

Will Chytridiomycosis' fatal reign finally be over?

By Gina Year 6

The chytrid fungus has sent Corroboree Frogs leaping towards extinction, as the fatal disease threatens to decimate one of Australia's most iconic and critically endangered amphibians.



The critically endangered Southern Corroboree Frog. (Photograph by Lorinda Taylor)

Listed on the IUCN Red List as 'critically endangered', there may now be as few as 50 adult Corroboree Frogs left in the wild. This species's population has declined steadily since the 1980's, and with numbers continuing to fall rapidly, wild populations are likely to become extinct within the next five to ten years without human intervention.

Chytridiomycosis, the disease associated with amphibian chytrid fungus, has influenced the disappearance of many species around the globe. In recent decades, it has become the primary cause of the Corroboree Frog's rapid and unabated population decline. Invading the surface layers of the frog's skin, the fungus damages and stirs infection within the outer keratin layer. Their skin becomes unnaturally thick due to a drastic change in the levels of electrolytes in the Corroboree Frog's outer skin. This is fatal in Corroboree Frogs, as unlike most animals, amphibian skin has the ability to tightly regulate respiration, water, and electrolyte levels. However, the disease Chytridiomycosis manages to overthrow the system controlling the amount of electrolytes and intake of vital proteins via the frog's skin, causing the death of the Corroboree Frog it infects.



Corroboree Frog (Photograph by Gary Ramage)

Facilitating the spread and persistence of chytrid fungus is the Common Eastern Froglet, a species living alongside the Corroboree Frog. Research has shown that this species appears to sustain high infection levels, but doesn't

develop the disease. "Other species like the Corroboree Frog are especially susceptible, and between those, there's a whole range of amphibian species that carry the fungus. Some of them die from it, and others don't," explained Michael McFadden, a Corroboree Frog Keeper at Taronga Zoo. As a result, the Common Eastern Froglet cannot be affected by Chytridiomycosis, rather it acts as a host, sustaining the disease for long enough to allow transmission to other amphibians such as the endangered Corroboree Frog.

Human actions are wreaking havoc on the survival of Corroboree Frogs, as climate change poses as an additional threat. Reduced precipitation coupled with warmer temperatures has already resulted in increased tadpole and egg deaths, as severe droughts result in premature pool drying, preventing tadpoles from completing their transformation. “There’s the possibility that more frequent wildfires would change the structure of the swampy bogs that the Corroboree Frog likes to breed in and make it no longer suitable for the frogs,” said David Hunter from the Office of Environment and Heritage, NSW. This phenomenon can lead to early mortality of entire tadpole cohorts which has undoubtedly contributed to the species ongoing decline.

Moreover, evidence suggests climate change is also likely to modify the functioning of wetlands which may inadvertently reduce the amount of suitable Corroboree Frog breeding habitat. As the frequency of droughts increase as a result of global warming, the Corroboree Frog’s recovery process is only being further hindered.

Breeding habitat and nearby vegetation is critical to the survival of Corroboree Frogs. Relying upon a variety of habitat types for breeding such as pools, bogs and fens, Corroboree Frogs also feed and shelter in forests and woodlands near their breeding sites. “The Corroboree Frog lives in the sub-alpine heathen and sphagnum bog systems throughout Kosciusko National Park. They’re only found in Kosciusko National Park, and they’re only found in nice cold climates, only up in Kosciusko,” said Michael McFadden.

During the breeding season, Corroboree Frogs tend to breed in normally dry water bodies, whilst sheltering under logs and rocks outside of the breeding season. The species is restricted to sub-alpine woodlands, heath-lands and grasslands that occur at a high altitude.

As the Corroboree Frogs are habitat specialists, restricted to certain areas in Kosciusko National Park, the functioning and maintenance of their environment is extremely important to the species' survival. However, in recent years, feral animals particularly pigs and deer have been observed damaging the habitat essential to Corroboree Frogs, causing the already critically endangered species' home to rapidly deteriorate. In particular, wetland incisions and the alteration of the vegetation structure can all be traced back to trampling and grazing by introduced species. What is more, they have been found to overturn shelter sites such as logs and destroy dense ground cover.

Adding to the breeding challenges of Corroboree Frogs, weeds and the planting of exotic trees are likely to significantly reduce the quality of essential breeding habitat as they eventually invade wetlands, bogs and grasslands. (Add Quote from David Hunter)

Managing feral animals and weeds so that they don't impact wetland habitats is important for the future recovery of the Corroboree Frogs. As a result, scientists are continuing the massive task of restoring Corroboree Frog populations, with multiple organizations joining forces to encourage the species' survival in the wild.

Coordinated by the New South Wales Office of Environment and Heritage, the main goal of the Corroboree Frog Conservation Strategy is to ensure the future of the amphibian in the case of catastrophic events in their natural habitat. Captive Corroboree Frog populations have been established for research and for re-establishing wild populations because it is clear that without human intervention, the species will become extinct.

As part of the National Recovery Plan, Taronga Zoo has been working with the Department of Environment and other conservation organisations to breed zoo-based populations of Corroboree Frogs which will be reintroduced into the wild.

Organisations hope the Corroboree Frogs' captive breeding program will help scientists gain valuable knowledge about how to breed, treat and care for this species when they are eventually released into the wild. "We're trialing arrange of different things at the moment, not just the cure for the disease, but trialing a range of different ways frogs can stay in the wild, even with the disease, in slightly different habitats," explained Michael McFadden.

Unfortunately, it is not currently possible to eradicate Chytridiomycosis from wild amphibian populations. For endangered species such as the Corroboree Frog, emergency measures have had to be implemented in an attempt to maintain a healthy population size. In particular, healthy, captive-breed frogs and tadpoles are released into secret disease free artificial pools that Taronga Zoo has stationed across Kosciusko National Park.



Taronga Zoo's Logo. (From Taronga Zoo website)

The location of the frog ponds is actually kept secret to avoid interference in this vital program. "The main reason we keep the location of frog ponds secret is because this animal is so endangered in the wild, we don't actually want anyone to go up and start playing with the animals or digging up the animals for photos or anything like that. At the moment, because they're so endangered, (they're down to the last individuals) any kind of disturbance to the frogs could affect their ability to breed in the wild, so we want to keep it (the location) as secret as possible, so that way there's no interference at all in the program," said Michael McFadden.

“We’ve created these big disease-free enclosures... down in Kosciusko National Park, and we’ve been reintroducing eggs and frogs into those enclosures, and hopefully, the frogs that build up in those enclosures keep breeding, and we’ll be able to use their eggs for reintroduction and further research as well,” Michael McFadden explained.

By placing the Corroboree Frogs into the artificial frog pools, the species will not be exposed to Chytridiomycosis, which they are highly susceptible to. The frog ponds also help the frogs to clear some of nature’s obstacles, as they are designed to prevent drought, feral animals and weed invasion.

The Corroboree Frog’s road to recovery is paved with obstacles from both humans and nature, but scientist and conservation organisations are doing what they can to help the species’ population regain their stability in the wild.