

Rescue at Toad Mountain

BY MARK CHEATER



CONSERVATIONISTS RACE TO SAVE PANAMANIAN



FROGS FROM EXTINCTION

Defenders of Wildlife has joined with other groups to protect creatures such as this rare harlequin frog (above) from a deadly fungus that is wiping out scores of amphibian species worldwide. A group of scientists recently traveled to Panama's remote Toad Mountain (inset and following page) to locate and capture these frogs.



Bob Chastain is standing calf-deep in the tumbling waters of the San Antonio River in eastern Panama, staring intently at the rocky banks and mossy boulders. It's an overcast morning in late June, and the leaves of the tropical plants above are still dripping from an early shower. Here, on the flanks of auspiciously named Cerro Sapo (Toad Mountain), in a remote part of Darien National Park, Chastain and a group of other biologists are stalking some small, slippery creatures.

"It can sometimes be like finding a needle in a haystack," says Chastain, the director of the Cheyenne Mountain Zoo in Colorado, referring to his quarry, *Atelopus certus*, an imperiled harlequin frog found only in Panama. Fortunately for us, these particular needles are moving. A slight twitch on the far bank sends the hipwader-clad Chastain splashing across the water. His hand darts out toward a rock and grabs an inch-long creature mottled in orange and black. "Got him!" he says, smiling.

Chastain drops the squirming frog in a small plastic bag on which he writes the time, location and other pertinent information, including an identifying number. This is #001—the first of several dozen harlequin frogs Chastain and his colleagues hope to capture on a five-day expedition at Cerro Sapo.

The expedition has been organized by the Panama Amphibian Rescue and Conservation Project (PARC)—a consortium of zoos, government agencies, research organizations and conservation groups that is trying to build a Noah's ark for frogs imperiled by a deadly fungal disease called chytridiomycosis, or chytrid for short. The group hopes to capture representatives of 20 different species of Panamanian frogs and move them to a new captive-breeding facility in Panama City before the flood of chytrid washes them into oblivion.

"For some species, it's sad to say, but there's no hope if they stay in the wild," says Edgardo Griffith, director of the El Valle Amphibian Conservation Center in Panama. "The only opportunity that we have is if we take them out of their natural environment and put them in captivity."

Before dawn the previous day, Chastain, Griffith and PARC's international director Brian Gratwicke tell me about chytrid and the Panama project as we drive out of Panama City in a pickup truck on the first leg of our journey to Toad Mountain.

The fungus that causes chytrid grows on the skin of frogs and other amphibians and interferes with the balance of water and salts in their bodies, causing lethargy and eventually death. Where and when the fungal disease originated and exactly how it spread are uncertain, but by the time it was identified and named by scientists in the late 1990s, it had already begun cutting a deadly swath through amphibian populations in Australia and the Americas. Although habitat loss, global warming and pollution also pose major threats to amphibians, chytrid is arguably their biggest peril, believed to be behind the disappearance of 94 species of frogs in the past 30 years.

"A whole class of vertebrates—a diverse and ancient evolutionary lineage of animals—is just vanishing," says Gratwicke, a biologist based at the Smithsonian Institution's National Zoo in Washington, D.C.

In response to chytrid's devastation, conservationists in several parts of the world have recently created "amphibian arks" to protect and breed imperiled creatures. One such facility was founded in 2005 by the Houston Zoo in El Valle, a town about an hour west of Panama City. Griffith—a native Panamanian biologist who is so enamored with frogs that he has a skeleton of one tattooed on his left calf—runs this center with his wife. They care for about 1,200 frogs representing 60 species, mostly from western-central Panama. When officials from the Smithsonian

contacted Griffith in 2008 about protecting frogs from the eastern portion of the country, which has not yet been inundated by the chytrid wave, he told them he couldn't handle more and suggested they create a new rescue center.

The Smithsonian began assembling a team of groups to launch such a facility. Chastain's zoo, which had previous experience rescuing Wyoming toads from the chytrid fungus, was brought in as a partner, along with Griffith and the Houston Zoo, Defenders of Wildlife, the Summit Municipal Park zoo in Panama and several other organizations—and the PARC project was formally established in May 2009. They subsequently hired Roberto Ibanez, Panama's leading frog expert and Griffith's

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Panamanian biologist Edgardo Griffith proudly displays one of the harlequin frogs he's caught during a long, hot and sometimes treacherous day of exploring on the flanks of Toad Mountain. The inch-long creatures, whose scientific name is *Atelopus certus* (close-up view, left), live in moist habitat that also shelters a host of biting insects, large spiders and venomous snakes.

mentor, as the in-country director. The Summit Zoo in Panama City donated space for temporary quarantine and breeding facilities, and the group began organizing a series of field expeditions in Panama to collect imperiled frog species.

Cerro Sapo has been chosen for this expedition because of its location in Darien National Park. This is not only the largest park in Central America, but also its largest untouched wilderness, Gratwicke explains as we approach the boundary of the province, about four hours south of Panama City. This wildness makes it not only a world-class haven for frogs and other wildlife, but a notorious refuge for drug runners, armed rebels and other outlaws—as we are reminded by dour soldiers with guns who stop us at several checkpoints along the way.

At Puerto Quimba—a small collection of buildings near a dock on an inlet of the Pacific—we transfer our gear to a motor boat. From there, it's a bumpy, 2-hour ride to Garachine, a fishing village near the western edge of Darien park. Toad Mountain—likely named for its squat, green, 3,500-foot-high profile—looms before us, smudged with clouds.

In Garachine, we hire indigenous Embera people and their horses to help get us and our equipment to our camp—a six-hour slog along, across and in the San Antonio River, with frequent bushwhacking forays into the jungle and around venomous snakes. At 8 p.m., we finally reach camp—a few blue tarps lashed between trees, a couple small platforms of palm-leaf mats, and a propane stove—in a small clearing about 50 feet above the river. We eat a light meal of chicken and rice and then hurry into our tents to escape swarms of ants, mosquitoes, gnats and other biting insects.

The next morning, Chastain and I are the first ones down to the water. After his disclaimer about how difficult the frogs are to find, he quickly bags #001 and two more before Griffith and Gratwicke arrive. The three biologists move upriver as sunlight begins to break through the clouds and filter through the green canopy above the river. They scour the boulders and leaves with their eyes, poking through the



vegetation with hiking poles in search of their small quarry.

Griffith describes the procedure to me as he plucks an unsuspecting male *Atelopus* off a damp tree root near the river. The scientists put on a fresh set of latex gloves for each capture, to avoid accidentally transmitting the chytrid fungus. Each frog is rubbed with a cotton swab that is stored in a small sterile tube for later analysis and chytrid detection in the lab.

So far the frogs at Toad Mountain appear to be disease-free; they move vigorously in their plastic bags even after a day or two of captivity. This is a welcome contrast to PARC's first expedition a few months earlier in a park north of Panama City. Most of the frogs there were sick from chytrid. "We got there too late," Griffith says, sadly. "I've seen it before and every time we get the same results—the loss of amphibian diversity, which will bring lots of bad consequences for the ecosystem since amphibians are such an important link between different levels of the food chain, and also they are one of the biggest groups of vertebrates that inhabit the planet."

The biologists continue moving up the river all day, pausing only for a brief meal at midday. They return to base camp, sweaty, soaked and exhausted, about 5 p.m. and unload a few dozen bags, each with a frog inside, into a large plastic cooler at base camp. The team tallies the day's take and spends the next hour swabbing frogs, putting damp paper towels inside the

plastic bags to keep the creatures moist, and giving the captive frogs fresh air. "There are a lot of steps," says Gratwicke, "but it's what we need to do to figure out what's going on here."

The scientists are finding many male *Atelopus*, which tend to stay closer to the water and out in the open so that potential mates can find them. The females, which are slightly larger than the males and have redder bellies, are playing hard-to-get. As Griffith notes, "if you want to have a captive breeding population, you need to have females," so the scientists decide to concentrate on capturing females and juveniles (which are so tiny they're difficult to sex, but have a 50-50 chance of being female.)

On the afternoon of the third day in the field, Griffith spots a juvenile on a mossy rock next to the river. This young frog is no larger than a house fly—and in contrast to the adults, its body is a dark, metallic green, and it has bright yellow feet. He points out how the creature walks rather than hops—a characteristic of this species. "Come on boy—come on!" he says, trying to coax the frog into a plastic bag.

Two hours and another mile or so upstream, Griffith spots a pair of adults mating on a mossy rock ledge about a yard above a rushing cataract. "This is the first female we've found in what—six, seven hours of work?" he says, guiding the couple into a bag. "It's not like they'll jump out of the rocks and into the plastic bag. So it can be frustrating. But I know that if we keep thinking positive and really looking for them, we'll get rewarded." The biologists bag two more females that day, along with several juveniles.

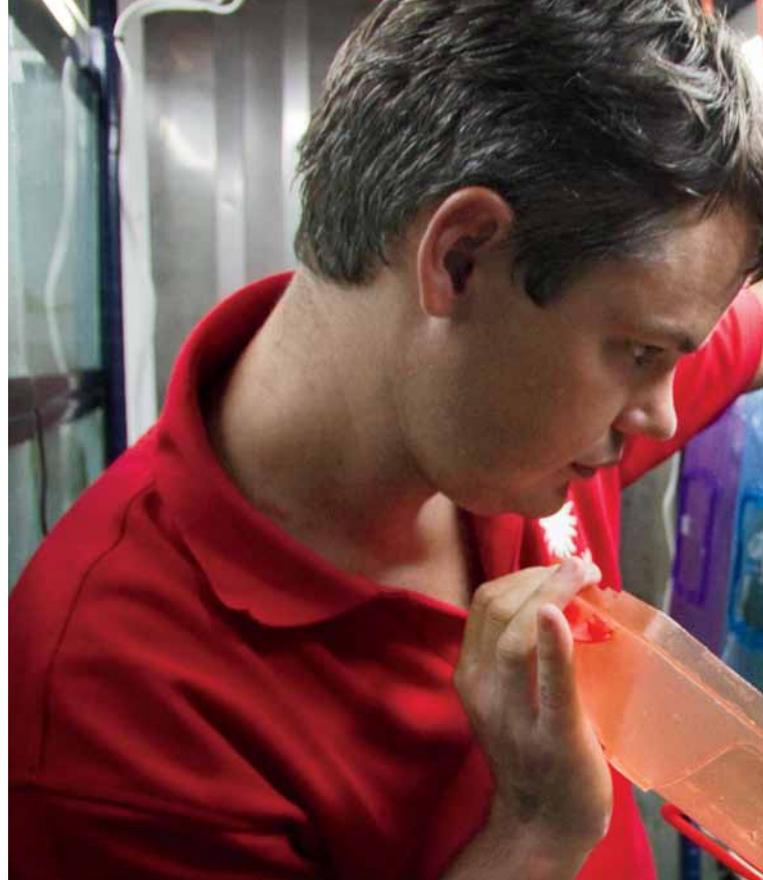
The next morning, Griffith and Chastain explore a small upstream tributary and return two hours later proudly carrying four more females. We spend the next few hours at camp transferring all of the captured frogs from baggies to sturdier plastic cups lined with damp moss to keep the animals moist and protected during their long journey out of the jungle. The final count: 50 males, 10 females, 16 juveniles.

The cups are carefully stacked back in the coolers, along with cold packs to keep the frogs from overheating as they're carried out of the jungle and into the hot sun by two of our Embera helpers. Ibanez and Chastain will ensure the coolers make it onto a plane to Panama City leaving from Garachine the next morning. Flying the animals will be more expensive than hauling them by boat and car with the rest of us, but speed is crucial when the lives of imperiled frogs are at stake.

"This is precious cargo because this is the founding population for a species that could well go extinct in the wild," says Gratwicke as he watches the porters leave camp. "We hope they all survive the trip back."



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Bob Chastain, director of Colorado's Cheyenne Mountain Zoo, on the hunt for frogs in the San Antonio River (left). He and his colleagues bagged nearly 80 frogs during their expedition to Toad Mountain. The animals were transported to a breeding center at Panama's Summit Municipal Park zoo, where Smithsonian Institution biologist Brian Gratwicke (above) checks on some of the other resident frogs. The animals will be bred and kept at the center until a cure for the fungal disease has been found.

Twenty-four hours later we are at the Summit zoo with the airlifted frogs. “We didn’t have a single mortality on the way here, so you can’t ask for anything better than that,” a relieved Gratwicke reports.

PARC has converted a room inside a one-story wooden building near the zoo entrance into a quarantine area for newly arrived frogs. Here, a team of zoo staffers and volunteers carefully removes the creatures from their plastic cups, washes them briefly in a mild antifungal solution, rinses them in filtered water and then puts them into clear plastic cages stacked neatly on metal shelves.

Griffith helps with the operation in the quarantine room and reflects on the expedition. “It’s very difficult to collect only certain species and leave others behind,” he says. “It breaks my heart but we only can do so much and work with only a handful of species because all the resources and space we have is limited.”

The frogs will stay in this quarantine area for 30 days until the scientists are certain they are free of the fungus. Then they will be moved to their permanent homes in one of several modified shipping containers—or “rescue pods”—that sit a few yards away on the lawn at the front of the zoo.

Gratwicke gives me a tour of one of the 40-foot-long pods, instructing me to leave my shoes outside and wash my hands carefully before entering. The pod is like a cramped and sterile

zoo exhibit. Plastic containers of frogs are lined up in rows on metal shelving units, each furnished with water, rocks, moss and potted plants to make the captive frogs feel at home. There’s artificial lighting, air conditioning and an automatic misting system, all of which are carefully calibrated to simulate the animals’ natural habitat. The frogs are fed a diet of live crickets and fruit flies raised on zoo grounds, and carefully watched over seven days a week by a dedicated staff.

“This is where we’re trying to breed frogs as the insurance colony to prevent against extinction in the wild,” Gratwicke says, walking down the rows of cages. There are about 120 frogs from several species in this, the first shipping container to be converted into a rescue pod. Two other containers nearby are in the process of being outfitted with water, plumbing and electrical systems so that they will be able to house the Toad Mountain frogs and animals from future expeditions.

Gratwicke stops at a cage containing another imperiled harlequin frog—the green-and-black *Atelopus limosus*, rescued from a part of Panama hit hard by chytrid. This is the only female of its species in captivity, and probably one of the few left in the world, he says. “If we’re lucky, this will be the first captive-bred *Atelopus limosus* ever,” he says.

He stops at another cage holding a two-inch-long leaf-colored



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One of the most promising research avenues, Gratwicke says, is a “probiotic” method using bacteria that naturally produce anti-fungal chemicals. Conservationists hope these bacteria can be grown safely and effectively on a frog’s skin to kill the fungus and protect the animal from the disease. “The idea is the offspring of these frogs could be treated with a probiotic bacteria and put back into their wild homes where they’re extinct, and hopefully they’ll be able to survive,” he says.

No one knows if or when this potential cure will work, so the PARC team is preparing for the long haul at Summit zoo. In



addition to outfitting several other rescue pods, they plan to build a permanent quarantine facility, a laboratory and offices for staff. All of this, as well as on-going expenses for salaries, utilities, equipment and travel, will cost money—much more

DEFENDING AMPHIBIANS

Defenders of Wildlife has played a crucial role in the Panama Amphibian Rescue and Conservation Project since its inception. Defenders was not only one of the founding partners of the project, but it has contributed \$150,000 toward the effort, along with lending the time and expertise of Defenders’ staff and board members.

In addition to this work to safeguard Panama’s amphibians, Defenders has been a longtime leader in efforts to address threats to amphibian populations worldwide—especially the threat posed by the massive international trade for the pet, food, medicinal, scientific and live-bait markets. Most recently, Defenders worked with Latin American and Middle Eastern governments to gain protection for amphibians at the 2010 meeting of parties to the Convention on International

Trade in Endangered Species of Wild Fauna and Flora.

Defenders has also petitioned the U.S. departments of interior and agriculture to immediately screen amphibian imports to block the deadly chytrid fungus. “These imports are currently unregulated and pose a major threat to native amphibians,” says Defenders international counsel Alejandra Goyenechea. “We are urging the federal government to follow the latest international animal health standards to ensure that the massive volumes of live amphibian imports do not continue to carry the chytrid fungus.”

Visit www.defenders.org/amphibians to learn more about Defenders’ work on amphibians.

creature with large eyes—a La Loma treefrog. “We’ve had pretty good success at keeping these guys alive, but we’ve had no breeding yet.” (As the magazine was going to press, Gratwicke reported that both the treefrog and the green-and-black harlequin frog at Summit zoo had successfully reproduced.)

PARC’s goal is to have 20 species in the rescue pods, each with a minimum of 20 males and 20 females. Assuming they can get the frogs to breed successfully, the animals will stay at the Summit zoo until it’s safe for them to return to their wild homes. “It could be a really long time or forever, we just don’t know,” Gratwicke says.

To help hasten the day the frogs can go back home, PARC is partnering with researchers who are searching for cures to chytrid.

than the \$314,000 PARC managed to raise last year, Gratwicke says. “We sorely need to raise funds to build the capacity to house these frogs.”

The key to that—and, ultimately, to the survival of frogs—is getting people passionate about amphibians, Gratwicke says. “We need people to love frogs at a whole new level—like they love pandas and trout. We need to tell people to get off their butts, because if they don’t, their kids will not see these magnificent animals in the wild, *ever*.”

To learn more about the Panama Amphibian Rescue and Conservation Project and how you can help support it, visit www.amphibianrescue.org