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



Research, Education and Art United for the
Conservation of Harlequin Toads

Building Partnerships and Ponds for
Anamalai Flying Frog in Western Ghats

Using Conservation Needs Assessments to
Help Develop National Conservation Plans

... and so much more!

FrogLog

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Editorial

Dear friends,

This year has seen major developments on two important global amphibian conservation fronts: the conclusion of the second Global Amphibian Assessment (GAA2), providing updated extinction risk assessments for all known extant species, and the development and open consultation of the Amphibian Conservation Action Plan (ACAP) Status Review, the first of two companion documents in this ACAP update. Undertaking global amphibian conservation over the last nearly three years has been impacted by COVID-19, but also recurring and chronic issues related to underfunding. We are, of course, extremely grateful to the specific donors that have allowed us to continue the work needed to coordinate and develop these important global products, and it is thanks to them that we now have a better understanding of the broad fundraising landscape in species conservation and how amphibians fit in. As highlighted by the ACAP Status Review draft, publicly shared in the [open consultation](#) process, amphibians are underfunded when compared with mammals and birds, and this refers not only to proportion of funded projects by taxonomic group, but also proportion of total dollar investment. The reasons behind these findings are nuanced and multi-layered, and while some of them lie within the amphibian conservation community (for example, increased collaborations between projects with overlapping goals, and expanding the scope of project proposals to mitigate threats), others would need to be addressed by the donor community (e.g. allowing for some funds to support core costs, removing language barriers for proposal submissions, increasing duration of support), and yet others would need to be addressed by both communities (e.g. building capacity in grant-writing, improving higher level coordination). In other words, there is homework for everyone here.

FrogLog is one of those underfunded global amphibian projects. It has been the flagship publication of the global amphibian conservation community for thirty years now; yet, funding it has been a struggle for most of its existence, as is revealed by James Murphy's article "The Genesis of FrogLog". FrogLog provides an important medium for stories that would otherwise not have an opportunity to be published because they don't fit an academic format, don't have a quantitative analysis, or because they don't have "positive" results or news. Yet, we see the ability to showcase these stories as critical; FrogLog provides a free medium for conservationists to highlight their work and also a mechanism to track and monitor projects as they develop. Where would these stories appear if it weren't for FrogLog?

In light of the above, the Editorial Board has decided to re-think a more sustainable approach for producing FrogLog in the New Year. We will keep the amphibian conservation community abreast of changes through ASA and ASG social media and website posts once details are finalized.

In the meantime, the Editorial Board wishes the amphibian conservation community all the best for 2023.

Ariadne Angulo

Co-chair, IUCN SSC Amphibian Specialist Group

FrogLog

FrogLog is produced by the IUCN SSC Amphibian Specialist Group (ASG) and the Amphibian Survival Alliance (ASA) to serve as the amphibian conservation community's news publication.

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Atelopus laetissimus, one of many frog species endemic from the Sierra Nevada de Santa Marta, Colombia, currently listed as Endangered by the IUCN. Photo: Pedro Peloso.

Research, Education and Art United for the Conservation of Harlequin Toads

By Pedro Peloso^{1,2,5}, Janni Benavides^{3,4}, Lina Valencia^{5,6}, and Luis Fernando Marin da Fonte^{5,6,7}

In August 2022 a diverse team of researchers, conservationists, artists, and representatives of local and Indigenous communities and park rangers met at Estación Experimental San Lorenzo in the Sierra Nevada de Santa Marta, Colombia with one common objective in mind: studying and preserving Harlequin Toads (genus *Atelopus*). The meeting was part of the project “The last refuge of Harlequin Toads: working together to save the jewels of the forest”, funded by the National Geographic Society. The project involves a large group of people and organizations, including several Amphibian Survival Alliance (ASA) partners, ASA Future Leaders of Amphibian Conservation and members of the *Atelopus* Survival Initiative (ASI). The partnership between scientists, conservationists, artists, and educators resulted in the creation of scientific protocols for research and monitoring of *Atelopus* and the publication of a children’s book and songs about Harlequin Toads.

Harlequin Toads are terrestrial amphibians, with striking and bright colors that inhabit several countries in Central and South America. These toads live from open areas (such as the Andean Páramos) to densely forested regions (such as the Amazonian rainforest) where they can usually be found near small streams with clear running water.

Harlequin Toads are one of the most highly threatened groups of animals in the world, with about 80% of all species currently listed as Critically Endangered, Endangered or Vulnerable on the IUCN Red List of Threatened SpeciesTM. It is believed that up to 40% of *Atelopus* species may be extinct in the wild, whereas some of these only still exist thanks to *ex situ* conservation programs that maintain populations in captivity. The biggest known threats to

Harlequin Toads are deforestation, water contamination, invasive species, and especially, infectious diseases. Among the diseases, the most lethal is chytridiomycosis (disease caused by the fungus *Batrachochytrium dendrobatidis*) — often referred to as the amphibian pandemic.

Because they are extremely threatened, Harlequin Toads receive special attention from the scientific community. The ASI was created from the urgency of implementing strategies for the conservation of *Atelopus* species. The ASI unites more than 100 individuals from more than 40 organizations in 15 countries dedicated to studying and conserving *Atelopus*. Rather than isolated stars the ASI is a constellation of champions working together to bring Harlequin Toads from the brink of extinction. Several ASI members are also National Geographic Explorers, and these Explorers seized on the opportunity to get funded by the Society to work on a proj-



San Lorenzo Harlequin Toad (*Atelopus nahumae*), only known from the Sierra Nevada de Santa Marta, Colombia, currently listed as Endangered by the IUCN. Photo: Pedro Peloso.

¹Museu Paraense Emílio Goeldi, Belém, PA, Brazil. ²California State University, Cal Poly Humboldt, Arcata, CA, USA. ³*Atelopus* Survival Initiative, ⁴Jacana Jacana. ⁵Re:wild. USA. ⁶IUCN SSC Amphibian Specialist Group *Atelopus* Task Force. ⁷Amphibian Survival Alliance.

ect that brought them together to exchange experiences and think about strategies for the conservation of *Atelopus*.

Meeting at Sierra Nevada de Santa Marta, Colombia

The Sierra Nevada de Santa Marta, Colombia, is a special place due to its incredible biological and cultural diversity. More than preserving an enormous diversity of animal and plant species that exists nowhere else in the world, the region is inhabited by four indigenous communities (Arhuaco, Kankuamo Kogui and Wiwa) who have lived in the region for centuries (at least 200 years BC). The Sierra Nevada is located only a few kilometers from the Atlantic coast and consists of a mountain range that reaches altitudes of more than 5500 meters — it is considered the highest coastal mountain in the world. These mountains harbor five endemic species of *Atelopus* in its streams, some of which are at high risk of extinction because of their extremely small geographic distributions. But unlike many other places where the genus occurs, in Santa Marta most of these species have populations that are stable and healthy. The researchers involved in the “Last refuge of Harlequin Toads” project believe that understanding the reasons why these populations persist in the wild despite threats can provide critical information for the development of conservation strategies for the group, in Colombia and elsewhere.

Over one week all participants shared lessons of success and failures on Harlequin Toad research and conservation and demonstrated different field methods used in *Atelopus* research. At the end of the project, the researchers promised to deliver a protocol that will be shared with the ASI and the rest of the scientific community, and that can be used as a starting point for future research

and conservation projects with Harlequin Toads throughout Central and South Americas.

Art and education for biodiversity conservation: Singing to save Harlequin Toads

The most beautiful and transforming moments of the expedition were the activities carried out with local communities, where the Colombian music group Jacana Jacana held concerts together with environmental education activities aimed at children. The events took place in a public school in La Tagua and in a private music hall in Minca. The concerts were predominantly attended by children, who were charmed by the beautiful songs created and performed by Jacana Jacana. The group is composed of musicians and educators with a strong background in creating and leading educational projects that aim to reconnect the public with themes of nature — their creative songs include diverse rhythms and celebrate the biodiversity of Latin American forests.

As part of this project the team selected four iconic species of Harlequin Toads from four different countries, and for each of them Jacana Jacana composed a unique song. The lyrics, developed together with researchers and local communities working in the conservation of each species, include elements related to the amphibians and the culture of the country where they occur. The four songs were performed live for the first time during the concerts in Colombia. Before and after the shows, educational activities were carried out with the children, including printing of t-shirts and posters with images of the four harlequin toad species, and the distribution of the trilingual book “Harlequin Toads, Jewels of our Forests and Páramos”. The book includes texts written



A prominent member of the Arhuaco Indigenous community from Sierra Nevada took the stage to talk about the importance of preserving the Starry Night Harlequin Toad (*Atelopus arsyecue*) during a concert performed by Jacana Jacana in Minca. From left to right: Andrés Alvarez, Janni Benavides, Ona Gabriunas, Ruperto Chaparro (Arhuaco), and Julia Alvarez. Photo: Luis Marin da Fonte.



Smithsonian Institution's scientist Brian Gratwicke talks to our diverse team about the long-term conservation program for the Panamanian Golden Toad (*Atelopus zeteki*). Photo: Pedro Peloso.

by the researchers and are accompanied by beautiful illustrations by Colombian artist Sara Ramirez [Instagram: @selvaselvita]. The published songs, along with music videos exclusively produced for the project, are available, respectively, on [Spotify](#) and [Youtube](#) by Jacana Jacana.

The release of the first song coincided with the launch of the Jambato Alliance (22 September 2022), an effort to study and preserve the Jambato Harlequin Toad (*A. ignescens*) in Ecuador. The song is a tribute to the species locally known as Jambato Negro. Scientists believed this species, like other *Atelopus*, was extinct, until it was rediscovered in 2016 by a child playing in his garden. The other three species chosen to be honored with a song were: *A. manauensis* from Brazil (song released October 12, 2022), *A. arsyecue* from the Sierra Nevada in Colombia, and *A. zeteki* from Panamá, a species considered to be extinct in the wild that only survives in captive breeding centers.

A constellation, rather than isolated stars, to save Harlequin Toads

The group that met in Santa Marta was composed of conservationists, researchers, educators, and artists directly involved with Harlequin Toad conservation, as well as local park rangers and leaders and members of the Arhuaco Indigenous communities. A total of 24 people from 9 different countries participated in the gathering in Colombia. This cultural and intellectual diversity was essential to the success of the expedition and in solidifying the group as a team that shares a solid goal — to secure a future for Harlequin Toads.

The team was led by Lina Valencia, coordinator of the IUCN SSC Amphibian Specialist Group *Atelopus* Task Force, and Luis F. Marin da Fonte, coordinator of the ASI and Director of Partnerships & Communications at the Amphibian Survival Alliance. Other team members were Brian Gratwicke (ASA partner Smithsonian Conservation Biology Institute), Delia Basanta (University of Nevada), Janni Benavides, Julia Alvarez and Andrés Alvarez (Jacana Jacana), Jeferson Villalba, José Luis Peres, and Sintana Rojas (ASA partner Fundación Atelopus), Juan Manuel Guayasamin (Jambato Alliance), Lilia Quintero (Parques Nacionales Naturales de Colombia), Mirna Garcia-Castillo (Universidad Nacional Autónoma de México), Pedro Peloso (ASA Future Leader of Amphibian Con-

servation), Ruperto Chaparro and Rufino Arroyo (Arhuaco Indigenous community), Sara Ramírez (Selva Selvita), and Timothé Le Pape (Cerato, Association Herpétologique de Guyane). Additional team members that were not able to join the fieldwork activities include Luke Linhoff (Smithsonian Conservation Biology Institute) and Jamie Voyles (University of Nevada).



Colombian artist Sara Ramirez from Selva Selvita (instagram: @selvaselvita) illustrated the book and led educational activities during our work in Colombia, which involved silk printing of t-shirts and posters for the kids. Photo: Pedro Peloso.

The Genesis of FrogLog

By James B. Murphy

When I attended the First World Congress of Herpetology held at the University of Kent, Canterbury, England, UK, during 11–19 September 1989, I spent an alarming evening in a local pub with a prominent group of amphibian biologists. Quickly the conversation centered on comparing notes about the apparent shrinkage of amphibian numbers at study sites. One scientist postulated that the loss was due to normal population fluctuations so it was premature to posit that there was a significant deleterious issue. All others were convinced that something unknown was going on and this terrifying developing trend needed a regular newsletter to highlight the scope of the problem to a broad audience. Hence, the genesis of *Declining Amphibian Populations Task Force* (DAPTF) and *FrogLog* (1).



Coordinator's Column

The DAPTF has been established by the International Union for the Conservation of Nature (IUCN), Species Survival Commission (SSC) to organize a global monitoring program for (1) determining the status of amphibian populations (2) assessing the implications of any declines (3) studying potential causative factors, and (4) making appropriate policy recommendations based upon these findings. The Coordinating Council, administered by the Coordinator, includes researchers, liaison officers of societies and agencies as well as other interested parties, all of whom serve as communicators.

As of the last week in January, the Task Force became equipped and manned at the project level when it occupied its present facilities at the Environmental Research Laboratory in Corvallis, Oregon. In addition to the recent acquisition of computer hardware, we now have a full time information systems manager in the person of Tony Clem. Once our system is interfaced we shall initiate an electronic database and other activities designed to serve as a viable communications network.

We are still in need of Regional Working Group Chairpersons for the U.S. Great Lakes area (W. Mitten).

Priority has been given to organization of a Working Group to assist in compilation of a comprehensive bibliography of reports relating to amphibian populations that will be generated and maintained at the Coordinator's office. We wish to include titles of primary and secondary literature, theses and dissertations, as well as names of earlier investigators who have archived their field notes at a repository. This resource will be freely available to those wishing to make comparisons with contemporary studies.

Anyone interested in these or related studies are invited to join the DAPTF. Please send your name, address and telecommunications number(s), indicating your interest or participation, to the Coordinator's address.

FROGLOG

IUCN/SSC Declining Amphibian Populations Task Force
March, 1992, No. 1



Canada Launches Major Initiative

(The following is edited and condensed from a report by Finnish Kaiser, Redpath Museum, McGill University, on the workshop 'Declines in Canadian amphibian populations: designing a national monitoring strategy' held at the Canada Centre for Inland Waters in Burlington, Ontario, on October 5 and 6, 1991. Bull. CAHACH 5(2):1-4.)

The workshop in Burlington, organized by Christine Bishop (Canadian Wildlife Service) and Bob Johnston (Metro Toronto Zoo), constituted the first comprehensive attempt to address the declining amphibian phenomenon from a Canadian viewpoint. The problem of amphibian declines has become an urgent concern among Canadian herpetologists. Participation of researchers in universities, governments and private organizations was truly exceptional. This meeting was the largest gathering of Canadian herpetologists in memory.

In his opening remarks, Bishop stated that the aim of the meeting was to create a framework to monitor Canadian amphibian declines and the factors causing them. Johnston, a DAPTF Board of Directors member, highlighted the problems speakers representing the various provinces gave depressing status reports on amphibian populations throughout Canada. In many cases, these were anecdotal accounts, although causal relationships between declines and anthropogenic events can be confirmed in all too many cases. Invariably, each speaker referred to the basic lack of knowledge about the amphibians in question: distributions are not precisely known, causes behind disappearances are uncertain, and habitat surveys are insufficiently detailed.

The introduction of non-native amphibian species and sports fish, mismanagement of wetlands, human intrusion, and logging, have all been identified as damaging to amphibian populations in more than one province. All were cited as being at least partly responsible for population declines in British Columbia. In Nova Scotia fragmented habitats and the resulting inbreeding within many species have produced increased frequencies of albinism and extra-limbed individuals. A well-documented problem is shown by *Rana pipiens*, stemming from the sale of

over a million frogs to biological supply companies in the U.S. until die-offs began in 1975. In the middle 1970s, the famous Manitoba frog holes were empty, and despite an eight-year ban on picking frogs their numbers have not much increased.

Natural events, such as droughts, may be in part responsible for declines observed in populations in Saskatchewan. An outbreak of red leg disease in 1976 resulted in many deaths of *Rana pipiens* in Alberta. Recent observations on *Rana caatesheaniana* in the Algonquin area showed that the average weight of calling bullfrogs at two separate sites differed significantly. It is unknown whether life history, social structure or harvesting contributed to this phenomenon.

In Ontario and Quebec, amphibian monitoring has been going on for some time. Since 1984, Ontario has received a total of 52,000 records from 2,700 volunteers and has also compiled a bibliography of herpetology including ca. 1,400 references. In Quebec, 5,400 records are reported.

However, it is puzzling that some species seem entirely unaffected. It has been suggested that certain ones may be rebounding from natural, cyclical events and that there may be positive changes in the environment over the past few years.

The afternoon talks centered on the monitoring of amphibian populations, including reports of projects that have produced quantitative data. Data from the best estimate is gained by intensive study. This method has actually been employed in a four-year study of Fowler's toads at Long Point. These toads have dramatically increased in numbers since the study began, likely an effect of the water level rise in Lake Erie.

Among other concerns presented was the importance of: experimental design, timing and length of study; preservation of natural conditions of the habitat; measuring both natural and anthropogenic environmental factors; generating a genetic database during monitoring; larval survival studies; and the effects of disease and gene flow; pathological conditions present in the populations; and determining the effects of contaminants upon entire populations.

Open discussions began on the second day. It was first determined that the Working Group will be a research coordinating body for investigating the hypothesis that amphibian populations are in decline. If this hypothesis is supported, the group should then seek ways to reverse the declines. It was agreed that



Philautus hallidayi by Tim Halliday

ians. Magnanimously he covered the entire cost of all members coming from throughout the world to the first meeting, hosted by Dave Wake, at University of California at Berkeley.

At our annual DAPTF board meetings great ideas regularly surfaced, but funding for such projects was mostly not discussed. One such issue was the production of *FrogLog*. I called my friend Ron Kagan, Director of Detroit Zoological Institute in Michigan, and explained the ongoing perilous future of *FrogLog*. Ron agreed that his zoo would cover the cost of the editor's salary and publication for the entire time—I am truly grateful to Ron for his generosity.

A word about my late friend Dr. Tim Halliday, International Director of the DAPTF. Tim would call me in desperation about the latest financial catastrophe befalling the Task Force and begging me to once again plead to our benefactor for more money. His contributions essentially kept DAPTF afloat, but each time I received a longer lecture about our fiscal irresponsibility. When I asked for US \$100,000 to close out DAPTF in the black and pay off unpaid bills, Tim had to send an itemized statement before the bill would be paid to prove that we were capable stewards. With the granted monies, the organization avoided bankruptcy.

Today's *FrogLog* is a marvel to behold—beautiful color, design and great articles about amphibian biology, including declines.

In 2005, Madhava Meegaskumbura and Kelum Manamendra-Arachchi published a paper entitled *Description of eight new species of Shrub Frogs (Ranidae: Rhacophorinae: Philautus) from Sri Lanka* (2). In it, *Philautus hallidayi* was described — In the Etymology paragraph — “The species name, in the Latin genitive singular, is a patronym honouring Timothy Richard Halliday (b. England, 1945), since 1994 International Director of the IUCN/ SSC Task Force on Declining Amphibian Populations (DAPTF), recognizing also his three decades of research on amphibians and his exceptional commitment to advancing our understanding of the global amphibian decline crisis.”

References:

1. W. Heyer, & J. Murphy, (2005). Declining Amphibian Populations Task Force. 10.1525/california/9780520235922.003.0005.
2. M. Meegaskumbura, K. Manamendra-Arachchi, *Raffles Bull. Zool.* 12, 305-338 (2005).

Retired Curator, Dallas Zoo, National Zoological Park, and Research Associate, U.S. National Museum of Natural History, Washington DC 20008 USA. Email: jbmurphy222@gmail.com



Photo: Jaime Culebras.

Lost-and-Found: Longnose Harlequin Toads Remain Suspended in a State of Emergency

By Milo Putnam

Ten. That's less than the number of Kardashians to keep up with. That's less than the number of times you've likely called your mom this month. And ten is definitely (should be?) less than the number of emojis you'll use today. Ten is a tiny number. Ten is especially dismal when it is the sum of an entire species left in the wild.

Only 10 adult Longnose Harlequin Toads (*Atelopus longirostris*) remain in the wild of Ecuador's Intag Valley. But for a species that was once considered extinct, this bleak number is in fact a sign of recovery. Longnose Harlequin Toads were largely wiped out in the late 1980s by climate change and a deadly disease caused by the chytrid fungus. But a twist of fate brought these striking, yellow-spotted toads 'back from the dead.'

In March of 2016, that tragedy unexpectedly turned to optimism as four adult Longnose Harlequin Toads were rediscovered in Intag Valley after disappearing for nearly three decades. These living, breathing parcels of hope represented the seemingly impossible. Following this rediscovery, the Jambatu Amphibian Research and Conservation Center in Ecuador led a rescue effort to bring these four precious toads into their conservation program with the hope of successfully breeding them in captivity and one day reintroduc-

ing this species back to the wild.

"Jambatu Center is their emergency room," says Andrea Terán-Valdez, collections manager for the Jambatu Center. "Amphibian species can hover here, away from the threats of the wild for as long as necessary, but we need to work in the wild too. They cannot be in an emergency room forever. We need to protect those ecosystems, and we need to preserve their habitats so we can reintroduce these species to the wild. Otherwise, our work here is useless."

As a member of the *Atelopus* Survival Initiative and partner of Re:wild, the Jambatu Center is also sharing its findings and best practices with initiative members who are working to conserve other species of harlequin toads. About 40% of harlequin toad species have disappeared from their known homes and have not been seen since the early 2000s. A deadly pathogen, combined with habitat destruction and degradation, water pollution, the introduction of invasive species, and the effects of climate change has left 83 percent of the 94 known harlequin toad species threatened with extinction, according to The IUCN Red List of Threatened Species™.

Longnose Harlequin Toads surprised scientists when they reappeared after decades, but these toads are suspended in a state of emergency. Six years since their fateful rediscovery, they remain



Photo: Gustavo Pazmiño.

threatened by extractive industries driving destruction in their only wild home, the Intag Valley. For the past 30 years, this region has been the target of numerous copper mines, repeatedly putting the Longnose Harlequin Toad and the many other wildlife species it shares its home with in jeopardy. How much longer can these tiny amphibians dodge yet another possible onslaught?

"If you have a mining disaster in Intag Valley, we might not be able to go and rescue the few individual frogs that are left in the field," says Terán-Valdez.

Ecuadorian amphibian ark,

Ecuador ranks third in the world for amphibian species richness, and over 44% of these species are found nowhere else on Earth. Founded in 2011, Jambatu Center is working tirelessly to ensure these amphibians are not lost to extinction. Currently, the center cares for over 1,100 individuals that represent 30 different species of amphibians. Jambatu Center is the only place in the world attempting to breed Longnose Harlequin Toads. In fact, it is the only place, outside of the wild, these tiny toads even exist.

Biologists at Jambatu Center worked diligently to perfect the correct conditions in the breeding center to care for and breed the Longnose Harlequin Toad. Their original assurance population of just four adults has grown with the addition of tadpoles collected from Intag Valley. But even more significantly, following many attempts, they have successfully bred this species at the center, a world-first achievement. Jambatu has now successfully reproduced Longnose Harlequin Toad on two separate occasions, once in 2018 and a second in 2020, a cause for celebration for a species once thought extinct.

With those breeding achievements and the collection of additional tadpoles, the founding population of four has turned into today's insurance population of 29 adult Longnose Harlequin Toads, thanks to the research and care of the Jambatu Center.

Reintroducing a lost species

The reality of returning the Longnose Harlequin Toad to the wild means there must be a wild to return them to. Intag Valley,

a biodiversity hotspot in the Andes mountains, is the only home of this species. But the threats to this ecosystem seem insurmountable, considering the Llurimagua copper mine's concession carves through the heart of Intag Valley. In a recent court case, a judge from Ecuador's Cotacachi canton court ruled to allow copper mining in Intag Valley, despite the plaintiff's argument that the concession violates the constitutional rights of local communities to consultation and the rights of nature.

"The livelihoods and wellbeing of the communities in Intag depend on a conserved forest and healthy watersheds," said Lina Valencia, Andean countries coordinator for Re:wild. "This mining concession will have detrimental effects to the forests, rivers and species that live there. Species don't often get a second chance, especially harlequin toads. A mining concession would be disastrous for fragile species like the Longnose Harlequin Toad."

In their astonishing journey back from near extinction, Longnose Harlequin Toads have now become the symbol of a rallying cry against extractive development in these sacred cloud forests of Ecuador.

"If you don't fight, then you have already lost. We have to try. We have to keep on trying. We are doing our part, the community is doing their part, and we need the courts to honor the rights of nature," says Terán-Valdez. "Otherwise, we will all lose."

Using Conservation Needs Assessments to Help Develop National Conservation Plans

By Kevin Johnson¹, Luis Carrillo¹, Federico Kacolicis², Borja Baguette Pereiro³, Cybele Lisboa^{4,5} and Iberê Machado^{4,6}



Recent Conservation Needs Assessment workshops have been held virtually, mostly due to covid-related travel restrictions. Photo: Cybele Lisboa

The conservation needs of amphibians have been assessed and prioritized using Amphibian Ark's Conservation Needs Assessment (CNA) process for the past 12 years, with 4,168 assessments now completed for 3,511 species in 48 countries. These assessments allow us to maximize the impact of limited conservation resources, and to guide the development of national and species-level action plans (1). The Amphibian Ark (AArk) was formed in 2006 as a joint effort of three principal partners: the IUCN SSC Conservation Planning Specialist Group (CPSG), IUCN SSC Amphibian Specialist Group (ASG) and the World Association of Zoos and Aquariums (WAZA) and its role is to support the implementation of the *ex situ* component of the Amphibian Conservation Action Plan (ACAP, 2, 3).

The CNA process was described in the December 2021 edition of FrogLog (Volume 28, number 2, Issue 123), and further information is available on the Conservation Needs Assessment website, www.conservationneeds.org.

The CNA process helps to evaluate and prioritize amphibian species to determine those with the most pressing conservation needs and to generate high-level recommendations for both *in situ* and *ex situ* actions. It fulfils the first stage in the IUCN Species Survival Commission (SSC) framework for the Species Conservation Cycle of **Assess - Plan - Act** (*Assess: Understand and inform the world about the status and trends of biodiversity*), with the recommendations arising from the assessments forming the basis of the second stage (*Plan: Develop collaborative, inclusive and science-based conservation strategies plans and policies*).

Working closely with the IUCN Red List of Threatened Species™ assessments, the CNAs allow a more holistic view of the threats facing species in the wild, along with identifying existing conservation actions which might be underway and developing recommendations for future conservation actions. The CNAs are a valuable

resource for directing and prioritizing amphibian conservation planning and action at the national level.

During 2020, AArk staff facilitated CNA workshops for 50 threatened and previously unassessed species in Argentina, and 67 threatened species in Brazil. Assessment consultation sessions were held virtually in both countries. The Argentinean assessments were developed by 31 field experts and experts in conservation breeding and reintroduction programs, and 50 experts contributed to the assessments in Brazil. From these 117 assessments, 343 recommendations for conservation action were generated, as outlined in Table 1.

Recommended conservation action *	Argentina	Brazil
<i>Ex situ</i> rescue	14	13
<i>In situ</i> conservation	35	25
<i>In situ</i> research	51	66
Husbandry analog	6	5
Applied <i>ex situ</i> research	8	15
Mass production	0	0
Conservation education	30	48
Supplementation	0	0
Biobanking	14	13

Table 1. Number of recommended conservation actions generated from Conservation Needs Assessments for Argentina and Brazil. Definitions of the conservation actions are available at <https://conservationneeds.org/Help/EN/ConservationActions.htm>.

The data contained in these assessments, and the recommendations generated from them are now being used in both countries to help guide national priorities and to develop plans for both *in situ* and *ex situ* amphibian conservation actions.

Argentina

Participants in the virtual assessment workshop included experts from all over the country, whose experience and knowledge contributed greatly to the assessment questions, objectively and consistently identifying priority species and immediate conservation needs for both *in situ* and *ex situ* actions. There are ten conservation actions which are not mutually exclusive, that can be attributed to each species: Rescue, *In Situ* Conservation, *In Situ* Research, Husbandry Research, Applied *Ex Situ* Research, Mass Production in Captivity, Conservation Education, Supplementation, Biobanking or No Action Required. These categories are generated from the information in each assessment, which includes the current conservation status, threats, presence in protected habitat, previous *ex situ* management experience, potential population recovery capacity, and if required, feasibility of obtaining authorization to collect founder animals.

During the workshop, fifty species were assessed by thirty-one specialists, representing universities, non-government organizations, technicians from local zoos and independent researchers. The assessments have now all been reviewed and approved for publication, with the conservation actions shown in Table 1 being

¹Amphibian Ark. ²University of La Plata. ³Ecoparque de Buenos Aires.

⁴AmphIUCN SSC Amphibian Specialist Group, Brazil (ASG Brazil).

⁵Reserva Paulista - Zoológico de São Paulo. ⁶Instituto Boitatá



The Casque-headed Frog (*Nyctimantis pomba*) from the southeast of Brazil is the highest priority amphibian species in Brazil for conservation action. Photo: Cybele Lisboa.

recommended.

Some of the priority species being considered for *ex situ* programs include Darwin's Blackish Toad (*Melanophryniscus nigricans*), El Rincon Stream Frog (*Pleurodema somuncurensis*), Patagonia Frog (*Atelognathus patagonicus*), *Alsodes neuquensis*, Rivera Redbelly Toad (*Melanophryniscus devincenzii*), *Melanophryniscus estebani* and Pehuénche Spiny-chest Frog (*Alsodes pehuenche*). It is worth mentioning that the first three species are already being managed in *ex situ* conservation breeding programs in Argentina, with all of them supported by AArk.

Over the coming months, the conservation actions identified for each species will be compiled into a planning document, to have a summary and a template for developing an action plan and a research-needs guide for each of the evaluated species. The CNAs for Argentina, along with more information about the process itself is available on the assessment web site at www.conservationneeds.org.

Brazil

In 2020, ASG Brazil and AArk organized a CNA workshop with Brazilian experts to assess the conservation needs of amphibian species in Brazil (see AArk Newsletter 52, 2020, www.amphibi-anark.org/Newsletters/AArk-newsletter-52.pdf). The assessment workshop took place between August and November 2020, however the review and approval process of the assessments wasn't completed until April 2021, when they became publicly available on the CNA website www.conservationneeds.org.

As Brazil is a megadiverse country, which currently has 1,213 known amphibian species, and to make the CNA process more focused on species which most need action, we chose to assess only those species which were listed in one of the Red List 'threatened' categories (Critically Endangered, Endangered or Vulnerable). We used the last national Red List provided by the RAN/ICMBio (Brazilian government agency) as a reference for this, and although the Red List evaluations took place in 2018, the results are yet to be published.

Sixty-seven species were evaluated, of which thirteen were listed as high priority for *ex situ* rescue conservation actions. Table 1

shows the recommendations arising from these assessments. Of the thirteen high priority rescue species, one is from the southern region of Brazil (*Pithecopus rusticus*), nine occur in the southeast (*Bokermannohyla napolii*, *Hylodes mertensi*, *Ischnocnema garciai*, *I. karst*, *Melanophryniscus setiba*, *Nyctimantis pomba*, *Physalaemus soaresi*, *Proceratophrys palustris* and *Sphaenorhynchus canga*), one in the mid-west (*Boana buriti*), one in the north (*Atelopus manauensis*) and one in the northeast (*Chiasmocleis alagoinus*).

To disseminate the results of the CNA to the wider conservation community, ASG Brazil organized the 3rd ANFoCO (Amphibians in Focus) – Brazilian Symposium on Amphibian Conservation (<https://asgbrasil.wixsite.com/asg-brasil>), which took

place from November 30 to December 2, 2021, as a virtual symposium. The idea behind ANFoCO is to provide a platform that generates contacts, connects different actors, promotes debate and which results in taking action that effectively contributes to the conservation of amphibians in Brazil.

The central theme of the 3rd ANFoCO was the reality of Brazilian endangered species, with emphasis on the thirteen species that are high priority for *ex situ* conservation. The objective was to discuss the current situation of these species and what paths should be taken to conserve them. Therefore, the slogan for the event was: "Where are we, why are we here and where do we want to go?"

The 3rd ANFoCO included speakers with different areas of expertise, including members of institutions which are important for conserving amphibians, both in the Brazilian and global context. Speakers also focused on the most important threats in the context of Brazilian endangered species, and on conservation strategies for amphibians, including strategies to search for missing species, implement *ex situ* conservation actions, disseminate scientific information and protect amphibian habitat.

The completion of the CNA and the 3rd ANFoCO were important steps towards directing and publicizing the actions necessary to help conserve endangered Brazilian amphibians. ASG Brazil's next steps will be focused on the development of specific action plans for the thirteen high priority species, and will engage all the necessary stakeholders from academia, zoos, governmental and non-governmental organizations.

References:

1. K. Johnson *et al.*, A process for assessing and prioritizing species conservation needs: going beyond the Red List. *Oryx*. doi:10.1017/S0030605317001715. www.amphibi-anark.org/wp-content/uploads/2018/07/A-process-for-assessing-and-prioritizing-species-conservation-needs-goingbeyond-the-red-list.pdf (2018).
2. C. Gascon *et al.*, Eds., Amphibian Conservation Action Plan. (IUCN/Species Survival Commission Amphibian Specialist Group. Gland, Switzerland, and Cambridge, UK, 2007).
3. S. Wren *et al.*, Eds., Amphibian Conservation Action Plan. IUCN Species Survival Commission Amphibian Specialist Group. <https://www.amphibians.org/resources/> (2015).

Progress on the Rescue of the Loa Water Frog (*Telmatobius dankoi*) from Las Cascadas, Calama, Chile

By Claudio Azat^{1,2}, Marco A. Méndez^{1,3,4}, Andrés Charrier¹, Paola A. Sáez^{3,4}, Osvaldo Cabeza^{1,5}, Pablo Fibla^{1,5}, Osvaldo Rojas⁶, Nicolás Rebolledo⁷, Roberto Villablanca⁸ & Gabriel Lobos^{1,6}



Figure 1: Sampling of an individual the Loa water frog (*Telmatobius dankoi*) for disease surveillance. Photo: FNDR Antofagasta.

Described in 1999, the Loa Water Frog (*Telmatobius dankoi*) has been only known from the single locality Las Cascadas, near the city of Calama, in the heart of the Atacama Desert in northern Chile (1,2). However, together with the Vilama Water Frog (*T. vilamensis*), this species has recently been proposed into the synonymy of Hall's Water Frog (*T. halli*) (3). Despite this, for the purpose of this communication, *T. dankoi* is treated as the population from Las Cascadas, until further evidence is available to resolve its taxonomic identity. According to The IUCN Red List of Threatened Species™ *T. dankoi* is considered Critically Endangered, due to its restricted distribution (area of occupancy <4 km²) and severe impact by water abstraction for mining, agricultural and recreation purposes (4). *Telmatobius dankoi* does not occur in a protected area.

By 2015 the population of *T. dankoi* at Las Cascadas was estimated at 600 adult individuals (2). In June 2019, we witnessed that its habitat (a small stream) had dried up completely, except for one pool of ~10 m² at the head of the permanent stream, with the last surviving animals showing severe emaciation and poor health condition. This dramatic event motivated members of the IUCN SSC Amphibian Specialist Group and Chile's Ministry of Environment to develop an emergency plan to avoid the local extinction of *T. dankoi*. The

plan consisted of several actions, including: 1) Rescue and conservation translocation: in July 2019, 62 individuals were relocated to a nearby stream (Ojo de Opache), which had no previous record of the species. 2) Public awareness campaign: the critical situation of *T. dankoi* reached widespread notoriety both nationally and internationally. A milestone was the collaboration with renowned environmentalist Leonardo Di Caprio. 3) *Ex situ* conservation: in August 2019, 14 additional individuals were transported to the National Zoo of Chile to start a captive breeding population. Reproduction has been successful and >600 tadpoles have been born in the zoo (of which 170 have reached the froglet stage). 4) Population monitoring: The presence of six adult frogs and a tadpole at

the original locality has been confirmed. Adults have been tagged with microchips for future monitoring and sampled for disease surveillance of *Batrachochytrium dendrobatidis* and Ranavirus (Fig. 1). 5) Funding: several sources of funding have been secured for the conservation of *T. dankoi*, including funds from the government, mining sector, universities and international NGOs.

Currently, efforts are focused on advancing habitat restoration and formal protection, reintroduction as well as a conservation plan not only for *T. dankoi* but for the genus *Telmatobius* in Chile, since most species in this group are highly threatened. The recently awarded National Fund for Regional Development of Antofagasta region for the conservation of *Telmatobius* in northern Chile is a starting point to achieve these objectives. The story of *T. dankoi* is a good example of a rapid coordinated response among conservationists, scientists, government officials and the local community, embracing a crusade to save a non-charismatic species from extinction, and can serve as an example to boost conservation efforts of highly threatened wildlife species elsewhere.

References:

1. R. Formas et al. *Rev. Chil. Hist. Nat.* **72**, 427- 445 (1999).
2. G. Lobos, N. Rebolledo, A. Charrier, O. Rojas, *Stud. Neotrop. Fauna Environ.* **51**, 152-157 (2016).
3. J. Von Tschirnhaus, C. L. Correa, *Zookeys* **1079**, 1-33 (2021).
4. IUCN SSC Amphibian Specialist Group, *Telmatobius dankoi*. In: IUCN 2021. (IUCN Red List of Threatened Species. Version 2021.1, 2021)

¹IUCN SSC Amphibian Specialist Group, Santiago, Chile. ²Universidad Andres Bello, Santiago, Chile. ³Universidad de Chile, Santiago, Chile. ⁴Center of Applied Ecology and Sustainability, Santiago, Chile. ⁵Zoológico Nacional del Parque Metropolitano de Santiago, Chile. ⁶Museo de Historia Natural y Cultural de Calama, Chile. ⁷Ecodiversidad Consultores, Santiago, Chile. ⁸Ministerio del Medio Ambiente, Chile

First Record of the Near Threatened *Astylosternus laticephalus* from Neung Forest Reserve in Ghana

By: Sandra Owusu-Gyamfi^{1,2}, Erasmus H. Owusu², Gilbert Baase Adum & Daniel K. Attuquayefio

It is important to know a threatened species' dispersal ability, distribution, and habitat suitability to plan conservation actions for its protection. The Near Threatened Wide-headed Night Frog (*Astylosternus laticephalus*) is a forest species that is not widely distributed and has been recorded only in swampy areas or sites close to streams (1, 2). It is confined to the Upper Guinean Forest of West Africa and has been recorded in only one locality in Ivory Coast: Banco National Park (1). In Ghana, it has been recorded in four places: Afao Hills Forest Reserve, Draw River Forest Reserve, Ankasa Conservation Area and Atewa Range Forest Reserve (2, 3). Aside from Atewa Range Forest Reserve which is located in south-central Ghana, the other localities are all in the south-western part of the country. There has never been a record of the species within the distribution gap between the south-west and central localities thus, limiting knowledge on the frog's dispersion and range size. Even though the species occurs in protected areas, it faces great risks from anthropogenic activities, especially mining and logging which degrades its habitat quality. We present the first record of *A. laticephalus* from Neung Forest Reserve, which increases the species current home ranges and provide further evidence of its conservation needs.

Neung Forest Reserve, 5° 7' 31" N 2° 2' 1" W, is located in the wet-evergreen forest zone of south-western Ghana. Nduμφiri Forest is the only reserve that separates Neung Forest from one of the known sites of *A. laticephalus*: Draw River Forest Reserve (Fig. 1). The forest is further split into Neung South and Neung Forest. It is 143 m above sea level and covers a total area of 131.72 km² (4, 5). It is an open canopy forest with between 15% and 30% of forest cover (6). Our study was limited to just Neung Forest which currently includes a gold mining concession (7).

Fieldwork was carried out during the minor wet season of Ghana from 30th October to 1st November 2021 using a combination of survey methods to increase chances of amphibian detection. Live trapping involved the use of a 100 m transect consisting of 11 buckets (17 litre each) buried in the ground along a drift fence. Visual encounter and acoustic surveys (stopping to listen for frog calls) as well as refuge examination were conducted by three researchers who moved leaf-litter, rocks and other forest debris that could serve as refugia for amphibians. Surveys were conducted in the morning (06:00 to 09:00 hours GMT) and night (19:00 to 22:00 hours GMT).

An adult female, identified from size (see discussion) and absence of vocal sac, was recorded during a night survey on 30th Oc-

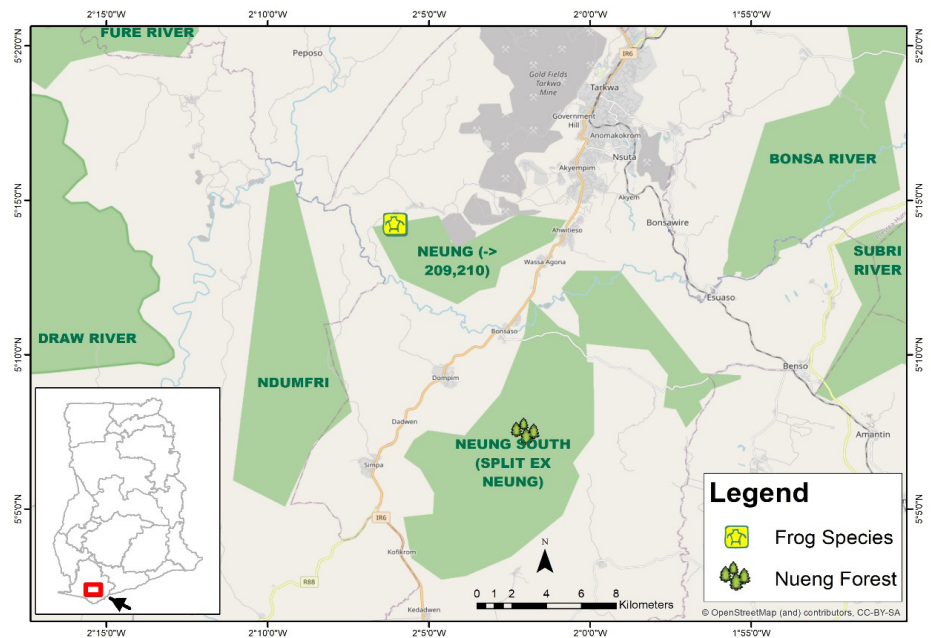


Fig 1: Map of Neung Forest showing location where *A. laticephalus* was collected.

tober 2021 (Fig. 2). The exact spot (5° 14' 11" N 2° 0' 1" W) where the individual was handpicked was a muddy footpath surrounded on both sides by trees of various heights. The individual weighed 20g with a snout vent length of 61mm. This is the first record of *A. laticephalus* from Neung Forest Reserve adding to the species' known home range in southwestern Ghana

Colouration follows the general description recorded by other authors (e.g., 3). A greater portion of the dorsum is brownish red which is replaced with grey colouration at the posterior. The distinct red dots spread to the extremities. The labial bar is a conspicuous dark colour which visibly separates the left and right sides of the face. This dark colouration fades and reappears at the interorbital width, extending slightly beyond the start of the supratympanic fold to form a wing-like shape. Its venter colouration is pale from the groin, tapering at the middle of the throat. The inner limbs and the outer portions of the throat are slightly pinkish. On the lower part of the inner thighs are granular that connect at the cloaca region. The individual has been preserved in 70% ethanol and kept at the herpetological museum of the Department of Animal Biology and Conservation Science, University of Ghana, Legon. After five months in 70% ethanol, the individual shrinks and losses most of its identifiable colours. It becomes more beige than brownish red with noticeable fade out marks on the back where red spots used to occupy (Fig. 2).

The individual adult female individual's weight and length puts it among some of the largest documented by earlier authors. Past records provide a snout vent length of female adults between 51.8 mm to 67 mm and 48.7 mm to 53.8 mm in adult males (3). *A. laticephalus* is differentiated from other species within its genus by its unique morphological features; a broader head, conspicuous red

¹Save Ghana Frogs, Ghana, ²University of Ghana; Email: ehowusu@ug.edu.gh

dots on a brownish to brownish-red dorsum (3). There is therefore no mistaking the identity of the recorded individual. Recording the individual at Neung Forest Reserve which is a close forest block to Draw River Forest Reserve, confirms a possible historically continuous home range of the species. Therefore, it may be possible to record new populations within the distribution gap within Ghana.

The species appears to tolerate varied canopy cover forests. Areas where the species has previously been recorded have been classified as closed (60%-100%) or open (20%-60%). However, this is the first-time the species has been recorded in an open canopy forest with less than 20% forest cover as classified in the Technical Report of Ghana's forest condition (6).

Although this individual *A. laticephalus* was found on a muddy footpath, less than a kilometre from this location is a perennial shallow slow-moving stream. This confirms previous records that such areas are the most suitable habitats for the species. It also suggests that the species explores areas farther from riparian areas.

Threats to *A. laticephalus* in this reserve are similar to those found in the other forests where the species has been recorded. The most noticeable in this new locality is habitat degradation from logging and charcoal production which are unabated. Several big trees had been removed with many areas of the forest now dominated by shrubs.

Developments such as human settlements and roads in addition to mining have further fragmented and removed any wildlife corridors between Neung Forest Reserve and neighbouring forest blocks. Although *A. laticephalus* has been recorded only in pro-

tected areas, the persistence of these threats could lead to the drying up of swamps and wet areas required for survival. Currently listed as Near Threatened by IUCN, the rapid deterioration of the species' habitats, therefore, requires greater attention to protect its home ranges.

Acknowledgements

We express our profound gratitude to, Traffic and Environmental Network for giving us this opportunity to conduct the first herpetological study of Neung Forest Reserve.

References

1. N. E. Asseman, N. G. Kouamé, B. Tohé, G. Gourène, & M.-O. Rödel, *Salamandra* **42**, 41–51 (2006).
2. M.-O. Rödel *et al.*, *Salamandra* **41**, 107–127 (2005).
3. M.-O. Rödel *et al.*, *Zootaxa* **29**, 1–29 (2012).
4. H. C. A. Brown, F. A. Berninger, M. Larjavaara, & M. Appiah, *Forest Ecology & Management* **472**, 118236 (2020).
5. European Commission <https://dopa-explorer.jrc.ec.europa.eu/wdpa/40832> (2021).
6. IUCN, https://www.iucn.org/sites/dev/files/import/downloads/mapping_ghana_forest_reserve_condition_pre_publication_report_draft_july_2014.pdf (2014).
7. T. M Akabzaa, Ed., Boom and dislocation: the environmental and social impacts of mining in the Wassa West district of Ghana (Third World Network Africa, Accra, Ghana, 2000).

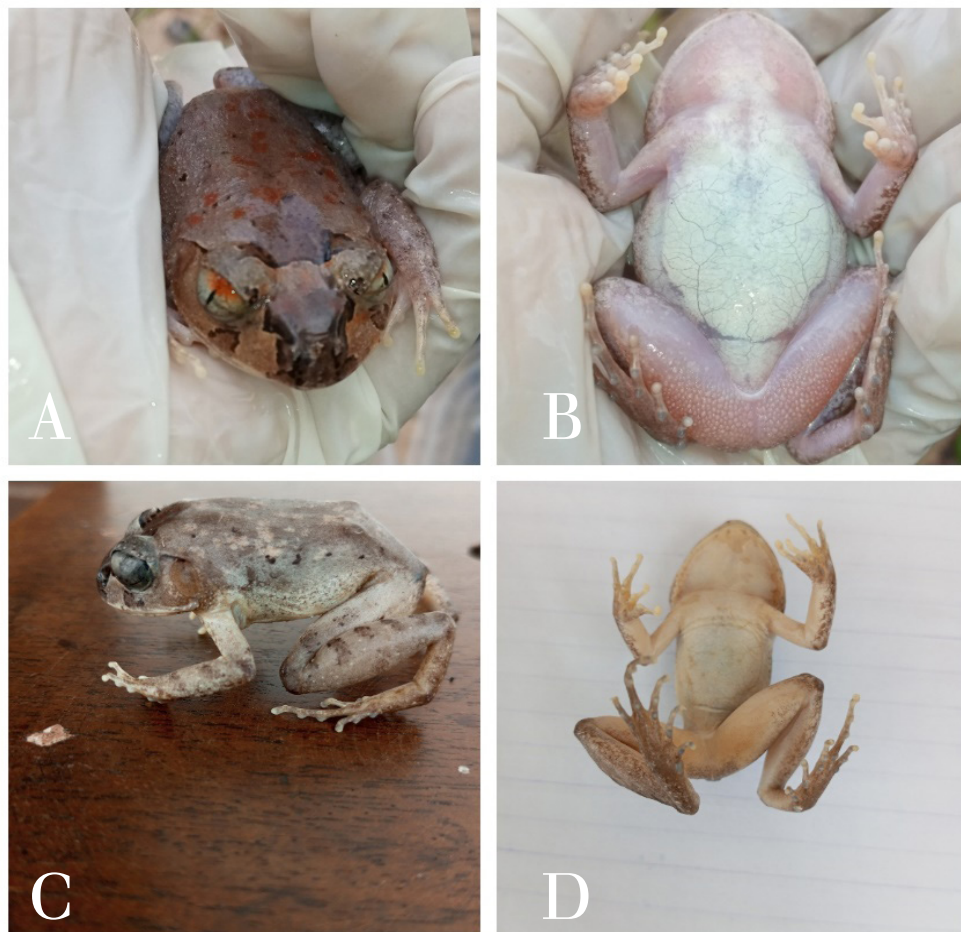


Fig. 2: *Stylosternus laticephalus* from Neung Forest Reserve: A & B- dorsal and ventral view when it was first caught and C & D- after 5 months in 70% ethanol.

Recognition and Recovery of the Large Brown Tree Frog (*Litoria watsoni*) following the Black Summer fires in South-eastern Australia

By Rena Gaborov¹, Michael Mahony², Marc Perri³, Louise Durkin⁴ and David De Angelis⁵

Much of the content in this article originally appeared in the February 2021 edition of the Frogs Victoria newsletter, "Pobblebonk".

For over two decades, ecologists have pointed to the declining number of observations of the Heath Frog or Littlejohn's Tree Frog (*Litoria littlejohni*), often referred to as the Large Brown Tree Frog in Victoria, Australia. This prompted the Conservation Biology Research Group at the University of Newcastle, led by one of us (M. Mahony), to examine its distribution and abundance in New South Wales. Genetic samples were collected as part of this process to help gain an understanding of the species' population ecology. Accumulation of material for the study was a slow process since observations of the frog, especially in the south of its range, were few and far between.



Fig. 1. *Litoria watsoni* in southern New South Wales. Photo: Matt Clancy.

Automated sound recorders were placed at 11 historic sites in New South Wales (NSW) for about 18 months, but only recorded *L. littlejohni* at three of those sites. Our observations returned similar outcomes and confirmed those made by field ecologists. Once tissue samples were collected from across the range, we conducted some preliminary genetic testing, which showed differentiation between northern and southern populations. However, before considering that the genetic differences were sufficient to recognise the frogs in the north and south as different species, it was necessary to apply a test of the evolutionary species definition. The test, in this case, was to ensure there was no evidence of gene flow where the southern and northern taxa meet. This was a difficult task since it was necessary to determine where the two taxa came close enough

or overlapped in nature and that evidence of gene flow was not occurring. It took several rounds of intense field work to close the geographic gap between the northern and southern taxa. This occurred at the southern boundary of the Sydney Basin bioregion where no evidence of gene flow between the southern and northern taxa was found.

Investigations of morphology and mating calls showed statistically significant mean differences between the species. However, because of overlap in measurements, none of these measures are particularly useful for field identification, and geography is the best way to determine species identity. We chose to name the southern species *Litoria watsoni*, also commonly referred to as the Southern Heath Frog or Watson's Tree Frog, (Fig. 1), in recognition of Dr Graeme Watson for his contributions to our knowledge of the evolutionary ecology of Australian frogs, including members of the same species group (1).

Sadly, our field studies, observations of museum collections, and a review of field records led us to conclude that both species are seriously threatened. The northern species, *L. littlejohni*, is somewhat

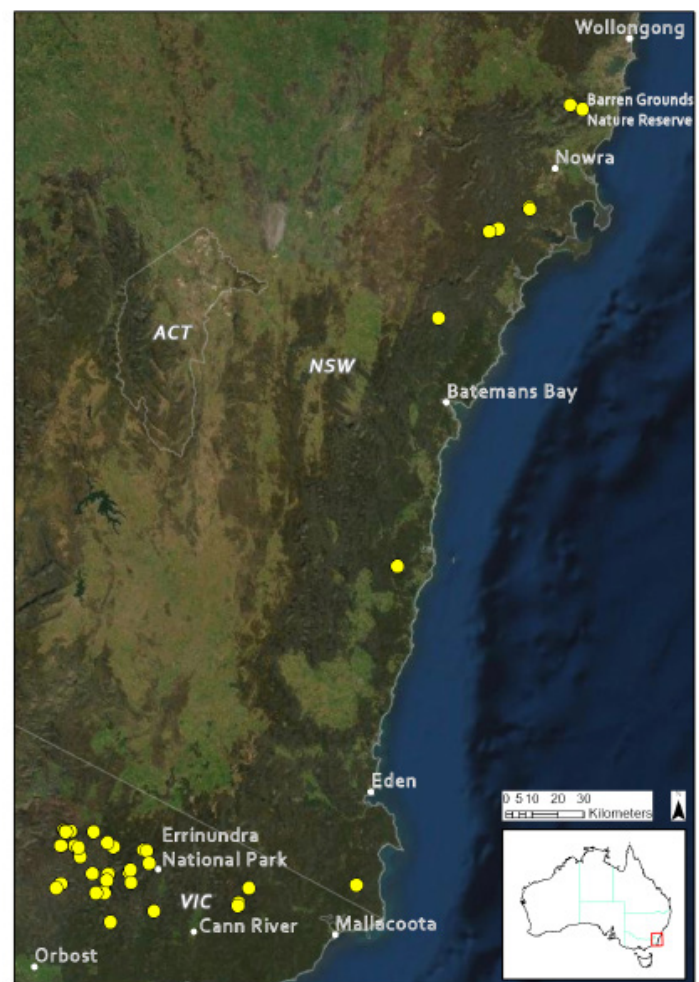


Fig. 2. Contemporary (post 2014) distribution of *Litoria watsoni*

¹Wildlife Unlimited (renagaborov@yahoo.com.au). ²School of Environmental and Life Sciences, University of Newcastle (michael.mahony@newcastle.edu.au). ³Department of Environment, Land, Water and Planning (marc.perri@delwp.vic.gov.au). ⁴Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning (louise.durkin@delwp.vic.gov.au). ⁵Frogs Victoria (d.deangelis@latrobe.edu.au).



Fig. 3. Breeding habitat for *Litoria watsoni* in NSW, burnt during the 2019-20 Black Summer fires. Photo: Matt Clancy.

of an enigma. In one relatively small area at the southern edge of the Sydney Basin it is reasonably abundant, while at the same time it has almost totally disappeared from the vast Greater Blue Mountains region, much of which is in a World Heritage Reserve.

The predicament for *L. watsoni* is similar. At the northern limit of its range there are several robust, but geographically restricted populations, and large gaps occur between these and isolated localities in southeast NSW and East Gippsland in Victoria (Fig. 2).

The fires of the 2019-20 summer burnt fiercely in the known habitat of several populations of both species (Fig. 3), and it will be some time before we can fully understand how they have been impacted.

In Victoria, *L. watsoni* had been rediscovered by one of us (R. Gaborov) in 2015 after not being recorded in the state since 1996 (2). Since then, several people have continued to search for the species as part of structured surveys funded by Victoria's Department of Environment, Land, Water and Planning (DELWP) and Zoos Victoria. There are now records from 37 sites and five known active breeding sites. The most significant of these is known as 'the log'; a large tree that was felled for road safety after wildfire in 2014. This log has held a pool of water since early 2015 and has supported successive clutches of *L. watsoni* tadpoles since then. However, chytrid fungus was discovered at this site in 2021 (previously not detected), and numbers of frogs, breeding and tadpoles have declined since.

Before the Black Summer fires in early 2020, DELWP's Arthur Rylah Institute for Environmental Research led a landscape scale project in East Gippsland to detect *L. watsoni* and improve habitat models for the species. Opportunistic surveying in spring and in early summer was also undertaken at sites where the species had

recently been detected.

The forest at Martins Creek Nature Conservation Reserve, home of 'the log', was severely bunt for the second time in seven years, but with trees still smouldering, remote audio recorders first picked up frog calls in less than two months after the Black Summer fire. Throughout 2020, tadpoles were found at four burnt sites post-fire, with three of the four sites considered severely burnt (death of the tree canopy). Tadpoles present at two sites resulted from late summer-autumn breeding, and tadpoles were produced from late winter-spring breeding at the remaining two sites. The sites were spread from Drummer Forest just east of Cann River, west to the eastern side of the Snowy River National Park.

Although only four breeding sites were identified after the Black Summer fires, this was not that different to pre-fire records. Apart from being rare, *L. watsoni* is also behaviourally very cryptic, and



Fig. 4. *Litoria watsoni* in amplexus at a breeding site on the Errinundra Plateau. Photo: Rena Gaborov.



Fig. 5. *Litoria watsoni* tadpoles found in December 2020. Photo: Rena Gaborov.

can be hard to find despite its preference for breeding in relatively accessible waterbodies such as roadside culverts and puddles.

Breeding has halted at one known burnt site on Mount Jersey. The site had *L. watsoni* tadpoles in December 2019, but the species has not been detected there post-fire and the site currently has no water. We know that adults have some mechanisms to survive the direct impacts of fire given some have persisted at other burnt sites, but further research is needed to find out what those traits are.

The indirect impacts of fire are typically unclear. In the two sites that had tadpoles in autumn 2020, one had no tadpoles in spring and there may have been a late winter breeding event at the other, but it dried out in late November. The former site was very dry when visited in early December, and was strangely much drier than in 2019 – which was a drier year on average and at the tail end of a drought. Similarly, the latter site had never been known to dry up since it was found in 2015. However, this site is ‘the log’ as mentioned above, which may have been compromised by fire. Alternatively or additionally, these sites may be drying because of increased evaporation due to decreased canopy cover and/or decreased ground water from vegetation regeneration post-fire.

These hypotheses would need further investigation, but do illustrate the lack of clarity of indirect impacts of fire on *L. watsoni*.

There are some *L. watsoni* sites on the Errinundra Plateau that did not burn. In 2020, frogs were found at three of these sites (Fig. 4) and two additional sites have had tadpoles (Fig. 5).

Since the species was rediscovered in Victoria, surveys have focussed on waterbodies close to roads, with most detections associated with roadside drains and culverts. These are known to be unreliable breeding sites as they fill with sediment and are prone to human and vehicle disturbance.

As managers of biodiversity and landscape values within Victoria, DELWP evaluated risks to *L. watsoni* and subsequent actions to improve outcomes for the species in the state. Some of the usual strategies involve establishing 30 hectare land protection areas around known populations by changing Forest Zoning statuses. DELWP also developed processes for field and road maintenance staff to assess waterbodies for signs of frogs, eggs and tadpoles before starting any works. While these activities help, one predominant issue remained; frog eggs and tadpoles at a number of sites have never completed their lifecycles by transitioning to adults.

Several ideas were discussed such as translocating eggs to more appropriate water bodies, digging ditches in the bush with machinery, carving fallen trees to mimic habitats like ‘the log’, and constructing artificial ponds.

In 2017, Tony Mitchell with the DELWP Natural Environment Program team at Orbost constructed a prototype design of artificial breeding habitat using a sheet of corrugated iron supported on a frame to feed water into a plastic tub; a self-sustaining frog pond! Rocks and logs were then added, as well as a wire grate to minimise the risk of predation (e.g. from birds feeding on tadpoles), and prevent other species such as the introduced Sambar Deer from using the tubs to drink. Tony set this up in his backyard and, encouragingly, within days recorded Peron’s Tree Frog, *Litoria peronii*, using it.

DELWP received funding to build 12 of the prototype models, partnering with Moogji Aboriginal Council in Orbost to construct the artificial ponds near sites where *L. watsoni* had recently been observed (Fig. 6). By June 2018, twelve breeding structures had been installed, and we soon began to see and hear Large Brown Tree Frogs near them.

It was November 2019 when we knew the tubs were working; one



Fig. 6. An artificial breeding structure that survived the 2019-20 East Gippsland fires. Photo: Tony Mitchell.



Fig. 7. Adult *Litoria watsoni* climbing out of artificial breeding structure. Photo: Rena Gaborov.

tub had *L. watsoni* tadpoles and two tubs had adult frogs present (Fig. 7). Mimicking the habitat provided by 'the log' had worked!

This success was unfortunately short lived. The 2019-20 fires in East Gippsland burnt 11 of the 12 sites, destroying nine tubs. DELWP began prioritising the replacement of these tubs as part of the Victorian Government's Bushfire Biodiversity Response and Recovery funding. DELWP has since worked with the Moogji Aboriginal Council to build 27 new artificial breeding habitat structures for the species. Building upon the documented success of the pre-fire trial, it is vital for the species' survival to increase the opportunity for successful breeding in the field and in turn, increase the known population in its native habitat.

Testing of *L. watsonii* (and other frog species at known *L. watsoni* sites) between 2015 and 2022 has detected chytrid fungus at 28% of sites. The pathogen is present across the east-west breadth of *L. watsonii*'s range in Victoria. With contiguous forest habitat between all sites, it is likely that this threat is at work across the species' range, and could be contributing to population declines. Recent genetics work on *L. watsoni* in Victoria has revealed very low genetic diversity, approximately half that of populations in the neighbouring state of NSW, with very few individuals contributing to the genetic pool, and elevated signatures of inbreeding. Acoustic monitoring of known sites over the past three years provides sobering evidence of continuing decline; calls were recorded at 8 out of 18 (44% of) monitored sites in 2019-20, but at only 4 out of 29 (14% of) monitored sites in 2021-22.

Zoos Victoria are also currently working on facilities to establish a captive population, which will hopefully be a focus of future updates on the species' recovery.

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References

1. M. Mahony, *et al.*, *Zootaxa* **4858**, 201–230 (2020).
2. G. Gillespie, E. McNabb, R. Gaborov. *Vic. Nat.* **133**, 128–138 (2016).

ASG News

For the last three years the ASG has been working to update the Amphibian Conservation Action Plan (ACAP). The current ACAP differs from previous iterations in that it comprises two companion documents, 1) a status review, or synthesis of current knowledge, identifying broad priorities, gaps and opportunities for conservation, and 2) a much shorter, multilingual and user-friendly document, aimed at distilling the key points from the status review and making them available to a broader audience. In July 2022 the ASG held a public consultation process of the ACAP Status Review, aiming to provide an opportunity to everyone with an interest in amphibian conservation to provide input into the development of the global plan. Since then, feedback has been collated and sent to chapter authors, and we are currently in the process of collating revised chapters to send a new draft out for formal peer review. After the peer review process, feedback will once again be sent to respective chapter authors for any further revisions. Revised chapters will then be assembled into a final version that will be sent for graphic design, after which there will be a chance for final corrections prior to the official launch of the Status Review. The ASG is very grateful for all of the feedback generously provided through the open consultation, by everyone with an interest and concern for amphibians. The Status Review is truly a collaborative effort that has involved over 100 authors from all corners of the globe. We see the updated ACAP as a key development in helping to move the needle on global amphibian

conservation, and we look forward to working with the global amphibian conservation community to achieve this goal.

We are proud to announce that the Amphibian Red List Authority (ARLA) has finalized the Second Global Amphibian Assessment (GAA2) after seven years of intense and dedicated work. Covering 8,011 species, the GAA2 not only provides an important update on the findings of the first GAA, but also includes first time extinction risk assessments and associated data for 2,286 species, constituting a 40% increase in the number of assessed species from the first GAA. Many of the updated assessments are already available on the IUCN Red List of Threatened Species™ but all remaining assessments are scheduled to be published on the Red List in 2023. The ARLA team are currently working on a manuscript analyzing the results and findings of the GAA2. The ASG is thankful to all ASG members and colleagues who contributed to this important milestone and of course to its ARLA for their leadership, determination and innovation over the years.

Finally, we are very pleased to announce that ASG Deputy Chair Amaël Borzée has now been officially designated as ASG Co-chair by the SSC Chair and the SSC Steering Committee, following a proposal tabled and approved by the ASG Secretariat. Amaël has been an extraordinary Deputy Chair and his designation as Co-chair is much deserved. Please join us in congratulating Amaël!



ASG

IUCN SSC
Amphibian
Specialist Group

Metal Band “Escaping Aghartha” Supports Amphibian Conservation!

By Avery Dart



Escaping Aghartha started out as a one-man band, but recently I’ve begun recruiting help from musician friends from around the world to actualize the full potential of the music I write. Similarly to conservation efforts, a team of people with diverse backgrounds and skills can make something far more impressive when working in unison than any one person alone.

When I start brainstorming ideas for an album theme, I consider a few factors - is the topic relatively obscure in popular culture, how much lyrical material can be crafted from the main album theme, and how severe is the environmental issue. The ongoing amphibian extinction checked all these boxes. For the album *Croak*, some

dire and more desperate in mood, transitioning seamlessly to *Into Extinction - II* which is harsh, grating, and bleak.

Through this experimental song structure, I aim to show people how it is important to take action early when it comes to environmental issues. It is easy for things to slowly change, almost imperceptibly, until you stop and think “How did the situation become so severe and dire?” *Croak* explores biological concepts such as how amphibians are indicator species and how their declines signify that the overarching environmental health of our planet is poor. Our ecosystems are croaking and change is too slow to prevent further ecosystem deterioration.



I chose the IUCN SSC ASG as the recipient of the sales from *Croak* for two reasons. First, their surveys of amphibian species, especially in relatively remote and poorly-surveyed areas are of great value. It is impossible to conserve a species if it is not scientifically described and it is equally impossible if there are no basic data. Secondly, the Amphibian Conservation Action Plan (ACAP) lays out a clear route for conservation efforts. Recently, I learned that the ACAP is being updated to be more user-friendly and that the ASG conducting an open consultation for the first part of ACAP, a status review of current knowledge. I applaud these changes as it is critical for scientific information to be accessible and easily understood by people of all backgrounds. For these reasons I’ve decided to donate all the profits in the first month to the ASG.

“Croak” was released April 19th, 2022. Now streaming on all platforms.

of the song themes are very straightforward, while the songs *Perpetual Decline - I* and *Into Extinction - II* are abstract in theme. They symbolize how extinction events, climate change, and habitat loss usually happen rather slowly compared to our human lifetimes. These events can take decades to fully develop into the full-blown emergencies that they currently are. *Perpetual Decline - I* starts with a hopeful mood, and a repetitive guitar riff is present throughout the song. But as the other instruments come in, it becomes more



Reinforcing Capacity for Urgent Mountain Frog Conservation in the Highlands of Cameroon

By Thomas Doherty-Bone

In 2011, endemic frog species that were common to Cameroon's mountains suddenly disappeared. This included numerous Puddle Frogs (*Phrynobatrachus* spp.), historically so numerous that one had to avoid treading on them. Numerous species of Small-tongued Toad (*Werneria* spp.) and Long-fingered Frog (*Cardioglossa* spp.) had also disappeared. Monitoring the same sites and searching complementary sites through to 2018 showed these disappearances were not temporary. The RZSS African Amphibian & Reptile Program had been working to understand and protect the unique amphibians of Cameroon's mountain ranges for over a decade, including training of Cameroonian amphibian conservation biologists. The collaborative research findings are still uncertain, though a combination of habitat loss, chytridiomycosis and climate change are major factors to address. Research was turning into action, to improve habitat protection, and to prepare emergency captive-breeding and rearing facilities.

Tragically, a civil war started across the majority of Cameroon's mountain ranges, which stunted work in 2018, even directly impacting several team members. This still left some mountains in areas unaffected by hostilities, but while we regrouped in 2019 ready for a 2020 campaign, the Covid-19 pandemic hit us. The hiatus of dedicated effort to continue the conservation program for endemic mountain amphibian species in Cameroon has caused a disruption for training of Cameroonian amphibian conservationists. While there is the case to leave them to continue on their own to work things out for themselves, the urgency of this crisis means the collaborative efforts needed to continue.

The 2021 ASA Start-up grant has enabled resumption of these efforts in Cameroon to consolidate the drive to stop and reverse these mountain amphibian population crashes. This enabled reunification of the field teams, visiting of new sites that could potentially hold remnant amphibian populations, engagement with com-

munities for these sites, and plan for how and where to set up an amphibian husbandry centre. These included liaising with Arnaud Tchassam at Mount Bamboutos, where he has been continuing his doctoral research to protect what is left of the montane forest, that still holds populations of Critically Endangered Bamboutos Egg Frog (*Leptodactylodon axillaris*) and Endangered Perret's Egg Frog (*L. perreti*), as well as the "Oku" Long-fingered Frog (*Cardioglossa oreas*) still holding on. Among others, the project also liaised with doctoral researcher at University of Yaoundé I, Marina Kameni, on Mount Manengouba. Training was provided on measurement of habitat characteristics, to enable data collection on forest and water quality for both restoration and captive breeding targets. This included use of GIS to map extent of forest and other habitats. Experience was shared on how to engage with local stakeholders for more sustainable programs. Mountains previously unsurveyed were visited, with introductions to local stakeholders. Discussions are underway with local authorities on the suitability for constructing breeding facilities, with resources being sourced. A significant part of the work is assessing the security situation, in collaboration with local communities and authorities in various field sites. Work is ongoing, but this grant has enabled a rejuvenation of work that was interrupted by the pandemic.





Photo: Umar Fhadli Kennedi.

Developing a Conservation Strategy for the Endangered Trilaksono's Bush Frog (*Chirixalus trilaksonoi*)

By Nathan Rusli and Umar Fhadli Kennedi

Indonesia is a megadiverse country and is home to numerous endemic amphibian species, many of which are now threatened. However, unlike orangutans and other charismatic species, threatened amphibians have attracted little attention or resources for conservation in this region. In recent years, capacity within Indonesia to undertake biodiversity research and implement conservation actions has been growing, and organizations such as the Indonesia Herpetofauna Foundation are playing an important role through these kinds of projects, including student training and community engagement. This present project is currently the only targeted amphibian conservation initiative in Indonesia.

The Trilaksono's Bush Frog (*Chirixalus trilaksonoi*) is a species of amphibian endemic to West Java. It was described in 2014 as *Chirromantis trilaksonoi*, before a taxonomic revision that moved it to the genus *Chirixalus*. The species epithet of this frog is in honour of museum technician Wahyu Tri Laksono, who discovered the holotype in his backyard in 2013.

To date, this frog is only known from three locations in West Java. All these locations are disturbed (e.g., agricultural land), and not inside protected areas. Out of the three known locations, two of them have been converted into residential estates. In the late 1980s, many of these frogs were found in a wetland area in Bogor, which has now been turned into Billabong Estate. The Trilaksono's Bush Frog is now threatened by habitat destruction and pesticide use.

During various surveys from 2017-2020, we have detected several other sites where these frogs still occur. However, all these sites are located in human habitation/agricultural areas, which could be wiped out at any moment. With the considerations above, it is extremely urgent to kickstart a conservation project for this species, with three initial steps: 1) conduct research on the distribution and ecology of the Trilaksono's Bush Frog, in order to obtain baseline data to best devise a conservation action plan; 2) raise awareness and educate the public about these frogs, especially in areas where they occur; and 3) monitor wild populations of this species when (or if) possible. The possibilities will depend on whether wild populations still exist, and if we manage to obtain sufficient funding for the project.

INDONESIA
HERPETOFAUNA
FOUNDATION



Photo: Lucas Bustamante.

International and Local Conservation Groups Condemn Ecuadorian Court's Decision to Allow Copper Mining in Intag Valley Cloud Forests

By Devin Murphy

A group of 12 international and local research, conservation and environmental organizations has condemned an Ecuadorian court's decision to allow copper mining in Intag Valley, a biodiversity hotspot in the Andes mountains. In response to a request from a legal team representing local communities, the judge presiding over the case declined, on March 16 to issue a written explanation providing more detail on his reasoning behind the original February ruling. The legal team representing local communities in Intag Valley has argued that the mining concession violates the constitutional rights of local communities to consultation and the rights of nature, and it plans to appeal the Cotacachi canton court's decision.

"The judge of Cotacachi didn't analyze the minimum standards for protection of humans and natural rights that we demand in this case, generating a serious violation of the rights enshrined in the constitution and judgments of the constitutional court of Ecuador," said Gustavo Redin, a lawyer arguing the case on behalf of local communities.

The cloud forests of Intag Valley are home to dozens of critically endangered species, some of which are not found anywhere else in the world, and it includes the Intag-Toisan Key Biodiversity Area (KBA). KBAs are critical to the persistence of life on earth.

The Longnose Harlequin Toad (*Atelopus longirostris*) is one of the species found only in Intag Valley, and specifically in the Llu-

rimagua mining concession. The toad was believed to be extinct until it was unexpectedly rediscovered in 2016. Despite being rediscovered in the Lluvimagua copper mine's concession, the long-nose harlequin toad was not included in the environmental impact assessment for Codelco, the Chilean state-owned mining company leading the mining project, along with Empresa Nacional Minera del Ecuador (Enami), Ecuador's state-owned mining company.

An independent partial survey of amphibians living in the Lluvimagua mining site by Jambatu Amphibian Research and Conservation Center found 22 species of frogs living in part of the concession area, but the center believes that there could be closer to 100 species. After the rediscovery of the longnose harlequin toad in 2016, the Jambatu Center led a rescue effort to bring a few long-nose harlequin toads into a conservation breeding program with the hope of one day reintroducing the species to the wild.

"If you don't fight, then you have already lost," said Andrea Terán-Valdez, collections manager at Jambatu Amphibian Research and Conservation Center. "We have to try. We have to keep on trying. We are doing our part, the community is doing their part, and we need the courts to honor the rights of nature. Otherwise, we will all lose."

The Longnose Harlequin Toad was believed to have been driven to extinction in the late 1980s by climate change and a deadly disease caused by the chytrid fungus. The same has happened to



many other harlequin toads, amphibians that breathe through their skin and are extremely sensitive to changes in their environments.

A new species of rocket frog discovered in Intag Valley has been named “Rana Cohete Resistencia de Intag,” which translates to “Intag’s Resistance Rocket Frog” in English. The frog was discovered in an area of Intag Valley that is slated to be destroyed for the Llurimagua mining project. The name was chosen in a public online vote and revealed May 4, in celebration of International Amphibian Week. “This little rocket frog’s name is proof that communities in Intag are not ready to give up,” said Lina Valencia, Andean countries coordinator, Re:wild. “The best chance we have to address the climate crisis, the extinction crisis and to safeguard human health is to protect endangered species and the places they live. Amphibians throughout Ecuador’s tropical Andes need to be protected from threats like mining.”

“At a time when the green energy transition is in full swing, rapidly increasing demand for key metals, such as copper, it is essential that humanity become aware that the demand will drive human rights abuses, contaminate rivers in perpetuity, and extinguish species, such as the Intag Resistance Rocket Frog, unless we all do something to prevent it,” said Carlos Zorrilla, co-founder, Defensa y Conservación de Intag.

In the meantime, local communities asked people around the world to stand in solidarity with them by voting on a potential name for the species of rocket frog discovered in 2019. Since voting opened on March 22 1,878 votes were cast. The winning name “Rana Cohete Resistencia de Intag” received nearly 84% of votes. The name represents hope that the Ecuadorian government will recognize the rights of communities and of nature by canceling the concession. The other name, “Rana Cohete Condenada”, means “Doomed Rocket Frog” and represents the Cotacachi canton court’s decision to destroy the frog’s home and endanger the biodiversity of all of Intag. It received a little more than 16% of votes.

Intag Valley is home to thousands of species that are threatened with extinction in addition to amphibians like the Longnose Harlequin Toad and the newly discovered unnamed species of rocket frog. Those species include mammals, from the critically endangered brown-headed spider monkey to the vulnerable Andean bear; several species of birds, including the critically endangered black-and-chestnut eagle and the endangered ground band-cuckoo; and many species of rare orchids.

Species don’t often get a second chance, especially harlequin toads. A mining concession would be disastrous for fragile species like the Longnose Harlequin Toad.

An environmental impact assessment conducted for Codelco and Enami EP, did not include all of the threatened and endangered species in the Llurimagua mining concession, nor did it include information on how mining could affect water sources that local communities depend on.

“Given the steep terrain of the mining area, the high rainfall, toxic makeup of the ore body, plus the primary cloud forests which protect dozens of endangered species and no less than 43 sources of rivers and streams, this mining project will turn out to be one of the world’s worst environmental catastrophes, if we allow it to go forth,” said Carlos Zorrilla, who has been supporting local communities’ case against the Llurimagua mining project.

The legal team representing communities in the case against Codelco and Enami EP had hoped that the legal precedent set by a case involving another protected forest in Intag Valley would affect the Cotacachi canton court’s decision about the Llurimagua mining project. Los Cedros Reserve won an historic victory in Dec. 2021 that determined mining concessions in that protected forest violated the rights of nature, which are protected by Ecuador’s constitution.

However, in February, after 75 hours of hearings over 9 days and 42 amicus briefs totaling 37,000 pages submitted to the judge, the Cotacachi canton court ruled after less than a day of deliberation that the neither the Llurimagua concession nor the planned mining activities violated the rights of nature or communities’ right to consultation about projects that could affect the environment. In its decision, the court decided that communities were not entitled to full reparations for any damage caused by activities within the concession. It also ruled that Enami and Codelco don’t have to stop the project.

The Llurimagua mine is the latest in a long history of mining projects in the region. Intag Valley has been the target for mining since the 1990s when a Japanese company initially planned to mine the area for copper. In the 27 years since the first mining concessions were granted without prior consultation, local communities have been fiercely opposed to mining. They have said that they were never consulted about Enami and Codelco’s mining plans, which is required under Ecuador’s constitution. Community resistance to mining in Intag Valley is the longest in Ecuador’s history.

Due to the predicted environmental impacts and lack of prior consultation, the Cotacachi canton court’s recent ruling on the Llurimagua concession has angered community members.

“If the mining that is proposed here in Ecuador, here in this specific place, in Llurimagua, if allowed, for me it would be devastating because they have to remove the entire layer of soil from the place,” said Cenaida Guachagmira, who lives in Cerro Pelado and is against the mining concession, and whose parents protested against earlier concessions. “The mining that is proposed here is large-scale, open-pit mining, so that is indeed a conditioning factor to turn all the biodiversity that I know of and that my future generation could not know into a desert.”

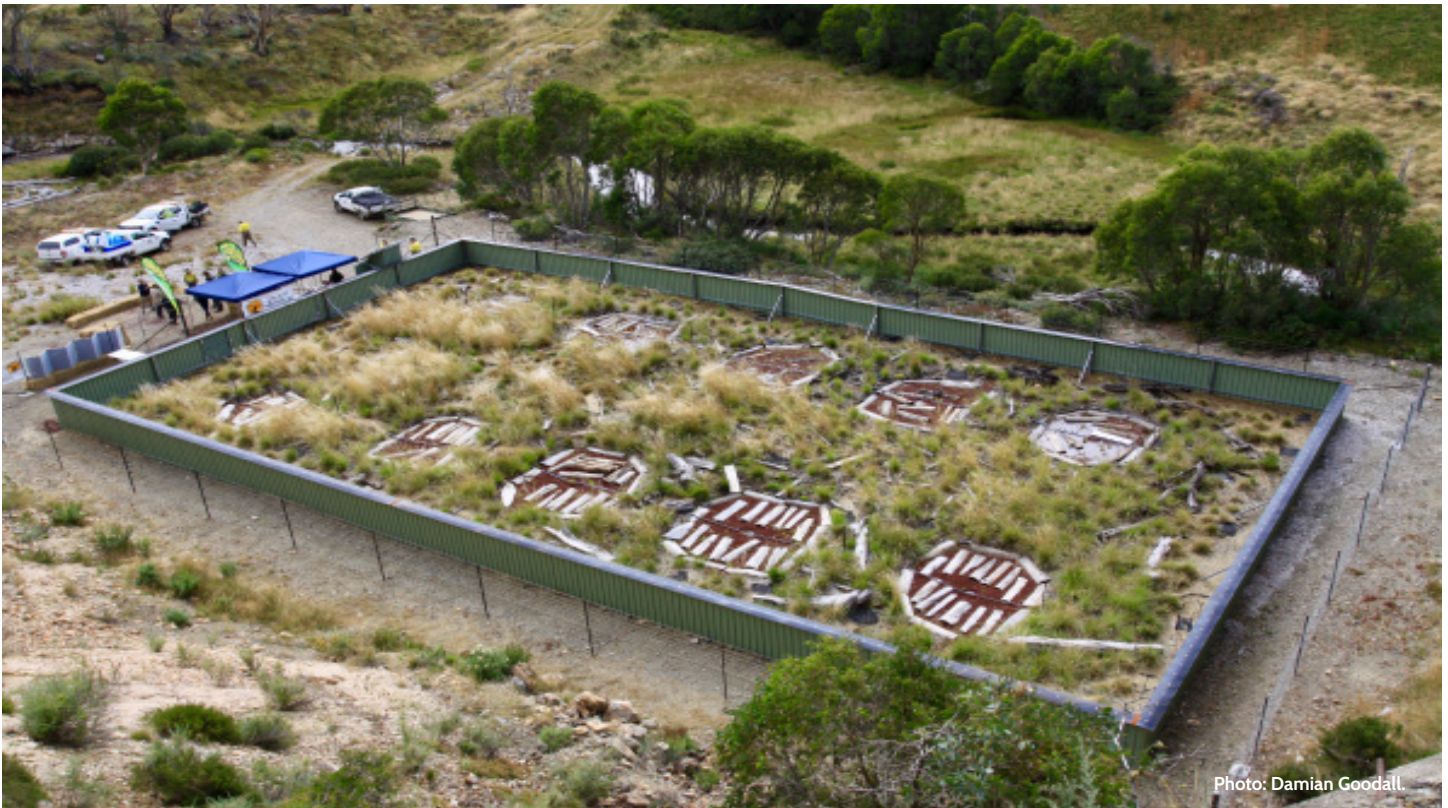


Photo: Damian Goodall.

Update From Zoos Victoria, Australia

By Chris Banks

In what is believed to be the first captive breeding of any species in the genus *Notaden*, Melbourne Zoo has bred the Holy Cross or Crucifix Frog (*Notaden bennetti*). Known for its distinctive multi-coloured cross-like arrangement of dots on its back, against a background of bright yellow or pale brown, this is one of Australia's most stunning little frogs. A fossorial species, with adults reaching 65mm in length and found throughout Western New South Wales and South-western Queensland, individuals are typically only encountered after heavy rainfall when they come to the surface. Melbourne Zoo has housed a small group of this species since 2009 and after many attempts, achieved successful egg laying in February 2020, followed by a further egg mass in January 2022. Thirty frogs are being raised on a diet of termites and small crickets and are growing well.

As part of the ongoing recovery program for the Southern Corroboree Frog (*Pseudophryne corroboree*), 100 frogs bred at Melbourne

Zoo and Taronga Zoo were transferred to Kosciuszko National Park in southern New South Wales for release into a newly-built field enclosure. Much of the Park was devastated by the 2019/20 fires and only about 30 frogs remain the wild. The enclosure measures approximately 15m x 30m, with a 1.5m high colour-bond perimeter wall (topped with a rubber overhang to prevent predator incursion) and a 1.8m wire feral herbivore-proof fence 2m outside the wall. The perimeter wall and fence are dug into the ground as an additional predator deterrent. The enclosure has been built with the risk of further fires in mind – an in-built sprinkler system, a surrounding substrate of fire-resistant rocks, 10 smaller areas of scoria and in-ground timber that provide extensive cavities for shelter, and an automated alarm system to alert National Park staff in the event of major fire. The recovery program is a collaboration between Taronga Conservation Society of Australia, Zoos Victoria, NSW National Parks & Wildlife Service and the NSW Government's Saving Our Species program.



Photo: Damian Goodall.

ZOOS
VICTORIA
Fighting Extinction

A Second Chance: *In Situ* Conservation of the Critically Endangered Jambato Harlequin Toad (*Atelopus ignescens*) Through Local Community Involvement

By María del Carmen Vizcaíno-Barba, Juan M. Guayasamín, Luis A. Coloma, David Parra Puente & Andrea Terán Valdéz

The main causes for amphibian population declines include infectious diseases, climate change, and habitat destruction. In the Neotropics, harlequin toads (genus *Atelopus*) have suffered the most alarming population crashes with more than 80% of the species classified as Endangered or Critically Endangered. The most dramatic example of amphibian declines in Ecuador is the Jambato Harlequin Toad (*A. ignescens*), which was historically abundant, but suddenly disappeared in the late 1980s, when it was considered as possibly extinct (last record in March 1988). In 2016, a small population was reported in a remote location by David Jailaca, a 12-year-old boy, a story that attracted a great deal of media attention. Thus, this emblematic species exemplifies the amphibian crisis in Ecuador, but also the hope for its recovery.

Since then, an emergency captive breeding program led by the Centro Jambatu for Amphibian Research and Conservation has been carried out, but no *in situ* conservation efforts have yet been made. Therefore, research was conducted by FLACSO-Ecuador to identify potential socio-environmental conflicts and opportunities to develop effective conservation strategies. A rapid ecological diagnosis and a series of interviews with the different stakeholders were carried out. We found that the area is strongly influenced by human activities and potential threats to the survival of the species were identified, such as habitat fragmentation, reduction of breeding sites, and predation by introduced species.

However, important opportunities were also identified for the development of an integrated conservation plan to revalue the rural Andean landscape as a habitat for the Jambato and as a livelihood for human communities. These include the generation of ecological corridors, the rescue of traditional agroecological practices, nature tourism, and the implementation of instruments and public policies in close coordination with local authorities and grassroots community structures. Thus, we face the challenge of understanding the population dynamics of the surviving species, while working with a community-based approach to establish a relationship of trust with the local community, through a transparent and collaborative effort for its conservation. To this end, as a first step, we have already established relationships with the local community, which will be part of all components of the project.

In this project, our intention is to work very closely with the people who live with the species, so that they become our best allies in the long term, as the social and cultural contexts are essential for the success of any initiative designed for sustainable biodiversity conservation. It is puzzling how the Jambato has survived in this Andean valley and gone extinct from, as far as we know, all other historic localities. Thus, we also need a focus on the ecology, diseases dynamics, and local adaptations of the species. With this information at hand, we aim to identify key strategic actions to ensure its conservation, such as habitat protection and restoration, reintroductions, or translocations. Our project also includes a first



Photo: Luis Coloma.

approach to include economic alternatives, such as agroecology and nature tourism, that benefit the livelihoods of the people while protecting and improving the habitat of the Jambato. This project is also part of Alianza Jambato and the *Atelopus* Survival Initiative.



Building Partnerships and Ponds for the Anamalai Flying Frog in Western Ghats



Photo: Rajdeep Das.

By Sethu Parvathy

Conservation action in India has been by means of declaring Protected Areas which are representative of biodiversity. Only a fraction of the Western Ghats is protected but it is contiguous with the production landscape of cardamom and tea plantations, as well as habitation areas. These plantations have become a critical part of the ecosystem providing refuge to animals especially during seasonal movements. They also harbor resident populations of endemic fauna. These plantations have even become key breeding habitats, as in the case of the Anamalai Flying Frog (*Rhacophorus pseudomalabaricus*).

The fluctuation in cardamom and tea prices have resulted in the owners adopting non-traditional and chemical dependent management of the plantations to increase yields. They have also started planting sun-tolerant varieties of cardamom by removing the large trees which provided shade to traditional cardamom varieties which needed it for optimum yield. Addressing this, Wildlife Trust of India's (WTI) amphibian recovery project has been monitoring known breeding sites of the Anamalai Flying Frog and liaising with the plantation owners to adopt frog-friendly practices on their plantations.

One of the two ponds created in Windermere Estate saw a foam nest after nine months of installation during the last monsoon. Apart from the foam nests, we encountered metamorphs of the species resting on the surrounding vegetation. Though the ponds were specifically created for Anamalai Flying Frogs, the ponds were occupied by the Meowing Night Frogs and its tadpoles, as well as the Mountain Dot Frog (*Uperodon montanus*).

In January, we observed Dot Frog egg masses lining the pond walls in the water like tiny bubble wrap bundles. Indian Bull Frog (*Hoplobatrachus tigerinus*), Sreeni's Golden-backed Frog (*Indosylvirana sreeni*), Common Indian Toad (*Duttaphrynus melanostictus*), Beddome's Bush Frog (*Raorchestes beddomi*), Ponmudi Bush Frog (*Raorchestes ponmudi*), Dubois' Bush Frog (*Raorchestes dubois*), and the Indian Tree Frog (*Polypedatus maculatus*) were all seen using the pond or seen occupying the bushes and shrubs around the pond.

In addition to frogs, the pond habitat is also being used by many insects including dragon flies and damsels, with the surrounding vegetation being occupied by Anamalai Spiny Lizard (*Salea anamalaiyana*), and Elliot's Forest Lizard (*Monilesaurus ellioti*).

After observing the success of the ponds, we have initiated the construction of two additional ponds in two other plantations. Now we wait for the next monsoon when it is hoped that these ponds will have more nests, eggs, tadpoles, and frogs. And by then, our interactions with the plantation workers and management will also ensure that these frogs are welcomed, and they agree to make changes to their management regime.





Photo: Asociación Pro Fauna Silvestre Ayacucho.

‘Ultu’ Project: An Initiative for the Conservation of Threatened Amphibians of the Puna and Montane Forests of Ayacucho, Peru

By Victor J. Vargas^{1,2,5}, Yorka Aguilar^{1,2}, Joe Roca^{1,2}, Vladimir Díaz^{1,2}, Kimberly Ñaccha^{1,2}, Kevin Rivera^{1,2}, Adamelita Quispe^{1,2}, Nancy Quispe^{1,2}

A sociación Pro Fauna Silvestre, Ayacucho has been implementing the ‘Ultu’ project, whose objective is to inventory and monitor threatened amphibian species in the central Andes of Peru, specifically in the department of Ayacucho. The project area is located in high Andean peasant communities that suffered from the armed violence that hit Peru over the past decade. These communities were especially affected, and many people, including adults, elderly, and children, were killed. Currently, they are rebuilding their lives, returning to their homes and their small agriculture activities, living in a difficult situation, forgotten by the state and at the mercy of a new threat, drug trafficking.

‘Ultu’ is a Quechua word meaning “tadpole or larva”. The local people see the amphibians in their puddles and streams and think of the tadpoles as a different type of animal than adult frogs or toads. Unfortunately, today amphibians are rarely seen due to threats.

The activities being implemented in the ‘Ultu’ project are:

(1) Environmental education and awareness on the conservation

and importance of amphibians. For this, talks were organized for elementary and primary school students in the rural communities of Tircos, Chullas and Putis. This activity was called ‘Among toads and frogs, knowing to conserve’. They were given information on the ecology, reproductive cycle, habitat, importance and threats of the amphibians present in their area. With the help of didactic



Photo: Asociación Pro Fauna Silvestre Ayacucho.

¹Asociación Pro Fauna Silvestre - Ayacucho. ²Colección Científica Pro Fauna Silvestre, Ayacucho. ³IUCN SSC Amphibian Specialist Group – Peru (ASG Perú).



Photo: Asociación Pro Fauna Silvestre Ayacucho.



Photo: Asociación Pro Fauna Silvestre Ayacucho.

materials such as photographic guides, brochures and videos, we organized painting and drawing contests on amphibians of the zones, and handicrafts based on colored plasticine, among other activities. We also organized the photographic exhibition 'Amphibians and reptiles of the department of Ayacucho, knowing to conserve' to inform the population about the diversity of amphibians and reptiles in this part of Peru, as well as to demystify some myths and legends about these animals. In addition, information was disseminated through social networks and written and radio media.

(2) Field trips to study threatened amphibians and reptiles in the montane forests and the puna to inventory and initiate monitoring of the status of their populations, and to learn about the presence

and impact of the chytrid fungus. Standardized methodologies were applied for the development of the activities. The field trips made it possible to learn about the little-explored diversity of these ecosystems, discovering new species for science and expanding the range of distribution of others. The information gathered will allow us to monitor these species in the long term.

The 'Ullu' project, funded by ASA partner Synchronicity Earth, also allowed us to strengthen our organization, both administratively and legally. This support allowed us to improve our conservation activities in this part of Peru. Our project is now entering a second stage and will allow us to expand our range of interventions in favor of biodiversity conservation in this part of Peru.



Asociación
Pro Fauna
silvestre
Ayacucho-Perú



Photo: Bivek Gautam.

Community Based Himalayan Salamander Conservation at Himalayas of Nepal

By Bivek Gautam

The Himalayan Salamander (*Tylototriton himalayanus*) is distributed outside the protected area systems in the human-dominated landscape of eastern Nepal. After the implementation of Nepal's Federal Government system, the Province-1 government and local governments have prioritized infrastructure development and tourism promotion in the distribution area of the Himalayan Salamander. Wetlands of this region are facing unsustainable development pressure. The species is threatened by habitat destruction/modification, release of exotic fishes, introduction of recreational boats, and pollution of most of its breeding grounds (wetlands).

In this context, the Biodiversity Research and Conservation Society (BRCS) realized the immediate need of an educational program to conserve the population of this locally threatened species. This project will advertise the presence of the salamanders across the region and engage local community in wetland and habitat conservation. Conservation educational programs will be conducted at local schools and communities, and a conservation capacity building workshop is planned for stakeholders and local authorities to help them adopt sustainable development practices.

The BRCS is a non-governmental organization registered in 2018 with the Government of Nepal under the Social Council Act (1992). We are an independent non-profit organization, actively working on research and conservation of different aspect of biodiversity. Since herpetofauna is one of our major interest areas, we organize regular herping activities, including survey and monitoring of amphibians and reptiles in Nepal.



Photo: Bivek Gautam.



A Conservation Project for the Three-colored Harlequin Toad (*Atelopus tricolor*), a Jewel in Bolivia



Photo: Patricia Mendoza-Miranda.

By Patricia Mendoza-Miranda

The Critically Endangered Three-colored Harlequin Toad (*Atelopus tricolor*) was known from the eastern Andes of Peru and Bolivia where it was once a common species. However, as with many other species of harlequin toads elsewhere, *A. tricolor* has suffered huge population declines and has not been recorded since 2003. Almost 17 years later and after dedicated several surveys by some biologist in Bolivia, in January 2020, four individuals were found in a province of La Paz, Bolivia. This area remains the only site in Bolivia where the species can be found.

This province of La Paz unfortunately, is affected by anthropogenic factors especially rapid deforestation, where natural areas are now being replaced with urbanizations, coffee and coca production, contamination and flow reduction of the streams. All these factors were identified during fieldwork, from December 2020 to November 2022, by Bolivian Amphibian Initiative (BAI).

At the same time, BAI are working in conservation actions aimed at protecting this local population of *A. tricolor*. By working jointly with local people who coexist with *A. tricolor*, we are helping them to revalue the importance of the proper care and use of natural resources (forests and water). Also, we are monitoring the population and searching other side with possible presence of the Three-colored Harlequin Toad (*A. tricolor*). This whole process is bringing us many results that allows us to know the next steps that the project will follow. The support of national and international institutions, and the union of different organizations having a common

goal, will allow us to continue on this path towards the protection of this jewel of the Neotropics, the only representative of the genus in Bolivia.

This project is support by Atelopus Survival Initiative (ASI), Durrell Wildlife Conservation Thrust, Museo Nacional de Historia Natural (MNHN) La Paz, Centro de Investigación para la sustentabilidad de la Universidad Andrés Bello (Santiago de Chile), IUCN SSC Amphibian Specialist Group (ASG-Bolivia), Diversidad entre pendientes, Biuken, Educa Anfibios Bolivia (EAB). Funding by Re:Wild and Amphibian Survival Alliance (ASA).





Photo: Mica Stacey.

An Alliance to Save the Jambato Harlequin From Extinction

By María del Carmen Vizcaíno-Barba¹, David Parra-Puente², Juan Manuel Guayasamín³, and Andrea Terán-Valdez⁴

Those who lived their childhood in the central-northern Ecuadorian Andes, before the 1980s, have surely heard of the Jambato (*Atelopus ignescens*): a playmate, inspiration for popular sayings and part of the daily life of the inhabitants of those lands. Due to its extraordinary abundance, it became the mental image of the word “toad”. Therefore, it is not surprising that the Kichwa word for these amphibians, “jambatu”, was adapted to Spanish as a common name for this species. However, a generation later, it was already a legend. While scientists around the world were warning of a wave of amphibian extinctions (especially of harlequin toads), children were hearing stories of absent Jambatos. After an intense search, in 1988, a group of Ecuadorian scientists announced this species as “possibly extinct”.

Over time it faded from the collective memory until 2016, when the Jambato was seen again in the media. David Jailaca, a 12-year-old boy, rediscovered it when he was cutting alfalfa at home, in a remote village in Cotopaxi province. For him it was just another toad in the area, as he did not know that it was such a sought-after species. Only when he heard that a reward was offered for whoever found it, he knew how special it was. After this, it was confirmed that the Jambato was still surviving in this distant val-

ley. The news made history.

Immediately, Centro Jambatu initiated a captive breeding program which has succeeded in reproducing the species under controlled conditions and currently has a backup population in its facilities.

However, the status of the wild population was unknown. For this reason, in June 2021, a new phase of research was initiated, focused on understanding the perceptions and characteristics of the local community to identify opportunities and stakeholders, and to lay the groundwork for designing a work plan. Shortly after, seed funding was obtained from the Amphibian Survival Alliance, through the ASA Phil Bishop Amphibian Conservation Grant, and from the Stiftung-Artenschutz, from the Amphibian Conservation Fund, to conduct a more in-depth investigation on the population status of the Jambato and to work with the community. This first stage began in November of the same year.

Currently, through the coordination of local leaders and researchers, the funds are being managed and the project activities are being carried out. Thanks to the support of partner institutions, this species is monitored monthly and a small, apparently healthy population, has been identified. The finding of gravid females and tadpoles indicates that the population is reproducing and there is a close relationship with the agricultural landscape. However, many questions remain to be answered. For this reason, working with the communities is extremely important. Together with the parish

¹FLACSO Ecuador and Sociedad Ecuatoriana de Etnobiología. ²Fundación Jocotoco. ³Universidad San Francisco de Quito. ⁴Centro Jambatu de Investigación y Conservación de Anfibios. Alianza Jambato (<http://www.alianzajambato.org>)



Photo: Mica Stacey

authorities, activities are being coordinated to promote a dialogue of knowledge, inquiring about the previous knowledge about the species and to learn more about its biology and the role within the ecosystems that they share with the people. In addition, there are plans to carry out experiential activities so that the people of the community can generate a greater bond with the Jambato, raising awareness about the importance of respecting and conserving this species and all biodiversity.

In addition to these efforts, the extremely critical situation of this species has motivated the team of researchers to seek more organizations with whom they have created the “Alianza por el Jambato” (Jambato Alliance). This Alliance seeks to unite efforts to position the Jambato as an emblematic species and save it from extinction, through research and conservation actions both *in situ* and *ex situ*, involving the local community. To achieve this, an integrated approach will be implemented including: Assessing the conservation status of the last known population of this species and its threats (e.g., chytrid fungus, climate change) to develop mitigation and/or adaptation measures; Raise awareness and develop capacities in the community to support its conservation; Generate an action plan established for *in situ* conservation involving the local community and proposing activities that benefit them (e.g. nature tourism and/or agro-ecology); Maintain and support *ex situ* conservation of the species in order to have a backup population for future reintroductions and/or translocations; Execute a communication strategy to report on the progress of the project and obtain the support needed to make it sustainable.

The team’s greatest achievement so far has been the joining of efforts to achieve an interdisciplinary and collaborative working group. Their main goal is to achieve the conservation of the last known population of the species, currently listed as Critically Endangered, through research work that will lead them to develop concrete conservation actions; and the participatory and commit-

ted involvement of the local community.

We may never fully understand why the Jambato disappeared or why it survived in this small valley. But we need to identify the local threats that could lead to its ultimate extinction and work hard to mitigate them. We also need to enhance the factors that allow it to thrive – in this sense, local communities play a fundamental role because they are part of the same ecological network. For a long time, it was the most dramatic symbol of amphibian extinctions in Ecuador; now we want it to become an ambassador of endangered species.

The Jambato Alianza is made up of the following members: María del Carmen Vizcaíno-Barba (FLACSO Ecuador y Sociedad Ecuatoriana de Etnobiología); Juan Manuel Guayasamín, Mateo Vega, Amanda B. Quezada (Universidad San Francisco de Quito); David Parra-Puente (Fundación Jocotoco); Mónica Páez-Vacas, Sofía Carvajal-Endara and Gabriela Maldonado-Castro; David Salazar, (Universidad Tecnológica Indoamérica); Andrea Terán-Valdez, Luis A. Coloma (Centro Jambatu); Gustavo Pazmiño-Otamendi, Andrés Marmol-Guijarro, Micaela Stacey-Solís, Andrea Varela-Jaramillo (3Diversity); Martín R. Bustamante, Gabriela Arévalo, Soledad Torres, Stefany Obando (Zoológico de Quito); Lina Valencia (Re:wild); Luis Fernando Marin da Fonte (Amphibian Survival Alliance); María José Navarrete, Laura Gómez-Mesa (independent researchers); Stiftung-Artenschutz; Atelopus Survival Initiative; and the International Union for Conservation of Nature (IUCN) – Regional Office for South America. The parish government of which the Jambato survived and the local community are also instrumental in this joint effort. This text was originally published by the IUCN. The Amphibian Survival Alliance (ASA) supports this project through the ASA Phil Bishop Conservation Grant and this project is also supported by Auckland Zoo.

Please visit our website at www.alianzajambato.org to learn more, and complete [this form](#) to become a member.



Photo: Roberto Elías.

Population Viability Assessment of the Lake Junin Giant Frog (*Telmatobius macrostomus*)

By L. Castillo, R. Elías, F. Bolaños, M. Herbert, J.E. Rodríguez & Y. Matamoros

The Lake Junín Giant Frog (*Telmatobius macrostomus*) is one of the largest fully aquatic frogs in the world. It was abundant in the past, and it was at the top of the food chain of Lake Junín and other bodies of water in the regions of Junín and Pasco in central Peru. The species was so abundant that it was a food resource for the human community since pre-Columbian times. However, the harvest of individuals without any control, together with other human activities that have affected the size and environmental quality of water bodies, has contributed to the species' current listing as Endangered (EN), according to the IUCN. In 2013, the Conservation Planning Specialist Group, Mesoamerica Resource Center (IUCN SSC CPSG Mesoamerica) collaborated with Denver Zoo, Junín's National Service of Natural Areas Protected by the State (SERNANP, by its acronym in Spanish), the Peace Corps and Universidad Peruana Cayetano Heredia, to develop a Conservation Strategy for the Lake Junín Giant Frog. This first meeting had the participation of 33 people from 26 different institutions and was attended by 32 observers, representing 21 institutions in the region Junín – Pasco.

One recommendation of this Conservation Plan was to do a Population and Habitat Viability Assessment (PHVA) which was scheduled for 2020, but because of the pandemic, it was resolved to do a Population Viability Analysis (PVA) using the virtual tools available online. The PVA meetings were held in six virtual sessions between February 17 and March 24, 2021 with an approximate duration of one to three hours, and with the participation of 15 people.

The PVA shows that the Lake Junin Giant Frog is a resilient species, even when different threats have made it difficult to observe today. Even so, if the threats persist over time or increase in intensity, the frog could become extinct in the near future. The baseline

model suggests the probability of extinction is 64% with a mean time to extinction of 36 years. If management actions aimed at mitigating threats to the habitat and the survival of individuals, especially females, are implemented, the Lake Junin Giant Frog could recover and possibly even in a short time, given its high fertility potential. For more information, please access the original report [here](#).



Stakeholder Cooperation to Reduce Amphibian Fatalities on Roads in Brazil

By Caroline Zank, Fernanda Zimmermann Teixeira, Júlia Beduschi, Larissa Oliveira Gonçalves, Talita Menger & Andreas Kindel

Mortality on roads is a highly unseen, chronic, and important impact for threatened (and non-threatened) amphibian species. Thousands of individuals are killed year after year on roads – and this can and need to be urgently avoided. With the aim of building a protocol with guidelines to assess amphibian fatalities on roads and the effectiveness of mitigation measures in the context of the licensing process of roads, the Road and Railway Ecology Group (NERF/UFRGS) organized and facilitated a cycle of three online workshops between October and December 2022 in partnership with the Brazilian Center of Research and Conservation of Reptiles and Amphibians (RAN/ICMBio, <https://www.icmbio.gov.br/ran/>) funded by the Amphibian Survival Alliance. The workshops involved 39 participants, including researchers and environmental analysts from ten Brazilian state environmental agencies and the federal environmental agency (IBAMA).

The idea of the workshops came from our experience in the Road and Railway Ecology Group (NERF) from the Federal University of Rio Grande do Sul, Brazil. Over the last decade, we have leaded similar initiatives by facilitating workshops with stakeholders to coproduce guidelines for the evaluation of animal fatalities and mitigation on roads and railroads (1). We also supported the elaboration of technical norms (2) that formally requires amphibian roadkill surveying and mitigation planning in Rio Grande do Sul. Moreover, we have been testing and developing sampling and analytical approaches for amphibian roadkill assessment with recent developments that include the use of hierarchical modeling to account for imperfect detection in fatalities estimation (3, 4). More recently, we are involved in implementing the first mitigation program specifically designed to reduce amphibian roadkill in Latin America, by combining and testing fences specifically arranged to block the access of tree frogs to roads and drive them to underpasses (5). These measures have been installed on a 1-km road stretch that crosses the Mata Paludosa Biological Reserve in Rio Grande do Sul, directly benefiting 24 amphibian species, including four regionally threatened species.

During the workshop cycle, we coproduced with the participants a protocol to monitor amphibian fatalities on roads in priority areas and then to evaluate mitigation effectiveness after its implementation. The final document of the protocol is being written to be published soon. We expect that within the next years at least half of the Brazilian states will have specific norms to obligate the estimation and mitigation of amphibian fatalities on roads that cross, or border protected areas and other priority habitats. As project impact indicators, over the next years we will record the number of states with implemented guidelines, the number of protected areas with fatality mitigation programs and the number of road segments outside protected areas with mitigation programs. In the long term, we expect to benefit dozens of amphibian species that are road-killed, initially targeting roads that cross or border protected areas. We expect that the recommendations produced in these workshops will support the construction of regulations for environmental licensing and monitoring at the state and federal level. Furthermore, we believe that the workshops will foster the

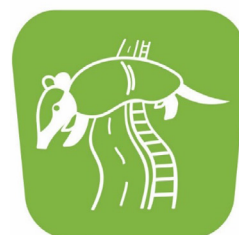


Photo: NERF.

creation of a cooperation network to exchange knowledge among state environmental agencies among different Brazilian states. Finally, we believe that the improvement of environmental impact assessments and strengthening of the professionals involved in it have a great potential to result in lesser impacts of linear infrastructures on amphibians.

References

1. A. Kindel et al., *Oecologia Australis* 21, 3 (2017).
2. Diretriz técnica referente ao termo de referência para o monitoramento de fauna em rodovias. (2018): Available at http://www.fepam.rs.gov.br/CENTRAL/DIRETRIZES/DIRET_TEC_06_2018.PDF
3. J. D. Beduschi, thesis, Universidade Federal do Rio Grande do Sul (2019).
4. T. Menger, thesis, Universidade Federal do Rio Grande do Sul (2020).
5. C. Zank et al., *Revista Estradas* 24 (2019).



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Meet ASA Future Leader of Amphibian Conservation

Luis Castillo Roque

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](#).



Hello, and thank you very much for this interview! My name is Luis Castillo Roque, and I am a Peruvian biologist with experience in the conservation of high Andean aquatic amphibians. I completed my Master's degree in biodiversity and ecosystem management from the Universidad Nacional Mayor de San Marcos (UNMSM). I am co-founder of the Amphibian Survival Alliance (ASA) partner NGO GRUPO RANA, and since 2018, I have been the coordinator of Junín projects for the Denver Zoological Foundation. In 2021 I won the Carlos Ponce del Prado award as a young conservationist, and in 2018 I was awarded by ASA as a Future Leader of Amphibian Conservation.

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

The most important step in my conservation career was made in 2017, together with Rogger Moreno and Oscar Damián, when we decided to create GRUPO RANA with the objective of promoting the conservation of Lake Junín Giant Frog (*Telmatobius macrostomus*). Since then, we have implemented an amphibian conservation program that encompasses different areas. Together with the Denver Zoological Foundation, we are executing the project "Guardians of the Frogs", where together with rural communities we monitor and restore the frog habitat and population. Moreover, GRUPO RANA also leads the project "The Frogs and I", whose objective is to provide local students and teachers with the tools to develop basic research to fill the gaps in biological information and help find solution to environmental problems. None of this would have been possible without the existence of protected natural areas, such as the Junín National Reserve, and the support of educational institutions and international partners such as ASA.

What is your favourite amphibian species and why?

My favourite amphibian is the Lake Junín Giant Frog (*Telmatobius macrostomus*), because it gave me the opportunity to study it and therefore know it and be able to conserve it. The life I am currently living is thanks to this frog: the opportunity to travel, to visit the countryside and work with rural communities ... everything is thanks to this beautiful frog!

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

Yes, my commitment has increased a lot! My focus now is to work for the conservation of frogs and the biodiversity. I believe that we can do many things as non-profit organizations, but we must also involve companies in this whole process of wildlife conservation, primarily because of the great scope they have in our daily lives.



INSTRUCTIONS TO AUTHORS

Background

FrogLog has been one of the leading amphibian conservation community newsletters since the early 1990s. 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.

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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.

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Titles should ideally be no more than 15 words.

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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.

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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, *Geochim. 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).

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Atelopus tricolor. Photo: Gabriel Callapa.