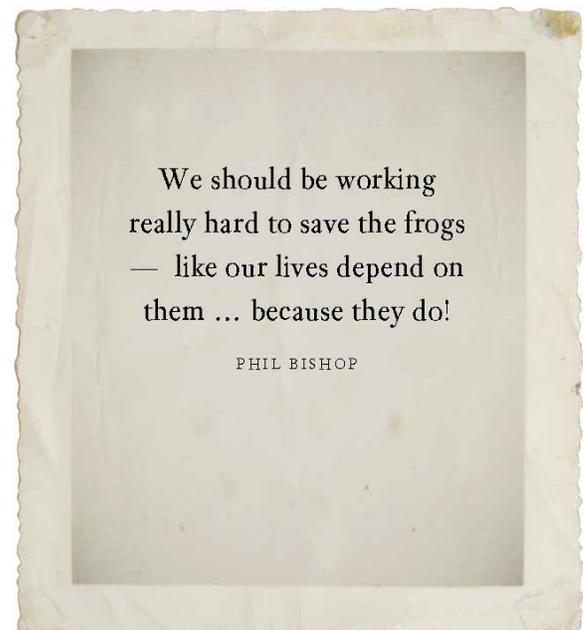
~ Kevin Johnson

Croak: A Book of Fun for Frog Lovers



Croak, the recently launched book compiled by the late Professor Phil Bishop, is a collection of delightful quotes and gorgeous photographs celebrating the underappreciated beauty of frogs. They showcase frogs in their natural habitats, paired with quotes from famous faces such as Jane Goodall and John Steinbeck. Many of the stunning, colourful images in Croak were taken by author Phil Bishop on his travels around the world. Croak now serves as a tribute to a life spent at the forefront of conservation as he sought to deepen our understanding of these vitally important creatures.

Available at www.exislepublishing.com (shipping to ANZ, US/CA & UK/EU)



CROAK

9

Amphibian Conservation Needs Assessments

By Kevin Johnson & Luis Carrillo

Conservation Needs Assessments (CNAs) use current knowledge of species in the wild to determine those with the most pressing conservation needs and provide a foundation for the development of holistic conservation action plans that combine *in situ* and *ex situ* actions as appropriate. These assessments allow us to maximize the impact of limited conservation resources by identifying which measures could best serve those species requiring help. In conjunction with data from recent IUCN Red List assessments and other amphibian databases, the CNAs are a valuable resource for directing and prioritizing amphibian conservation planning and action at the national level.

BACKGROUND

In 2005 the IUCN Species Survival Commission (SSC) Amphibian Specialist Group (ASG) tasked the IUCN SSC Conservation Breeding Specialist Group (CBSG, now renamed the Conservation Planning Specialist Group, CPSG) with implementing the *ex situ* components of the Amphibian Conservation Action Plan (1, 2). The Amphibian Ark (AArk) was subsequently formed in 2006 as a joint effort of three principal partners: CPSG, ASG and the World Association of Zoos and Aquariums (WAZA). The AArk is an international NGO which supports a global network of captive breeding programs that are explicitly linked to conservation and research programs, and our role is to implement the *ex situ* component of the ACAP. We work closely with the ASG and the Amphibian Survival Alliance (ASA), to achieve a shared Vision: *Amphibians thriving in nature*.

AArk assists its partners in evaluating the needs of amphibian species for conservation work; leads development and implementation of training programs for building capacity of individuals and institutions; raises funds and provides grants for establishing and managing *ex situ* conservation programs; and develops communication strategies, newsletters and other messages and materials to promote understanding and action on behalf of amphibian conservation. Our mission is “Ensuring the survival and diversity of amphibian species focusing on those that cannot currently be safe-guarded in their natural environments”.

Conservation resources are limited, and the amphibian conservation community lacks the resources required to effectively manage the massive task of mitigating threats and protecting habitat to prevent further species extinctions. With 41% of amphibian species assessed by the IUCN Red List currently threatened with extinction (3) the CNA process seeks to objectively and consistently identify priority species and their immediate conservation needs, so resources can be most appropriately allocated.

THE ASSESSMENT PROCESS

In 2006, CBSG (now CPSG) and WAZA held an Amphibian *Ex Situ* Conservation Planning workshop in Panama (4), and during that workshop, a species selection working group developed a decision tree to provide high-level guidance to the *ex situ* conservation community, providing a means to identify and prioritize which amphibian species were most in need of *ex situ* intervention to prevent extinction (4). At the time the original process was developed there was no established methodology for evaluating the

suitability and need for a given amphibian species to be included in an *ex situ* program, and which of those species should have *ex situ* programs established ahead of others.

The decision tree has been further reviewed and refined and has now evolved into the AArk CNA process. While AArk’s focus remains to identify and prioritize species for *ex situ* conservation actions, the current version includes recommendations for both *in situ* and *ex situ* conservation actions (5). It is available online (www.ConservationNeeds.org), in English, Spanish and French versions, and all completed assessments and recommended conservation actions available on the web site.

Most often, national ASG Chairs help to coordinate and assemble appropriate experts in their country to collaborate on the amphibian assessments. Scientists, field biologists and researchers, animal husbandry experts and others are vital to the success of the CNAs. Sharing expertise and experiences enhances the assessments, ensuring that appropriate recommendations for national and global conservation actions are delivered where they are most needed, and participation in the process, along with the networking opportunities encourages stronger stakeholder buy-in. Assessments can be undertaken in a physical workshop-based situation, with appropriate experts, government representatives and other stakeholders present, or can be undertaken online, with trained facilitators using internet-based video conferencing services, such as Zoom. Online assessment workshops are much cheaper to hold and greatly reduce the carbon footprint associated with bringing experts together for physical workshops. With travel restrictions imposed by the global pandemic, virtual assessment consultations have become more common and have proven to be very successful. The subsequent assessments and recommendations for conservation actions generated by the data in the assessments can then be used as the basis for developing a new national amphibian action plan or updating an existing plan.

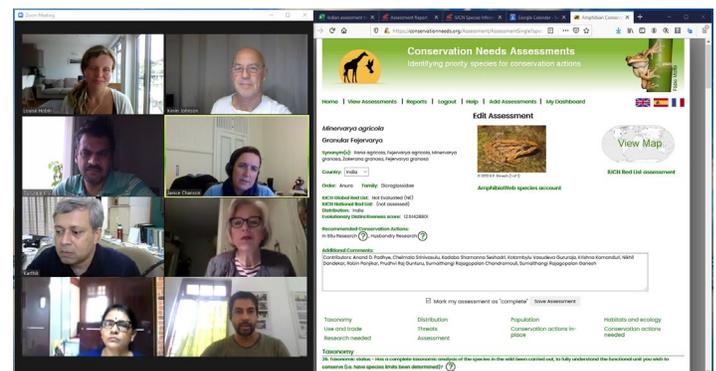


Fig. 1: Assessment workshops are increasingly being held online. Photo: Kevin Johnson.

Unlike IUCN Red List assessments, which assess the risk of species becoming globally extinct, CNAs are developed at the national level, since typically, conservation actions are also planned and implemented at the national level, hence multiple assessments, with differing recommendations might be available for the same species in different countries within its distribution.

A complete CNA for each species includes current information

on the status of the species in the wild; suitable protected habitat; the threats facing each species and the likelihood of them being mitigated in time to prevent further decline; cultural, scientific, socio-economic and phylogenetic significance; and past *ex situ* experience with the species, as well as information about potential authorization for implementing *ex situ* conservation programs, and the availability of founder animals, should captive assurance colonies be required. Any additional field research which might be required is documented, along with any conservation actions which are required *in situ*.

Once assessments are completed and saved, each species is assigned to one or more of ten different conservation actions, based on the data in the assessments. Potential actions include *Ex Situ* Rescue, *In Situ* Conservation, *In Situ* Research, Husbandry Research, Supplementation, Biobanking, Mass Production in Captivity, and Conservation Education, with none, one, or multiple actions being recommended for each species. These high-level actions, in combination with the data and extensive supporting comments recorded during the assessment process, can subsequently be used by national or regional amphibian conservation groups as a guide to develop new, or update existing amphibian action plans within each country or region or as a prioritized guide to inform future conservation program development. Species are listed according to their priority for the particular conservation action.

ASSESSMENT RESULTS

The current version of the CNA process has been used to generate almost 4,200 assessments for 3,544 species of amphibians (31% of the 8,384 currently known species (6), in 47 countries (7). Approximately 32% of completed CNAs have been for Asian species, with 25% in South America, 14% in Central America and 14% in North America (Fig. 2). CNAs for species in Africa, Europe and Oceania remain relatively low in numbers. Anurans account for 3,582 assessments, with 528 assessments for caudates and 87 for caecilians.

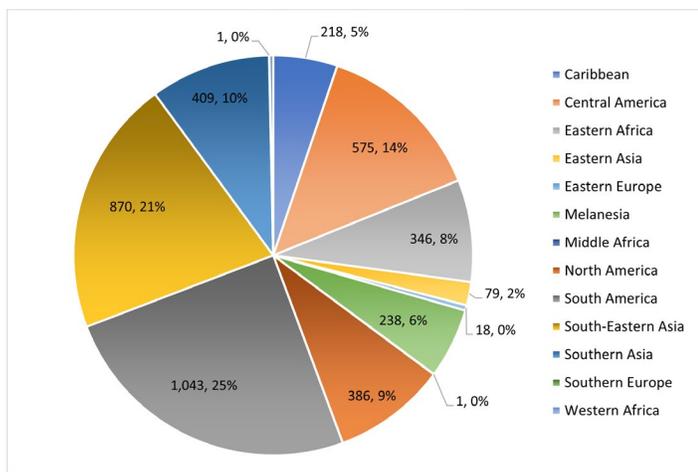


Fig. 2: Number of completed Conservation Needs Assessments by region.

Of the assessments completed to date, more than half (2,845) lack one or more critical pieces of information at this time, with further *in situ* research required to be carried out as part of the conservation action for the species. For many of these assessments, a brief description of the specific research required is included in the assessments (Fig. 3).

According to the data, 1,048 assessments (25.5%) state that no conservation actions are required at this point to ensure the species' survival, with an additional 574 assessments (13.7%) indicating that the majority of the population of the species in the wild is sufficiently protected to prevent further decline in numbers. However, for 676 assessments (16%) no knowledge about the threats to this species exists, or there is so little information known about the distribution of the species in the wild, that the threats cannot be determined. Four hundred assessments indicate that the current threats cannot be mitigated in time to prevent further decline or extinction, and these 400 assessments recommend that *ex situ* conservation-assurance programs are required for 382 different species, to prevent their eminent extinction.

The assessment process considers effectively protected habitat (i.e., actively managed to protect natural biodiversity, within a national system of protected areas or privately-owned land), with 1,754 assessments suggesting that 50% or more of known populations are currently in effectively-protected habitat, while 1,961 assessments show that less than 50% of known populations are in effectively-protected habitat. The status of populations in protected habitat is unknown in 461 assessments.

Definitions for the recommended conservation actions and the criteria for allocating them can be found on the CNA web site at <https://conservationneeds.org/Help/EN/ConservationActions.htm>.

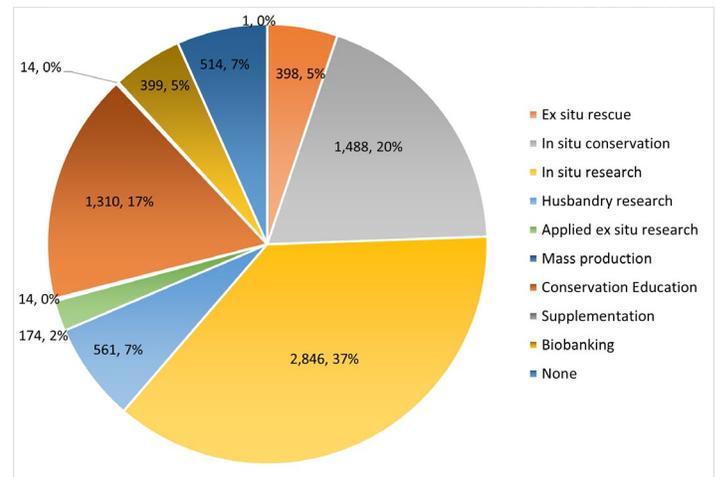


Fig. 3: Number of recommended conservation actions generated by Conservation Needs Assessments. Note that multiple actions are recommended for many species.

RED LIST & CONSERVATION NEEDS ASSESSMENTS

We are often asked if there is overlap with RLAs. Approximately 40% of the data contained within a RLA is also required within CNAs. The CNAs amplify conservation actions in RLAs, with the Conservation Needs section in many older RLAs lacking consistency and not providing guidance, although recommendations are now required in RLAs for threatened species. The CNAs complement RLAs, and when used together, they provide a more holistic guide to conservation priorities and actions.

The group of experts required to compile both RLAs and CNAs is similar and bringing them together for a single workshop is a much better use of our respective resources. Since early 2018 joint assessment workshops have been held for species in Costa Rica, Ghana, Honduras, India, Malaysia and Papua New Guinea, with a joint methodology being developed to integrate both sets of ques-

tions into a single process.

USING THE ASSESSMENTS

National groups of relevant stakeholders should make use of the recommendations to develop a national action plan, followed by holistic species-level action plans for the highest priority species that detail species actions, responsible parties and a timeline for achieving the goals outlined in the plan.

While many amphibian field researchers are well aware of research priorities within their countries, or the regions in which they work, the CNAs provide a consolidated list of species which require further research, and the most pressing needs. Species' requirements can be grouped by geographic locations and are an ideal way of developing field research projects for students and others. When additional information is discovered, the corresponding CNAs can readily be updated, and after doing so, recommended conservation actions will also be updated, based on the new data.

In many countries, zoos and aquariums work closely with their regional or national wildlife authorities, and the decision about which amphibian species are priorities for captive assurance programs is often made collaboratively, based on national assessments. However, in many countries, the decision about which amphibian species to manage in captivity is made based on information which lacks current knowledge of the situation in the wild. Field experts contribute current knowledge to the CNAs, and so the priorities and recommended actions they contain are based on a more solid input than that which generally exists within the *ex situ* community.

Although conservation resources should generally be applied to the highest priority species, this is not always practical. Some species may be facing serious threats that are unlikely to be mitigated or have such low numbers in the wild that the chance of recovery is extremely low. Likewise, some species have not been seen in the wild for many years, despite regular surveys. Thus, the potential benefit of any conservation actions directed toward an individual species must be weighed against the likelihood of success, with resources directed to those that are most likely to show the most promise of benefitting from those resources.

The CNA process has been an evolving protocol. The criteria and their rankings have been adjusted as experience with the process was gained, and we continue to work with the broader conservation community to identify goals, threats, and conservation options. This evolution is ongoing, with regular reviews of the type of information being collected in the assessments, and the methodologies used to generate priorities and recommended conservation

actions. Assessments and prioritization of individual species are reviewed and updated as we gain knowledge and as the threats to each species change. While the process was originally designed to be used with amphibians, it is now designed such that it can be applied to any group of taxa, and its use with species other than amphibians is currently being tested. The questions in the assessments, possible responses, and the text used within the interface are all customisable and can readily be modified if needed, to better suit difference taxonomic groups.

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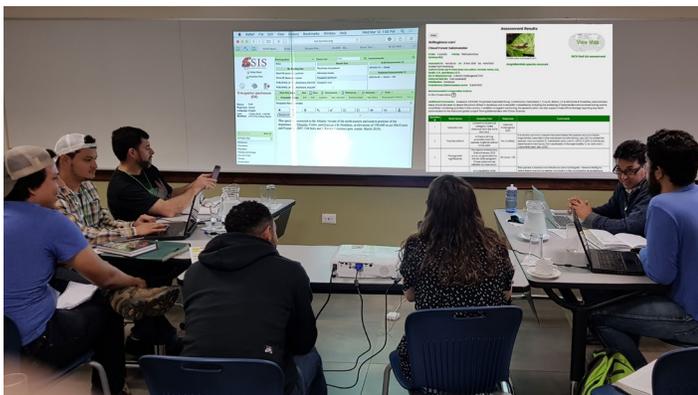


Fig. 4: Joint Red List/Conservation Needs Assessment workshops are held where country priorities overlap. Photo: Kevin Johnson.

David Wake, a Prominent Herpetologist Who Warned of Amphibian Declines, Dead at 84

By Robert Sanders



Photo: Michelle Koo, Amphibia Web.

Renowned evolutionary biologist David Wake, the world's leading expert on salamanders and among the first to warn of a precipitous decline in frog, salamander and other amphibian populations worldwide, died peacefully at his home in Oakland, California, on April 29. The professor emeritus of integrative biology at the University of California, Berkeley, and former director of the campus's Museum of Vertebrate Zoology (MVZ) was 84. Wake died of organ failure after the reoccurrence of cancer, but until the week he died, his health problems did not keep him from publishing papers, conducting fieldwork, meeting with colleagues in person or on Zoom, and calling friends.

It was while pursuing a college degree in entomology that Wake became fascinated by salamanders. In search of insects, he'd turn over logs and leaf litter and discover these fascinating creatures. "He starting seeing species of *Plethodon*, and then found *Ensatina* ... and that was it. The end. He was captivated, and he tried to learn everything he could about these animals," according to a 2017 perspective on Wake's life written by former students Nancy Staub and Rachel Lockridge Mueller. Staub and Mueller are professors and salamander biologists at Gonzaga University and Colorado State University, respectively.

Wake abandoned entomology for the study of amphibians and reptiles, a field known as herpetology. He focused much of his attention on one species-rich, but poorly understood, family of mostly North and Central American salamanders, the lungless salamanders, Plethodontidae, many of which lead an entirely terrestrial existence and consequently do not lay eggs in water, like many other salamanders. His favorite among these were the *Ensatina* — a West Coast genus he studied, among many others, throughout his career.

Over his 57-year career, he discovered and described more than

144 new species of salamander and had four amphibian species named after him. But to Wake, salamanders were also a means of answering deep questions in evolution. "He chose a particular lineage of organisms — in this case, the family Plethodontidae — and pursued it in all respects in order to understand how the group diversified and why it did the way it did. It was molecules to morphology to ecology to behavior to development, overlaid by taxonomy — his was a deliberate conviction that in order to really understand the evolution of organisms, you have to focus on a particular group and get to know it extremely well," said James Hanken, director of Harvard University's Museum of Comparative Zoology and one of Wake's former students. "He is

not the only person who chose that strategy. But what is unique is how successful Dave was at it. He took it to a level and a sophistication that few other people have done."

Among the questions Wake addressed were how changes in development give rise to diversity, how geographic variation contributes to the formation of species, and convergent evolution — the way different lineages converge on the same morphological forms and how that happens. "He is famous for describing ring species in a genus known as *Ensatina*. These are plethodontid salamanders in California that occur in a ring around the state, such that there is some gene flow between adjacent populations, but as you go around the ring, you get to a point where they are so different that they are reproductively isolated" and essentially separate species, said Michael Nachman, current director of the MVZ and a professor of integrative biology. "Salamanders were his love and passion, but he was really a deep thinker who used salamanders as an entry way to thinking about the biggest questions in evolutionary biology."

AMPHIBIAN DECLINES

As early as the 1970s, Wake began noticing that the sounds of frogs croaking at night in the Sierra Nevada had lessened, and in the 1980s, while searching for salamanders in Mexico, he noticed that once super-abundant species he had collected in the 1970s — at the time, species totally unknown to biologists — were no longer easy to find or completely missing from their previous habitat. Other herpetologists were reporting that frog populations worldwide also were declining, so he joined with several colleagues to bring the amphibian community together to discuss the threat. At their urging, the National Research Council quickly assembled a meeting in 1990 that drew widespread public attention to the prob-

lem — and an unaccustomed notoriety to Wake, as he fielded dozens of calls every week from reporters. The decrease in amphibians was the first of many documented declines in animal populations, including insects and birds.

“Amphibians are, in some respects, very sensitive to environmental perturbations, the canary in the coal mine,” Hanken said. “Dave and a small number of people really called the world’s attention to this phenomenon. He had a knack for seeing things on the horizon before other people did, of sensing trends or sensing important phenomena before others might have.” Wake and others pinpointed one unexpected cause — the pathogenic chytrid fungus, which fueled a worldwide pandemic among frogs. This and the effects of global warming arrived on top of many other environmental insults — pesticides, parasites, habitat loss and the introduction of predators, such as trout in Sierra Nevada lakes — to depress global amphibian populations.

He began educating his students about the threat to amphibians, which eventually generated a clamor for a website to document the decline. In response, in 2000, he and several colleagues turned a class project into [AmphibiaWeb](#), which has become a compendium of all known species worldwide — 8,418 as of December 21, with more than 40,000 photos — and a major resource for amphibian conservation. The site connects citizen scientists with researchers and spawned other efforts to create Internet sites cataloging the diversity of life on Earth before it goes extinct. Wake, who was the project’s director until his death, noted that the effort actually spurred the discovery of new amphibian species: There are now about twice as many known species as 20 years ago.

As director of the MVZ from 1971 until 1998, Wake shepherded the museum into the era of molecular genetics, establishing, with integrative biology professor and curator of mammals James Patton, a molecular evolution laboratory for use by all museum students, faculty and staff. Wake also encouraged the collection and freezing of DNA and tissue samples from animals, in addition to the skinned or pickled specimens typical of natural history museums. Such tissue has been critical in understanding how genes underlie evolutionary change. “That was 1972, and that was the first molecular lab facility associated with any museum in the country,” said Patton, who arrived at UC Berkeley the same year as Wake and served as assistant museum director under him. “And the frozen tissue collection — since we were out collecting specimens, we decided we might as well collect tissues that could be used for biochemical purposes — was the first tissue collection associated with a museum anywhere in the world, as far as I am aware.”

Wake was on the committee that directed the renovation of UC Berkeley’s Valley Life Sciences Building and the movement of the MVZ collections into a new space there in the 1990s. He also was largely responsible for the museum’s current layout: a central collections area surrounded by faculty and student offices, a layout that facilitates interactions among the researchers. Nachman compared Wake’s impact on the museum to that of biologist Joseph Grinnell, who founded the museum in 1908 and created the modern concept of a natural history museum as a resource for generations of biologists. “From my vantage point, David Wake’s influence was as great (as that of Grinnell),” said Nachman. “He is, without question, the only other director in the MVZ since its inception to have the kind of influence that Grinnell had on this institution.”

FROM ENTOMOLOGY TO HERPETOLOGY

David Burton Wake was born on June 8, 1936, in Webster, South

Dakota, and spent his adolescence in Pierpont, a town of a few hundred people. He was the grandson of Norwegian immigrants — Wake’s grandfather, Henrik Martinus Solem, was the first person to earn a college degree in the Dakota Territories. Wake’s mother, Ina Solem Wake, earned a college degree, as well, which was unusual for women of that era, and she groomed her son to follow in her family’s footsteps. She was a school teacher during the Depression; Wake’s father, Thomas, sold hardware and farm implements. The family moved to Tacoma, Washington, in 1953, where Wake finished high school.

Wake’s grandfather, an amateur botanist, instilled in him a love of nature, which he took with him to Pacific Lutheran College (now University) in Tacoma, from which he graduated in 1958 with a B.A. in biology, magna cum laude. His interest had shifted to entomology, and, in his senior year, to salamanders. At the encouragement of his entomology professor, he applied to graduate school in herpetology and was accepted by the University of Southern California, where he completed his Ph.D. in biology in 1964. He wrote his master’s and doctoral theses on the Plethodontidae.

In 1962, he married a fellow student at USC, Marvalee Hendricks, who abandoned her idea of becoming a medical doctor to become an evolutionary biologist and, later, a UC Berkeley professor of zoology and founding chair of the Department of Integrative Biology. Wake joined the faculty of the University of Chicago in 1964, but was invited to join the UC Berkeley zoology department in 1969 as associate professor and associate curator of herpetology in the MVZ. He published more than 400 papers, 160 since his retirement in 2003, when he became a Professor of the Graduate School. “Dave was a towering figure in evolutionary biology and herpetology and trained generations of students, including many leaders in the field today,” Nachman wrote on the MVZ website. “His deep wisdom, gentle demeanor and friendship were an inspiration to all.” Patton echoed Nachman’s sentiments. “They do not make people like David anymore, with his combination of integrity, ethics, drive and passion for sharing,” he said.

Upon full retirement as professor emeritus in 2016, Wake received the Berkeley Citation, campus’s highest honor for a faculty member. He also was a member of the National Academy of Sciences, American Philosophical Society and American Academy of Arts and Science. Among his honors were the Fellows Medal of the California Academy of Sciences, Joseph Leidy Medal of the Academy of Natural Sciences in Philadelphia and the Grinnell Medal from the MVZ. He served as president of the Society for the Study of Evolution, American Society of Naturalists and American Society of Zoologists.

Wake is survived by his wife, Marvalee Wake, now a UC Berkeley professor emerita of integrative biology, son, Thomas, a zooarcheologist at UCLA, and one grandchild.

This obituary was originally published by UC Berkeley. You can find the original text [here](#).



Rainer Schulte (1948-2021)



Desde la Asociación Herpetológica del Perú, Museo de Biodiversidad del Perú y Grupo de Especialistas de Anfibios de la UICN SSC - Perú, lamentamos el sentido fallecimiento de nuestro amigo y colega Rainer Schulte Jung, acaecido este último 6 de junio de 2021.

Establecido en el Perú desde 1979, Rainer nos deja un gran legado de conocimiento, desde diversas (más de 50) publicaciones científicas hasta libros de decenas de páginas sobre lo que más amaba, la herpetología neotropical; también nos deja como herencia la formación de una nueva generación de profesionales amantes y defensores de la naturaleza, principalmente de su amada San Martín. Además, a las personas que lo conocimos, nos deja la imagen del herpetólogo apasionado e intenso, que siempre brillaba cuando hablaba de la herpetología y su conservación, y que siempre estaba dispuesto a poner el hombro para estos fines. Rainer siempre contagiaba sus ganas de emprender nuevos proyectos en pro de la conservación de los bosques amazónicos que lo rodeaban.

¡Rainer, te recordaremos por siempre...!



Dendrobates azureus. Photo: E. Isselee.

More Than 40 Organizations From 13 Countries Come Together to Protect and Restore Harlequin Toads

With the first-ever action plan in place for harlequin toads, the Atelopus Survival Initiative is bringing together resources, decades of expertise and passion to save one of the world's most imperiled groups of amphibians

With the formation of the Atelopus Survival Initiative (ASI), a new alliance of more than 40 organizations from 13 countries, comes a new day for harlequin toads, the jewels of South and Central America's forests and creeks and a group of amphibians hardest hit by the deadly chytrid fungus *Batrachochytrium dendrobatidis* (Bd).

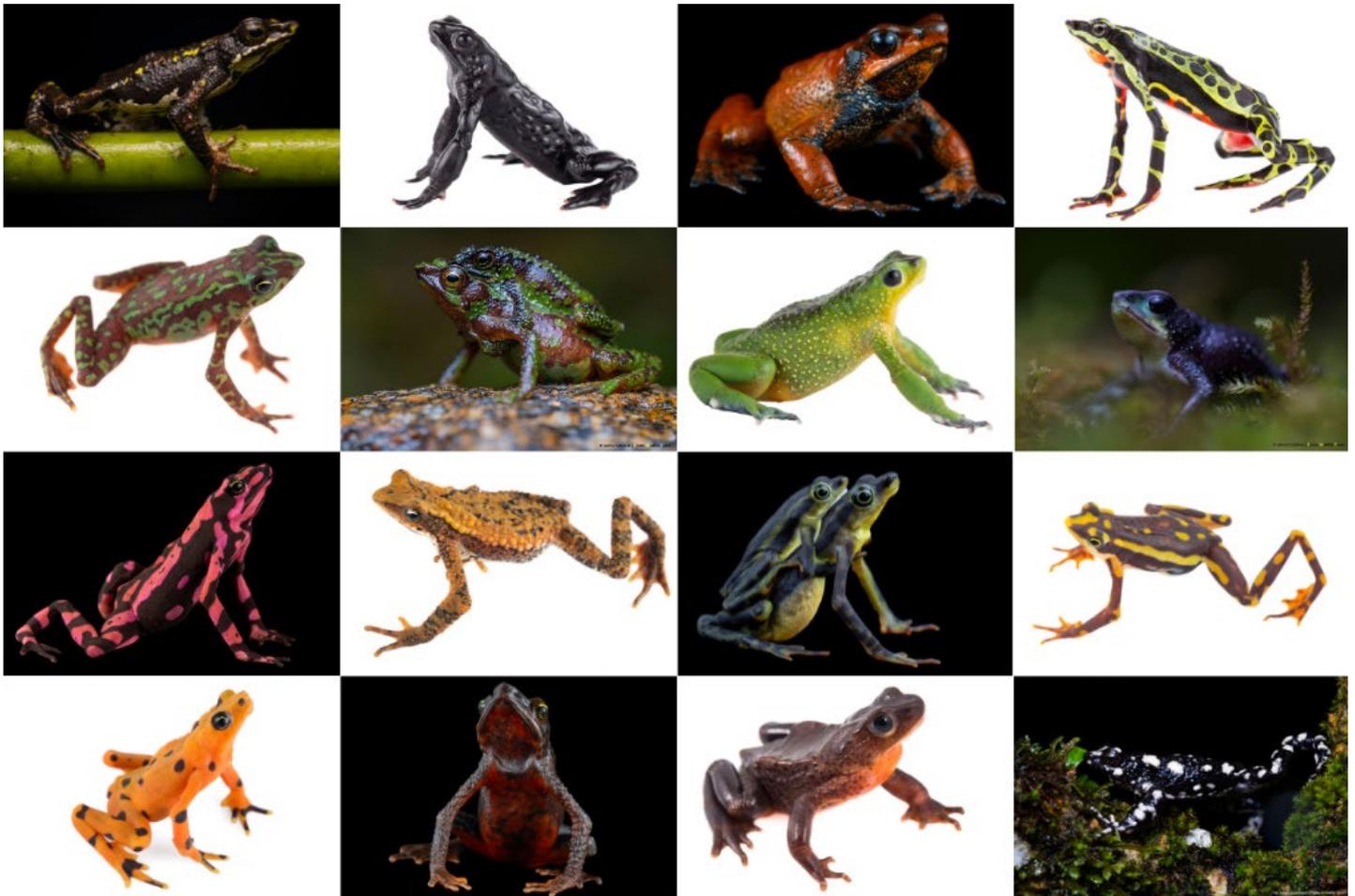
While amphibian researchers and conservationists have worked for many years to save harlequin toads (which make up the *Atelopus* genus) and groups of species in individual countries, the ASI is bringing them together for the first time to pool the resources, decades of experience and knowledge necessary to prevent the extinction of the entire genus of harlequin toads across the region where these species still survive.

"As an incredibly diverse group of amphibians facing a number of threats, harlequin toads require innovative solutions coming from a diverse group of individuals and organizations with different expertise, knowledge and capacities," said Lina Valencia, ASI

founder, co-coordinator of the IUCN SSC Amphibian Specialist Group Atelopus Task Force and Andean countries coordinator for Re:wild, one of the primary ASI conveners. "More than ever before, we need a constellation of champions working together to bring harlequin toads back from the brink of extinction. The ASI underscores the vital need to implement on-the-ground conservation actions that will mitigate the main threats to this beautiful group of amphibians."

Over the past few decades, many harlequin toad species have suffered severe population declines and extinctions throughout their range. Today, of the 94 harlequin toad species that have been assessed by the IUCN, 83 percent are threatened with extinction, while about 40% of *Atelopus* species have disappeared from their known homes and have not been seen since the early 2000s, despite great efforts to find them. Four harlequin toad species are already classified as extinct, according to the IUCN Red List of Threatened Species, but this number is likely higher.

The fungus *Batrachochytrium dendrobatidis* (Bd) causes the lethal disease chytridiomycosis, which has resulted in amphibian declines all around the world, including in South and Central America, Australia and the western United States. Although Bd may



Harlequin toad photos in compilation by Jaime Culebras/Photo Wildlife Tours.

likely be the primary driver of several of these declines, a number of other threats are exacerbating the precipitous drops in population numbers. This includes habitat destruction and degradation (as the result of animal agriculture, logging, mining and infrastructure development), the introduction of invasive species such as the rainbow trout that prey on harlequin toad tadpoles, pollution, illegal collection for the pet trade, and the effects of climate change.

The ASI and its members, including governments, local communities and Indigenous peoples, will collaboratively address each of these threats--and new ones as they arise--across the genus's full range, taking into account the social, political and cultural realities of each of the 11 countries where harlequin toads are found.

"With their beautiful songs and unique lifestyles, amphibians are among the most extraordinary animals on Earth, and among them, harlequin toads stand out for their amazing colors," said Luis Fernando Marin da Fonte, coordinator of the ASI and director of partnerships and communications for the Amphibian Survival Alliance. "But these colorful and delicate jewels are becoming increasingly rare. Harlequin toads must be protected not only because of their beauty and uniqueness, but also because of their intrinsic value and biological, ecological and even cultural importance."

The initiative's newly developed Harlequin Toad (*Atelopus*) Conservation Action Plan (HarleCAP) provides the roadmap for conserving and restoring harlequin toads as a genus and their habitat. The action plan's goals, which ASI aims to achieve by 2041 (the 200th anniversary of the description of the genus *Atelopus*), include:

- developing and implementing innovative methods to mitigate chytrid's impacts on harlequin toad populations and better understanding why some species are less susceptible to the effects of chytrid;
- protecting and restoring harlequin toads' forests and watersheds;
- creating and maintaining conservation breeding programs;
- searching for species that are lost to science and filling in other gaps in scientific knowledge about harlequin toads;
- sharing stories that will transform harlequin toads into symbols of hope for the region and the world and a flagship for conservation success, and demonstrate a commitment to the conservation of harlequin toads;
- ensuring the *Atelopus* conservation network has the technical, logistical, and financial support to secure the long-term conservation of harlequin toads

"The genus *Atelopus* is among the most threatened groups of amphibians in the world," said Ariadne Angulo, chair of the IUCN SSC Amphibian Specialist Group. "By rallying behind a conservation strategy with collective input from key stakeholders, the *Atelopus* Survival Initiative is taking an essential step towards the conservation of these diverse and highly emblematic toads and the habitats that they live in."

Harlequin toads are found from Costa Rica in the north to Bolivia in the south, and Ecuador in the west and French Guiana to the east. They are known as the jewels of South and Central America in part because of their beautiful and varied colors, which range from orange, green, yellow, brown, black, red, and sometimes even purple. They are celebrated in a number of Latin American cultures, including Indigenous cultures, and across entire countries, like in Panama, where the national animal is the Panamanian golden toad.

Like other amphibians, harlequin toads support healthy ecosys-

tems. Their tadpoles depend on clean water and, because of this, the presence of harlequin toads indicates better quality water in an ecosystem, while their decline or absence is often the first sign of an ecosystem in trouble.

"Protecting and restoring harlequin toads and their habitats will also benefit the species that share the ecosystems in which they live and that provide water to tens of millions of people, and ultimately all life on Earth," Valencia said. "And we're hoping that the ASI will be a successful model that conservationists can emulate for other groups of threatened species."

The *Atelopus* Survival Initiative includes national and international conservation groups, zoos, captive breeding centers, academic institutions, governments and local communities. Its current members represent the following organizations: Amphibian Ark, Amphibian Survival Alliance, Asociación Pro Fauna Silvestre - Ayacucho, Bioparque Municipal Vesty Pakos, Bolivian Amphibian Initiative, Centre National de la Recherche Scientifique, Centro de Conservación de Anfibios AMARU, Centro Jambatu de Investigación y Conservación de Anfibios/Fundación Jambatu, CORBIDI, DoTS, El Valle Amphibian Conservation Center Foundation, Facultad Latinoamericana de Ciencias Sociales, Florida International University, Fort Worth Zoo, Fundación *Atelopus*, Fundación Zoológica de Cali, Universidad del Tolima (GHEE), Grupo de Trabajo *Atelopus* Venezuela, Image Conservation, Instituto Nacional de Pesquisas da Amazônia, Instituto Venezolano de Investigaciones Científicas, Ministerio del Ambiente de Perú, MUBI (Museo de Biodiversidad del Perú), Parque Explora, Parque Nacional Natural Puracé, Photo Wildlife Tours, Pontificia Universidad Católica del Ecuador, Pontificia Universidad Javeriana, Re:wild, San Diego State University, Smithsonian Tropical Research Institute, Trier University, Universidad de Antioquia, Universidad de Costa Rica, Universidad de los Andes, Universidad del Tolima, Universidad del Magdalena, Universidade Federal do Pará, Universidad Nacional, Universidad Interamericana de Panamá, Universidad Nacional de Colombia, Universidad San Francisco de Quito, Universidade Estadual de Campinas, Universidade Federal do Oeste do Pará, University of Nevada, Reno, University of Notre Dame, University of Pittsburgh, WCS (Wildlife Conservation Society), WCS Colombia, Zoológico Cuenca Bioparque Amaru.

Amphibian Reintroduction Guidelines Are Here!

By Gemma Harding and Luke Linhoff

Following a huge team effort by a multinational working group and vital input and reviews from amphibian enthusiasts and leading experts across the globe, the IUCN Guidelines for Amphibian Reintroductions and other Conservation Translocations are now freely available. This digital book was many years in development and is applicable to any type of amphibian translocation.

The aim of the guidelines is to provide an accessible resource for anyone, anywhere who is involved in amphibian conservation. This book gives a concise overview of conservation translocation methods for amphibians, covering all the main stages including pre-release planning, implementation, and post-release monitoring by focusing on the elements most important to amphibians. Embedded within each topic are direct links to other helpful resources and documents that amphibian conservation practitioners will find useful. The document also contains numerous case studies and examples of amphibian translocations compiled from around the globe which offer insight and contacts from others working on amphibian conservation.

The document is free and can be [downloaded as a PDF](#) or accessed online. By existing as a digital book, the plan is for the guidelines to be regularly updated and improved to maintain relevance. The implementation of amphibian conservation translocations is a rapidly changing field of amphibian conservation. While some amphibian translocations have historically had low success rates, there are frequently few alternatives for recovering many species of conservation concern, and the number of global amphibian translocations continues to increase. We hope these guidelines will provide information on best-practice and useful guidance to help practitioners avoid many of the pitfalls associated with undertaking such a challenging conservation method.

Please make use of this document and share it widely!



Reconstitution of the ASG Membership for the 2021-2025 IUCN Period

The International Union for the Conservation of Nature (IUCN) holds the World Conservation Congress (WCC) every four years. During this congress, elections are held for key positions within IUCN, inclusive of the positions of President, Treasurer, Commission Chairs and Regional Councillors. At this time, membership across all of IUCN's six commissions lapse, and need to be reconstituted for the following IUCN quadrennial period. Due to the COVID-19 pandemic, WCC was postponed twice but eventually took place on September 3-11, 2021, in Marseille, France.

This reconstitution period provides us with an opportunity to revise and update commission memberships. Further, after this revision period is concluded, commissions are able to open up to include new members.

The Amphibian Specialist Group (ASG) is a specialist group within the Species Survival Commission (SSC), IUCN's largest commission member-wise. As with other SSC specialist groups we are currently in the process of reconstituting the group, which

entails a two-step approach for previous ASG members: applying through the IUCN Commission membership system and then applying through the ASG. Once a member has completed both processes they will be officially members of the SSC and ASG for 2021-2025 (members will receive a welcome email as confirmation of both).

ASG members should have heard from IUCN and ASG as we complete membership reconstitution.

We wish to take this opportunity to wholeheartedly thank ASG leaders and members for supporting ASG in these past years. We are very much aware of how much our members bring to the table, and that it would be impossible for ASG to achieve all that it does without the membership's commitment, initiative, generosity and passion. For this, the ASG Secretariat is deeply grateful.



Photo: Devin Edmonds.

Action Plan for the Conservation of *Mantella cowanii* Launched in Antananarivo, Madagascar

Madagascar is a hotspot of amphibian species richness, with over 380 native frog species, all of which are endemic to the island. However, of those species that have been assessed by the [IUCN Red List of Threatened Species](#), over half are categorised as either threatened or Data Deficient.

Mantella cowanii – Cowan’s or Harlequin mantella - is one of Madagascar’s threatened amphibians, currently classified as Endangered. It is known to occur in just four small locations in the Central Highlands, with those populations highly isolated from one another. None of these populations are currently included within a protected area.

This small but striking frog is primarily threatened by habitat destruction, but also potentially hybridization and climate change. In the past, this species has been the subject of over-collection for the pet trade, with a peak of 1520 individuals exported in 2002. Trade in live specimens was banned in 2003.

To improve conservation action for this frog stakeholders, including many members of ASG Madagascar, have produced a new action plan - *Mantella cowanii* Action Plan (McAP) - the output of a workshop that was held in December 2018.

This plan, which covers the period 2021 – 2025, summarises the

current state of knowledge of *M. cowanii* population status, taxonomy, and ecology, and of the threats facing the species. It goes on to describe the institutional framework for conservation management in Madagascar by listing the key stakeholders, vision, goals, objectives, and conservation actions needed. The new plan succeeds the first *M. cowanii* Action Plan, produced a decade earlier.

McAP was officially presented to all stakeholders including authorities and technical partners in Antananarivo, Madagascar, on Thursday, September 23rd.

You can download McAP [here](#).

Open Consultation on Draft ACAP Status Review Opening Soon

One of the IUCN SSC ASG's major projects recently has been the update of the Amphibian Conservation Action Plan (ACAP). The first iteration of this document was the output of the Amphibian Conservation Summit, held in Washington, DC, USA, in 2005 in response to the alarming results presented in the Global Amphibian Assessment (GAA).

So far, ACAP remains the only global, class-level vertebrate action plan. It is important to have such a document given the large number of amphibian species requiring conservation attention, the trans-boundary and higher-level nature of key threats impacting amphibians, and the low likelihood that effective species-specific action plans can be developed for so many species within an acceptable timeframe.

Although the ACAP was updated as a 'living document' in 2015, it was not updated as originally envisioned and we felt like it could be improved to better serve the needs of the amphibian conservation community. As such, we undertook a survey in late 2019 to understand how ACAP is being used and how it could be improved.

Based on the survey results we have re-conceived the format of ACAP for the latest iteration; moving forward ACAP will consist of two documents, a 'Status Review' document which collates the evidence on threats to amphibians and conservation actions that might be used to ameliorate these threats, and a second, more action-oriented document. We plan for the academically-oriented Status Review to be published as an IUCN SSC Occasional Paper.

Our work to date has been focussed mainly on the Status Review document, the chapters of which have been drafted by expert ASG members through our Thematic Working Groups. Since our

aim is for ACAP to be a product of the global amphibian conservation community, our next step is to collate the draft chapters into a document to be reviewed in an open consultation. We hope that everyone will take the opportunity to provide feedback through this process, particularly on chapters where you have greatest expertise.

The draft ACAP Status Review document will be available for open consultation on our [website](#). We will inform the community when the consultation period starts via emails through the ASG, ASA and AArk networks.



Salamandra salamandra. Photo: E. Isselee.

Thank you Phil. We Will Miss you so Much



Photo: Phil Bishop

Our friend, colleague and mentor, Professor Phil Bishop, passed away surrounded by family, around 1:30 New Zealand time on Saturday, January 23rd, 2021.

While his passing was expected, it is the finality of this news that makes this moment so exceedingly difficult to process. A true great and such a bright light in all our lives. Our collective hearts break for Debbie and Phil's family, all his friends and an entire conservation community. He touched so many lives and meant so much to all of us.

In one's life, if you are lucky, you will come across a person that changes not just your path in life and your world, but the entire world. There are so few people that bring such monumental change to a community, to a mindset and to the natural world. There are so few people who, despite their Rockstar-like status in a community, are so warm and welcoming to newcomers and treat you as a long-time friend and equal. There are so few people that no matter how serious a situation or problem may be, will make you and those around you laugh and help you navigate your way through.

There are few people so full of passion and the desire to give to all those around them, asking so little in return. People who give no matter what is asked of them and continue to give even after that.

Phil was that person. His passing leaves us a moment of pause to realize just how much he has given to us all, how much he has done, and what a tremendous impact he has had on individuals, communities, and species. He truly is an original titan of amphibian conservation. Phil brought together and inspired so many people to save species that many would not have given a second



Photo: Phil Bishop

thought. He has inspired us all to do more, to care more, and to build the momentum of a movement for amphibian conservation. But beyond this, he has provided us with an example of how this dedication can be combined with such great joy in life as well as work, and always with a healthy sense of humor.

We never seem to have enough time in the world with those people that come to mean so much, and have become not just part of a community, but also a family. Life always seems to be far too short, and yet few people could have possibly crammed more into a single life than Phil. For many of us who tour the world as part of conferences, meetings and expeditions in the name of amphibians, Phil and his wife Debbie have been a common and joyous sight, delivering a message of fun and unity amid even the bleakest and most serious work events. Phil demonstrated how life and work can be interwoven with great purpose and enjoyment of every moment. The strength he gained from family and friends clearly bolstered his tenacity and resolve. His honesty and motivation were clear for all to see – Phil brought his whole being to everything he did, which is a powerful example to us all.



Leiopelma archeyi, Photo: Phil Bishop.

His work will continue, and the memory of his tremendous spirit will endure. And as a community, we will be there for Phil's family and each other during this difficult time.

Phil exemplified living life to the fullest and leaving the world a much better place after his all too short time here.

We will miss him very much, but we will also work hard to keep his legacy and honor what he has accomplished. His work for amphibians does not end. The flame of his life and passion has not been extinguished but will continue to shine brighter in everything we do from this day forward.

Phil, you have done so much. It is now our turn to do just as much for you.

With great sadness and heavy hearts,
The Amphibian Survival Alliance Secretariat

AmphibiaWeb Celebrates Students

Undergraduates and education have always been part of AmphibiaWeb's mission, indeed, we continue to grow due to the contributions of students. We believe student engagement helps train the next generation of researchers and creates well-educated, scientifically literate citizens who can become future advocates for biodiversity. Since 2000, AmphibiaWeb has mentored 123 undergraduate apprentices at the Museum of Vertebrate Zoology (MVZ) through the UC Berkeley Undergraduate Research Apprentice Program (URAP). Most of these students worked several semesters; some almost their entire undergraduate career! We also work with undergraduate and graduate student volunteers. Species account writing isn't just limited to UC Berkeley; we have had over 546 students from 42 university herpetology classes write Species Accounts in the last two decades. Students are involved in many aspects of AmphibiaWeb, including programming, writing, editing, GIS, cartography, and UC Berkeley outreach.

Two former apprentices, Sierra Raby (2016 - 2019) and Darren Ayoub (2016 - 2018), recently described how AmphibiaWeb impacted their lives. Sierra Raby joined the Peace Corps' Environmental Education sector after graduating and was stationed in Tlaxcala State, Mexico. Cut short due to the COVID-19 pandemic, Sierra was accepted into the UCLA's Environmental Health Sciences program. She is using GIS to study how climate change is changing fires in California and how that affects the public health burden of air pollution.

Sierra: AmphibiaWeb was my first exposure to really anything GIS. That initial exposure made me aware of GIS as a field, as a research scope. I think that if I hadn't had the exposure to GIS that I got with AmphibiaWeb, I probably wouldn't be doing anything GIS related because it wasn't on my radar before that. [For Sierra, it was just] cool being inside the MVZ, seeing all the specimens and meeting researchers where they do their research. The visual proof of the career I would maybe pursue in the future. The MVZ had a community and I was part of an academic work environment.

Darren Ayoub wrote his senior thesis while working at AmphibiaWeb, examining patterns of new amphibian species discovery, especially the process from fieldwork to formal species description.

After graduation, Darren became a clinical research coordinator at University of Washington's cancer research center, where he acts as a liaison between the research study and the doctors.

Darren: [As a junior] I had worked a little in Berkeley, but I hadn't had that much structure. [AmphibiaWeb] was good at adding structure and accountability, where I needed ... to communicate... [and]... be in at certain hours, and it was good to have that responsibility. I was learning about the importance of conservation projects, [as AmphibiaWeb] was one of my first experiences with extinction and conservation. I learned a lot of things I didn't have time to take in classes. I really enjoyed what I was working with, what I was learning, the people I was working with. It was a really great environment where the people really cared about us, there was a lot of room to grow with different tasks.



Exciting Discoveries During the First Amphibian Survey of One of Madagascar's Smallest Protected Areas

By Katherine Mullin

Madagascar's forests have been subject to tragic deforestation in recent decades, and much of the remaining forest exists in isolated forest fragments. In the highlands of Madagascar, on the island's central plateau, it is hotly debated how much land was once covered in forest, with increasing evidence that grasslands are indeed native and historic. However, it is in living memory that much of the riparian valley forests have been deforested. My PhD at Cardiff University, in collaboration with Durrell Wildlife Conservation Trust, aims to study how amphibian genetics are affected by this habitat fragmentation.

While mapping my field sites on qGIS, I identified two habitat fragments north of my main field site, Ambohitantely, called Anka-

fobe. This reserve is managed by the Missouri Botanical Garden, in collaboration with the local led VOI Sohisika and is one of Madagascar's smallest protected areas covering 133 hectares. However, just 27 ha of forest remains in the reserve and they are vulnerable to man-made fires which are carried across the landscape by wind. I knew these fragments would be interesting sites to add to my fragmentation study, given their small size and isolation. Further, no one had ever surveyed frogs here before, so the managers had no idea what species they had. This would be an exciting opportunity for any herpetologist!

So off we went to do a rapid amphibian assessment in March 2020. We conducted buccal swabbing for DNA barcoding of all the



Anilany helenae. Photo: K. Mullin.

species present, given the high level of both cryptic and candidate species in Madagascar. Our most surprising and exciting find was the Critically Endangered EDGE species *Anilany helenae*. This species was previously thought to be a microendemic to Ambohitantely Special Reserve, 10km south east of Ankafoabe. This finding extends the species' range to another protected area and helps safeguard the species. It makes you wonder what other unsurveyed, and unprotected, remnant fragments across the central plateau may be home to this tiny (SVL 10-15mm) species. We also found an Endangered species *Boophis andrangoloaka*, which extends this

species' range to a third known protected area. We found a total of 14 species in the reserve.

As deforestation continues across the country, these findings highlight the importance of small forest fragments for the conservation of Madagascar's biodiversity. These fragments must be protected to avoid the loss of these unique species and further inventories are required of remnant forests which are currently unprotected and often logged and burned for charcoal. The protection efforts ongoing at Ankafoabe are inspiring, and there are hopes to gain official government protected status soon. While our inventory is likely an underestimate of the frog species present, we hope that our results will support this reserve in their ongoing conservation efforts. This study also highlights the efficiency of non-invasive buccal swab sampling for inventory type studies, without the need to collect specimens in degraded habitats.

Watch this space for our large-scale habitat fragmentation study in which the data from Ankafoabe is included.



Photo: K. Mullin.





© Jaime Culebras

2021 World Press Photo of the Year

By Jaime Culebras

A photo taken by Jaime Culebras, from ASA partner Photo Wildlife Tours, got the 3rd prize of the prestigious 2021 World Press Photo of the Year award, in the category Nature. The photo is called 'New Life' and features the eggs of a Wiley's Glass Frog (*Nymphargus wileyi*) hanging on the tip of a leaf in Tropical Andean cloud forest, near the Yanayacu Biological Station in Napo, Ecuador.

Nymphargus wileyi is known only from individuals discovered around the Yanayacu Biological Station, and so is listed as 'Data Deficient' by the IUCN Red List of Threatened Species. The species inhabits primary cloud forests, where individuals can be found on leaves at night. Females deposit eggs in a gelatinous mass towards the tip of the dorsal surface of leaves which hang above streams. A male can fertilize up to four clutches of eggs in a breeding season. The whitish embryos, between 19 and 28 per clutch, will develop for a few days until they are ready to drop into the water and continue their metamorphosis there.

Amphibians are the most threatened vertebrates in the world, with an estimate of 40% being in danger of extinction according to the IUCN Red List. But these results could be much more dramatic, taking into account the gaps in information. Of the more than 8,300 amphibians described in the world, more than 1,200 have not yet been included in the data bases of the IUCN Red List of Threatened Species. Furthermore, 1,200 of the list species are classified as Data Deficient, which means that they are species of which very little is known and as such their status is not known. The species included

in this category are sometimes ignored in conservation strategies. However, many scientists consider that they should be treated as an urgent conservation priority and thus are pushing to develop studies that allow us to know their true status. With that in mind, this beautiful species of glass frog could be on the brink of extinction without our knowing it.

It is endemic to the cloud forest of the Tropical Andes, a bioregion that is one of the more biodiverse hotspots in the world, and yet, tragically, more than 70% of its vegetation cover has been lost. Habitat loss is the main threat to the amphibians of the Tropical Andes, and in Ecuador amphibian populations are suffering another serious threat: an abrupt growth of large-scale mining concessions.

These eggs carry with them the hope of increased support for the research and conservation of these unknown animals. Hope of a new birth in the consciousness of society, and renewed support for the conservation of these mysterious and magnificent creatures. Because without them, this planet loses more and more of its color.





Arthroleptella rugosa. Rough Moss Frog (Critically Endangered) in habitat on the Kleinswartberg -Overberg, South Africa.

Protecting the Endemic and Threatened Frogs of the Western Cape, South Africa

By Alouise Lynch & Jeanne Tarrant

In partnership with the Bionerds, the Endangered Wildlife Trust is implementing a project focusing on several rare, threatened and range restricted amphibian species that occur only in the Western Cape Province of South Africa. These are the Rough Moss Frog (Critically Endangered), Moonlight Mountain Toadlet (Data Deficient), Micro Frog (Critically Endangered), Cape Platanna (Endangered), and the most eastern populations of Western Leopard Toad (Endangered). Supported by a small grant from Re:wild through the ASA, this work began in July 2021 and to date has confirmed three new localities for the Moonlight Mountain Toadlet (*Capensibufo selenophos*), one new locality for the Rough Moss Frog (*Arthroleptella rugosa*) – previously known only from one other site as well as new sites for the Cape Platanna (*Xenopus gilli*). Project localities span across a chain of three mountain ranges in the Overberg, the Kleinriviersberg, Akkedisberg and Soutmuisberg. One landowner has already signed the Intention to Declare contractual agreement to have his property declared a Nature Reserve for the Moonlight Mountain Toadlet. Mount David borders on Maanschynkop Nature Reserve, a provincial nature reserve managed by CapeNature. Maanschynkop is the type locality for

Capensibufo selenophos, but surveys in 2018 through 2020 have been unsuccessful in locating any toadlets. We extended our surveys to the neighbouring Mount David and successfully recorded adults, tadpoles, and eggs on this new locality for the species. The landowner has spent 12 years clearing this property of alien invasive vegetation, with

the subsequent rediscovery of a population of *Erica jasminiflora* thought to be extinct in the wild. We engaged with the landowner regarding protecting this property through formal proclamation, and he jumped at the opportunity. He has signed the Intention to Declare contracts to have Mount David designated a Contract Nature Reserve through Biodiversity Stewardship, and the paperwork is currently awaiting the signature of the Western Cape MEC and CapeNature CEO. This is the first private property that will be proclaimed in favour of the conservation of *Capensibufo selenophos*, which was only described in 2017.

Arthroleptella rugosa, the Rough Moss Frog, is a range-restricted endemic that only occurs on the Klein Swartberg Mountain above the town of Caledon. This species is Critically Endangered, and during August through September (2020) surveys of the type locality delivered very few records at only two of the five known sub-populations. Alien vegetation encroachment on the type locality is of great concern, and we are working alongside CapeNature and the landowners to put an ecological burn regime in place to eradicate and control the alien vegetation density and encroachment. During late spring surveys, a new sub-population was discovered north of the type locality, on a farm where the landowners have been eradicating alien vegetation over the years, which has kept viable habitat clear for the Rough Moss Frogs to thrive. This is the most significant population of Rough Moss Frog known on the Klein Swartberg and there is engagement underway to work with the landowners regarding the formal protection of this critical habitat.



**ENDANGERED
WILDLIFE TRUST**

Lunar Landings: Research Shows That Toad and Frog Migrations Peak at a Full Moon!

By Jules Robinson

The results of a study, carried out by National Charity Froglife, and recently published in The European Journal of Wildlife Research, has shown that the peak migration of both common toads and common frogs coincides with the waxing phases of the moon, reaching its climax around the full moon, as they make way to their breeding sites.

Whilst previous research has shown the effects of rainfall and temperature on this annual journey of frogs and toads, up until now, no lunar research has been undertaken or recorded. The research, carried out by Dr Laurence Jarvis at Froglife, using Froglife data at 43 sites across the UK over 4 years, showed that the highest numbers of common toads (*Bufo bufo*) and common frogs (*Rana temporaria*) occur on warm and damp evenings close to a full moon. The findings are crucial in providing guidance for amphibian conservation initiatives such as 'Toads on Roads' as they will help inform patrollers on the most effective timing to help toads and frogs cross roads safely, at a time when common toad populations are under threat. A study undertaken by Froglife in 2016 revealed that common toads have declined by 68% over the past 30 years in the UK. If this continues the UK could lose all of its common toads by 2030.

Common Toads are very particular about where they breed and migrate back to their ancestral breeding ponds each year, following the same route, which often leads to them crossing busy roads and being stuck down drains. Froglife has been coordinating 'Toads on Roads' patrols manned by volunteers up and down the country for around 30 years. Migration can run from as early as January to as late as April and patrollers can't always be out every night, so they need all the pointers they can get.

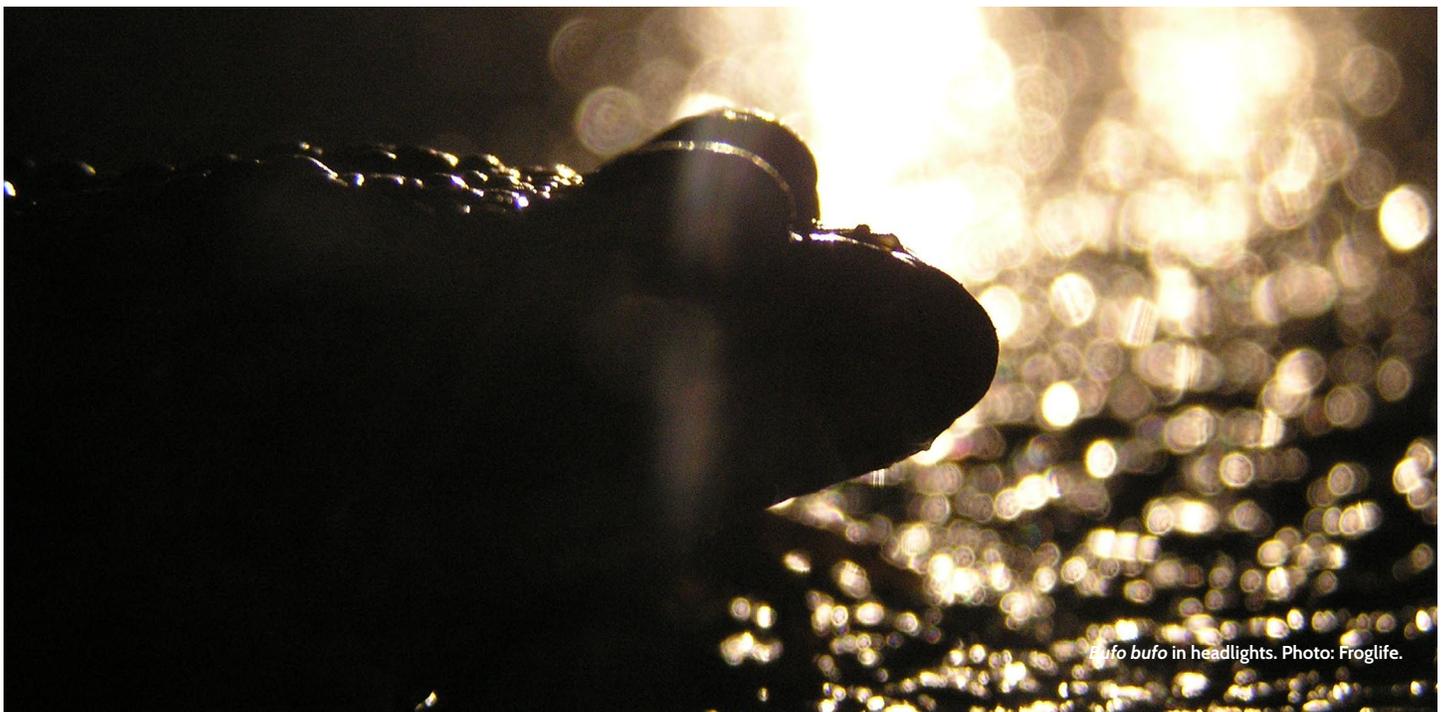
Despite both common toads and common frogs being more vulnerable, visually, to predators when moving under a full moon,

the fact that they synchronise their movements to migrate and breed in large numbers, may dilute this risk. Overall, this study has implications for the conservation of both species.

The main findings of this research show that both common frogs and common toads have their peak migration close to a full moon. Both species are explosive breeders, which means that they are only at breeding ponds for one or two weeks per year. Therefore, it is crucial that individuals synchronise their movements to ensure highest mating success. Both species become active when the first mild weather occurs in spring. However, the timing of this is highly unpredictable, due to variations in local conditions. Therefore, we suggest that the first activity of common frogs and common toads occurs in the first mild weather and they then synchronise peak breeding activity at ponds at the next full moon. This ensures the highest number of individuals are at ponds for breeding.

Froglife are also running a Wildlife Tunnel Campaign to help our amphibians and small mammals cross the roads safely. Once it has reached a substantial number of signatories Froglife will contact the relevant Government departments, all UK Local Authority Transport departments, ecological consultants and developers. You can sign the campaign [here](#).

Finally, Froglife were also delighted to host a Wildlife Road Mortality Webinar in March where wildlife conservationists from around the world came together to discuss their work in relation to mitigating the death of wildlife on our roads. You can read all about it [here](#) and also watch a recording of all of the speakers [here](#).



Bufo bufo in headlights. Photo: Froglife.

The Amphibian Conservation Fund – Catalysing Support for Amphibians

By Pria Ghosh



Photo: Vernon Crooke.

Synchronicity Earth was founded to support the most overlooked and underfunded of conservation issues in the world. The amphibians, even as they experience a global extinction crisis on a scale unseen in any other vertebrate group, continue to receive far too little conservation action or funding to meet the scale of the challenge.

Approximately 40 per cent of amphibian species are currently threatened with extinction, and many of them are declining at a precipitous rate. In these vanishing amphibians, the world is losing unique, beautiful, and fascinating branches of the tree of life and critical keystone members of ecosystems. Despite a relatively high volume of research, all of which has reinforced again and again the plight of the amphibians, there is a serious gap between an understanding of the crisis, and conservation action and funding to address it.

Synchronicity Earth's [Amphibian Programme](#), launched in 2019, aims to support and catalyse conservation efforts for threatened amphibians. It does this by improving the knowledge base to guide amphibian conservation on the ground, by funding increased amphibian conservation in the field, and by supporting the development of amphibian conservation organisations. Due to a historic lack of funding, many of the organisations actively working to conserve amphibians are nascent and face a lack of financial and institutional stability that hinders their ability to focus on their fantastic and dedicated conservation efforts.

At Synchronicity Earth, we have a track record of developing innovative funding solutions

– in 2017 we established the [George Rabb Amphibian Endowment Fund](#) to ensure a long-term and stable source of funding for our amphibian conservation partners. This is an expendable endowment fund, named in honour of Dr George Rabb, who was

fundamental in bringing the plight of amphibians to global attention. Through this fund we can provide stable and regular funding to those partners doing crucial work that is difficult to fundraise for – particularly red-listing work, as well as some amphibian conservation on the ground.

However, as we grow our amphibian programme to meet the huge challenge of global amphibian extinctions, we recognise that there is an urgent need to increase the rate at which we can direct funding to organisations working on the ground, and to ensure that the funding available increases as the capacity and number of our amphibian partners grows.

In 2020, our former Chief Scientific Adviser [Simon Stuart](#) won the [Blue Planet Prize](#) for his outstanding contributions to wildlife conservation throughout his career. We were able to use part of this prize to launch the Amphibian Conservation Fund in support of Synchronicity Earth's Amphibian Programme. With matched funding from three more generous donors, [Fondation Segré](#), [Oak Foundation](#) and [BAND Foundation](#), Synchronicity Earth is now building a vibrant coalition of partners united by an absolute determination to reverse the plight of amphibians. A challenge for donors wishing to support amphibian conservation in the past has been the fact that most amphibian conservation work is undertaken by small, institutionally informal groups, working at a very local level in often remote and challenging regions.

Through the [Amphibian Conservation Fund](#), like-minded donors can join forces and their resources to direct funding to a strategic and considered portfolio of partners within Synchronicity Earth's Amphibian Programme. We have been able to find a diverse and promising set of organisations to work with through our close collaboration with the Amphibian Survival Alliance, which plays a critical role as the umbrella body of the amphibian conservation movement.

Our approach allows funding to be allocated in a way that ensures long-term support, access to the learning network of the wider Synchronicity Earth Programmes, and Synchronicity Earth's support to build institutional capacity. This is particularly valuable for the smaller and more remote organisations, which are doing invaluable work on the ground but are often hard to access. These conditions mean that donors can rely on their funding to effectively enable a diverse range of conservation partners to focus on what they do best: saving amphibians from extinction.

Already, in the first few months of its existence, the Amphibian Conservation Fund is supporting Synchronicity Earth partners in Brazil, Peru, Ghana, South Africa, Madagascar and Papua New Guinea. For more information about the projects supported by the Amphibian Conservation Fund, visit the [Amphibian Programme](#) and learn about our [Amphibian Programme partners](#). If you would like to speak to us about contributing to the Amphibian Conservation Fund, please [get in touch](#).



Science and Art Come Together to Reveal Amphibians and Reptiles From Southwestern Angola

By Ninda L. Baptista, Fernando Hugo Fernandes, Vladimir Russo & Pedro Vaz Pinto



Angola is one of the most biodiverse countries in Africa. Part of its unique biological richness lies in the highlands (temperate and relatively moist areas above 1700 m asl), of which the Humpata plateau constitutes its southern limit. This region is famous for amazing landscapes features such as Tundavala, but little is known about its fauna. To address these shortcomings, we produced a poster about its amphibians and reptiles!



Hyperolius chelaensis. Photo: AIB - Angola Image Bank | KODILU, Lda.

Pulling this poster together combined scientific research and graphic design. Firstly, we searched for information from literature and surveys carried out on the Humpata plateau, to compile a list of amphibians and reptiles that occur there. We then gathered photographs of all frogs, toads, lizards and snakes, mainly photographed in the region, displaying a striking diversity of shapes, colours, sizes and habitat uses. Some of the species only occur in the Angolan highlands – such as Chela Reed Frog (*Hyperolius chelaensis*), described in 2012 and assessed as Data Deficient in the IUCN Red List in 2016, despite being one of Angola’s most threatened amphibians.

In the design workshop, there were other challenges. Assembling this poster was the synthesis of years of hard work, carried out by nature lovers. Reducing it to a single page encompassed the responsibility of trying to honor that effort and transmit the beauty of each species. Behind each picture, there is a story of dedication - finding the animal, getting the right shot, capturing unique moments. Then choosing the best image for each species that fitted scientific requirements, showed relevant characteristics and had aesthetic appeal, all while ensuring the quality of the photo. After this choice, each image is cut cropped – a time-consuming technique called ‘deep etching’ – and then edited, sometimes using applications to correct colour tones or improve resolution. We created symbols to represent the abundance and habitats of all species, and then moved towards the spatial architecture. Fitting a tiny species like the Monard reed frog (*Hyperolius cinereus*), just over 2 cm, in the same poster as a black mamba (*Dendroaspis polylepis*), which reaches more than 2 m, was definitely challenging! Finally, like in nature, where life arises out of the chaos, images fit together harmoniously, giving meaning to the whole.

The poster “Amphibian and Reptiles of the Humpata Plateau” celebrates a long lasting partnership between Fundação Kissama, an Angolan NGO, and FHF – Tracilustra, a Brazilian/Angolan illustration and design workshop, often producing environmental education materials in Angola. It is our conviction that combining science and art in appealing content is the best way to bring nature into the society’s attention. This poster has just been published in Portuguese and English. It will allow for people to get to know the incredible diversity of frogs and reptiles of the Humpata plateau, and hopefully encourage them to be proactive in their conservation! The Bill Branch Memorial Grant from National Geographic Okavango Wilderness Project was the perfect funding, recognizing Bill’s surveys conducted in the region years ago.

Find out more about Fundação Kissama and FHF – Tracilustra and our diverse projects on our websites and social media!





Photo: Winy Arias & Jose Corneli.

Conservation Efforts with Local People to Protect Frogs in Peru

By: Luis Castillo, Roberto Elias, Rogger Moreno & Jhusely Navarro

The Lake Junin frog and the Junin Riparian frog are two endemic species of the high Andes of central Peru. Before the year 2000, these species were abundant, being a food and economic resource for local people. Unfortunately, they are now Threatened due to water pollution, climate change, overexploitation and the presence of introduced alien species that have decreased their populations by more than 95%. That is why the NGO Grupo RANA and the Denver Zoological Foundation, together with national and international allies, have been developing research, education and environmental management activities. At the end of 2018, after a scientific exploration, places where these frogs still exist were identified and it was confirmed that both species are strongly linked to the local inhabitants. While most people had seen them in their childhood, very few had seen them recently. Thanks to this data, more than 10 new sites where these frogs occur have been reported.

The pilot project “Guardians of the Chinchaycocha frogs” began in 2019, with a presentation to the local communities, authorities and the management committee of the Junín National Reserve. Interviews were conducted with local people to measure their scientific knowledge, share experiences, and share information about their environmental perception of the conservation status of the frogs. From this, workshops grouped by stages were developed: (1) “little egg” workshop (theoretical) done virtually, (2) a “tadpole” workshop (practical), performed in the field and (3) “frog” workshop (will be developed as a bi-annual population monitoring of frogs). The names of the workshops were created from the developmental stages of the amphibians, huevito (little egg), unto (local name for tadpoles) and rana (frog in Spanish). Thanks to funding

from the Denver Zoological Foundation, National Geographic Society and Amphibian Survival Alliance, by mid 2021, several workshops have been carried out with the participation of dozens of people, including local residents, park rangers, tourism companies, and teachers, among others. With the information obtained, a community monitoring protocol will be developed with help from local participants, along with a guide for community monitoring of high Andean aquatic frogs and a network of first guardians of the frogs, who will monitor the frogs and their habitats and train new guardians.





Photo: Adam Leech.

Zero Extinction Status Makes Atewa No-Go Area for Mining

Ghana's Atewa Range Forest, designated by the Government of Ghana as a Globally Significant Biodiversity Area, has recently made it on to the list of the world's **Alliance for Zero Extinction** (AZE) sites. This is a critical new development as Atewa Forest now becomes a "No-Go Area" for mining, strengthening its protection of the species, ecosystem services and livelihoods it supports.

To achieve this reputable global conservation status, the area must contain more than 95% of the entire population of one or more species listed as Endangered or Critically Endangered on the IUCN Red List of Threatened Species. The recent discovery of the endemic (found nowhere else in the world) Afia Birago's Puddle Frog (*Phrynobatrachus afiibirago*) in swampy habitats within the summits of Atewa Forest has ensured the forest now holds this globally recognized conservation designation - in addition to its existing status as a **Key Biodiversity Area** (KBA). The frog has been recently added to the Key Biodiversity Area (KBA) database managed by the KBA Partnership, simultaneously triggering Atewa's new status as an AZE site.

The Afia Birago's Puddle Frog was discovered by Ghanaian scientist Dr. Caleb Ofori-Boateng of the CSIR-Forestry Research Institute of Ghana and ASA partner Herp Conservation Ghana, proudly named it after his mother. Designated Critically Endangered by the IUCN in 2019, it is found only in very limited habitats within the

Atewa Forest, an area now targeted by the government for bauxite mining. This is a huge threat to the survival of this species.

The central goal of AZE is to prevent any further extinctions of species from

the world. It does this by eliminating threats and where possible restoring habitats at AZE sites so that populations of threatened species can survive. The Alliance is made up of 93 conservation organizations from 37 countries, and has now identified over 850 sites across the world as AZE sites.

For the Atewa Forest and all the threatened and endemic species living there, the new AZE status is highly significant. It means that the forest now falls under the International Finance Corporation's (IFC) No-Go areas for project financing. The IFC is part of the World Bank Group and is the largest global development institution focused on the private sector in developing countries. It is owned by 185 member countries that collectively determine its policies.

The IFC's Performance Standard 6 (IFC PS6) on Biodiversity Conservation and Sustainable Management of Living Natural Resources states that, "Based on the mitigation and management requirements of paragraph 17 of Performance Standard 6, some areas will not be acceptable for financing... They include the following: Sites that fit the designation criteria of the Alliance for Zero Extinction (AZE)". The only exception is where a project is specifically designed to contribute to the conservation of the area. Ecotourism or green development initiatives, for example, may fall into this category.

The IFC's 'No-Go' criterion is significant because many finance institutions, including the 116 that have signed up to the Equator Principles – an environmental and social risk management framework – and certain international standards for best practices in mining, have incorporated IFC PS6. This makes Atewa Forest a no-go area for both project finance and project development.



KEY BIODIVERSITY AREAS



Photo: Matías Scincha.

The Giant of the Pampas: Conserving Amphibians in a Global Pandemic Context

By Camila Deutsch, Ana Lis Lopez Etcheves, Sofia Perrone & Gabriela Agostini

The Ornate Horned Frog (*Ceratophrys ornata*) is an emblematic amphibian found in the South American temperate grasslands of Argentina, Brazil, and Uruguay. Although the species has not been recorded in Brazil and Uruguay since 1982, some populations remain in the Argentinean Pampas.

Since 2015, we have been intensively working on the Giant of the Pampas project which aims to bring on conservation actions in Argentina and to rediscover the species in Brazil and Uruguay. In early 2020, we received an ASA Conservation Start-up Grant to fund several activities to be carried out throughout the year. We designed a strategy that would include intensive fieldwork to study wild populations (e.g. reproductive behavior, occurrence areas, Bd detection) and a public engagement campaign to promote local knowledge and raise awareness of this species (including a citizen science program and volunteer training). We had not anticipated that humanity would go through a global pandemic which would change forever the way we live, including how we implement biodiversity conservation in territories.

In the beginning, given the restrictions on circulation in Argentina, we thought that the activities of the whole project would be compromised, especially the field campaign planned for 100 days. Fortunately, a remarkable collaboration with the local communities materialized in Working Agreements with the authorities of two districts which allowed the team members to obtain permits and move to a rural areas where the Ornate Horned Frog occurs. During six months of fieldwork we obtained novel information on the species' natural history and the threats facing it.

More obstacles emerged when undertaking activities which required close contact with the population. But once again, the im-

pressive commitment of the local communities to the conservation of the Ornate Horned Frog enabled the emergence of solutions. Despite the inability to hold face-to-face meetings, we overcame these obstacles and successfully achieved one of our main objectives: the mobile app. This new app, created and developed by high school students, is a citizen science tool which allows us to obtain real-time records of the species, in addition to a series of automatically generated data (photo or audio, date, time, GPS coordinates, and weather conditions). The workshops with volunteers and the outreach program were also redesigned in response to the social restrictions. By adapting the contents and using virtual tools, we obtained remarkable results. Fourteen institutions from kindergarten to primary and secondary school worked together with team members and carried out many educational activities remotely, and performed pre- and post-surveys to evaluate the effectiveness of the outreach program. The possibility of conducting training courses to engage local volunteers was of vital importance because we were unable to implement the program of volunteers who usually travel from different cities around the world to collaborate with the project.

The global pandemic has forced us to reconsider conservation strategies and the way forward. The new and exciting challenges we face will find us working tirelessly for conserving the Giant of the Pampas.



Meet ASA Future Leader of Conservation James Watuwa



Photo: Keneth E.

The Future Leaders of Amphibian Conservation program is an award to a number of early-career conservationists from around the world that have been identified by the Amphibian Survival Alliance as the next generation of amphibian conservationists. So far we have awarded 19 Future Leaders from 12 countries (Bolivia, Brazil, Peru, Mexico, Ghana, South Africa, Uganda, India, Nepal, Pakistan, Australia and United States). You can learn more about some of the Future Leaders of Amphibian Conservation [here](#).

Can you tell us a little bit about yourself, James?

My name is James Watuwa. I am a wildlife veterinarian and conservationist from Uganda. I am also the Co-Founder and CEO at Elgon wildlife conservation organization for four years since its founding in 2018. I am in charge of overseeing strategic planning, administration, program and fundraising activities. We are a team of 6 staff.

What projects have you been involved in to promote amphibian conservation?

In Uganda, only basic amphibian conservation efforts have been conducted so far.

In this context, I founded [Elgon Wildlife Conservation Organization](#) (EWCO), Uganda's first nonprofit organization with a program dedicated exclusively to amphibian conservation.

My conservation efforts have focused on contributing to the ongoing Herpetofaunal Conservation Assessment of Uganda, a loose collection of efforts to assess the conservation status of the country's amphibians, improve natural history information for Data Deficient and Endangered species.

Education

EWCO recognizes the importance of public education as an

integral part of conservation outreach, with the ultimate goal of changing attitudes towards conservation, resulting in pro-conservation behavior. With this in mind, I am currently working to develop the first Amphibian Communication and Education Strategy for Uganda.

Citizen Science for Amphibian conservation

Through [HerpMapper Uganda](#) project, we are contributing to protected areas management by gathering and updating information to their databases. The project uses an online platform, accessible through a phone application, to gather data on amphibians and reptiles. Through this approach, I have been able to establish an amphibian conservation database using HerpMapper to generate records of observations of herps by the general public, which can submit their observations or images through the application. The collected data is then made available to all HerpMapper partners and groups, who can use

the recorded observations to raise awareness about conservation, research and education purposes.

Ex-situ conservation

Understanding the many facets of amphibian biology is paramount in establishing a successful Conservation Breeding Program. In 2020, UWEC ZOO where I work as a zoo veterinarian and coordinator of the amphibian captive breeding program, received an Amphibian Ark Conservation mentorship Grant for the project "Capacity building of Uganda's in-country *ex situ* husbandry and captive amphibian breeding expertise". This project aims to establish the first *ex situ* supporting program for Uganda's amphibian species. The project will be housed at the Uganda Wildlife Conservation Education Centre, with mentorship received from Ian du Plessis from the Johannesburg Zoo in South Africa.

What is your favourite amphibian species and why?

My favourite amphibian species is *Leptopelis karissimbensis* of family Arthroleptidae, listed as Vulnerable (IUCN, 2020). It is considered to be the most threatened amphibian species in Uganda (National Red List, 2016). *Leptopelis karissimbensis* frog is a powerful symbol of the need to protect amphibian diversity, and publicizing the search for this species will raise awareness of a great many other indigenous species.

Has being recognized as a Future Leader of Amphibian Conservation by ASA made a difference in your career so far?

Being recognized as a Future Leader of Amphibian Conservation has improved my confidence among my peers. It has offered me a platform to network, learn and share knowledge as well as meet multidisciplinary professional teams and strategic partnerships, consequently creating local and global networks for collaborations in addressing amphibian conservation challenges.



Pakistan's Amphibians Need More Research Efforts and Better Protection

By Muhammad Rais

The Future Leaders of Amphibian Conservation program is an award to a number of early-career conservationists from around the world that have been identified by the Amphibian Survival Alliance (ASA) as the next generation of amphibian conservationists. So far the ASA has awarded 19 Future Leaders from 12 countries (Bolivia, Brazil, Peru, Mexico, Ghana, South Africa, Uganda, India, Nepal, Pakistan, Australia and United States).

Amphibians are bioindicators of an ecosystem's health and may also serve as biological control of crop and forest pests. The first World Herpetological Congress, organized in 1989, presented alarming findings about the decline in amphibian populations. Currently, amphibians include the highest percentage of threatened species (>40%), as well as the highest number of Data Deficient species (>1500 species). The little we currently know about the occurrence of the chytrid fungus, which has already been implicated in the decline of many amphibian species globally, is a grim example of how urgent it is to acquire further information.

New research led by ASA Future Leader of Amphibian Conservation Dr. Muhammad Rais is the first comprehensive study on all known amphibian species of Pakistan. The study was recently published in the open-access journal ZooKeys. In it, authors report 21 species from the country, providing their identification key and photographic guide. However, as many of Pakistan's potential amphibian habitats are difficult to access and study, especially the high-altitude northern and arid western mountains, it is highly

likely that a lot of species are yet to be discovered.

In particular, the authors point out that habitats facing destruction, urbanization, pollution, unsustainable utilization and other human-caused threats need to be put on high priority, so that suitable conservation strategies can be devised. This way, amphibian populations would be better controlled with less financial, administrative, and human resources.

So far, amphibians have been excluded from all current legislative and policy decisions in the country. Likewise, they are not protected under any law. Hence, the legislation pertaining to rare and endemic species needs to be updated. Schedule III, which includes protected species, provincial and federal wildlife laws, and CITES appendices are in particular need of revision.

Currently, wildlife conservation projects in Pakistan mainly focus on carnivores, ungulates and birds. Therefore, the authors of the study propose adopting an inclusive wildlife conservation approach in Pakistan. This approach would advocate the integration of poorly documented taxa, such as amphibians, in wildlife conservation and management projects. It is by highlighting the significance of their existence and the intrinsic values of all wildlife species that local ecosystems can remain healthy in the long run.

"There is also a dire need to change social attitudes towards the appreciation and significance of amphibians in our society. This could be achieved by initiating community awareness, outreach and school classrooms, and through citizen science programs," add the researchers.

Original source: Rais M, Ahmed W, Sajjad A, Akram A, Saeed M, Hamid HN, Abid A (2021) Amphibian fauna of Pakistan with notes on future prospects of research and conservation. ZooKeys 1062: 157-175. <https://doi.org/10.3897/zookeys.1062.66913>



Photo: Herpetology Lab, Arid Agriculture University Rawalpindi.



Pedro Peloso Is a 2021 Awardee of the Maxwell/Hanrahan Individual Award in Field Biology

By Maxwell/Hanrahan Foundation

The Future Leaders of Amphibian Conservation program is an award to a number of early-career conservationists from around the world that have been identified by the Amphibian Survival Alliance (ASA) as the next generation of amphibian conservationists. So far the ASA has awarded 19 Future Leaders from 12 countries (Bolivia, Brazil, Peru, Mexico, Ghana, South Africa, Uganda, India, Nepal, Pakistan, Australia and United States).

Amphibian Survival Alliance (ASA) Future Leader of Amphibian Conservation Dr. Pedro Peloso was selected as a 2021 awardee of a Maxwell/Hanrahan Individual Award in Field Biology! Pedro was awarded by the Maxwell/Hanrahan Foundation in recognition of the quality and creativity of his research, dedication to field biology, and great potential for future impact in his field. Part field biologist and part visual storyteller, Pedro has studied the diversity and evolution of amphibians and reptiles, especially Amazonian frogs, and has highlighted the importance of conserving biodiversity.

The Maxwell/Hanrahan Individual Award in Field Biology recognizes individual scientists and provides the support they need to explore and test what they learn at a time when the world faces great challenges – and opportunities. Launched in 2020, the awards provide scientists with funding, attention and support at critical junctures in their careers so they can focus on mastery and creativity, elevate often underrepresented perspectives to problem-solving and promote progress in the biological sciences through individual

research focused on our natural world. Nominators confidentially identified scientists for the awards and a committee selected winners based on potential for impact in the field, demonstrated excellence in field biology research, originality and the under-the-radar nature of their work.

The Maxwell/Hanrahan Foundation focused on field biology because of the founders' interests and experiences. While a graduate student in Wisconsin, Pat Hanrahan's professors and colleagues introduced him to the power of exploration in field biology—and despite following a different career path, work with invertebrates and bacteria continues to intrigue him. Delle Maxwell grew up in an environment where science and field work were intertwined. Her father was oceanographer Arthur Maxwell, who conducted research on ocean geothermal measurements. Close family friends included Delle's sibling Rick in their summer vacation research adventures searching the western U.S. for Paleozoic brachiopods. The intellectual challenge associated with outdoor exploration continues to inspire her. The foundation will expand its investments in individuals committed to exploration and learning in fields including crafts, protecting nature and education.

INSTRUCTIONS TO AUTHORS

Background

FrogLog has been one of the leading amphibian conservation community newsletters since the early 1990's. Over the years it has been affiliated with different groups but has always strived to help inform the community. In 2005 *FrogLog* became the official newsletter of the IUCN SSC Amphibian Specialist Group and is produced on a quarterly basis.

FrogLog invites contributions of research, reviews on current management and conservation issues, methods or techniques papers and, editorials. We also actively encourage submissions describing the current activities relating to projects and academic institutions in order to help inform the community as to the general state of current research and conservation activities.

PUBLICATION

FrogLog is published online at: www.amphibians.org and is Open Access.

REVIEW

FrogLog is not a peer-reviewed publication and the onus for submitting accurate information remains with the authors.

PRODUCTION EDITOR

Candace M. Hansen cmhansen@amphibians.org

EDITORIAL COMMITTEE

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SUBMISSION OF MANUSCRIPTS

Manuscripts can only be received as electronic files. Text should be submitted in MS Word format and may contain tables, but figures should be sent as a separate attachment where possible. All documents should be sent to froglog@amphibians.org. Each file should be labeled in a style that illustrates clear association, i.e., authors_name_ms and authors_name_figure1.

TITLE

Titles should ideally be no more than 15 words.

AUTHORS

Authors names should be written in full as follows: By John P. Doe & Jane P. Doe.

MAIN BODY OF TEXT

Use Georgia 11-point font. Genus and species names should be in italics as should

the abbreviation for *Batrachochytrium dendrobatidis*, *Bd*. Suggested headings include Acknowledgements, Author Details and References and Notes.

AUTHOR DETAILS

Author details may be provided, including affiliations and contact details.

FIGURES

Figures should be numbered and include brief, concise legends. Where photographs or illustrations are used please state whom the image should be credited to, e.g., Photo: John P. Doe. Graphics should preferably be submitted in tiff or jpeg format in the highest possible quality. Resolution should be at least 300 dpi at the final size.

TABLES

Tables may be included within the text file and should be numbered and include brief, precise legends.

CITATION OF LITERATURE

FrogLog uses a numbering system for references and notes. This allows explanatory or more detailed notes to be included with the references. Journal names are abbreviated using common abbreviations to save space.

Journals/Periodicals

1. E. Recuero, J. Cruzado-Cortés, G. Parra-Olea, K. R. Zamundio, *Ann. Zool. Fenn.* 47, 223 (2010).

Books

2. J. Gupta, N. van der Grijp, Eds., *Mainstreaming Climate Change in Development Cooperation* (Cambridge Univ. Press, Cambridge, UK, 2010).

Technical reports

3. G.B. Shaw, *Practical uses of litmus paper in Möbius strips* (Tech. Rep. CUCS-29-82, Columbia Univ., New York, 1982).

Paper presented at a meeting

4. M. Konishi, paper presented at the 14th Annual Meeting of the Society for Neuroscience, Anaheim, CA, 10 October 1984.

Published Online Only

5. N. H. Sleep, *Geochem. Geophys. Geosyst.*, 10, Q11010 (2009); DOI:10.1029/2009GC002702.

Web site

6. National Oceanic and Atmospheric Administration, Beaufort Wind Scale, <http://www.spc.noaa.gov/faq/tornado/beaufort.html> (2012).

SPECIAL NOTE: Use only one space after all punctuation marks (this includes only one space after "periods" at the end of sentences).

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