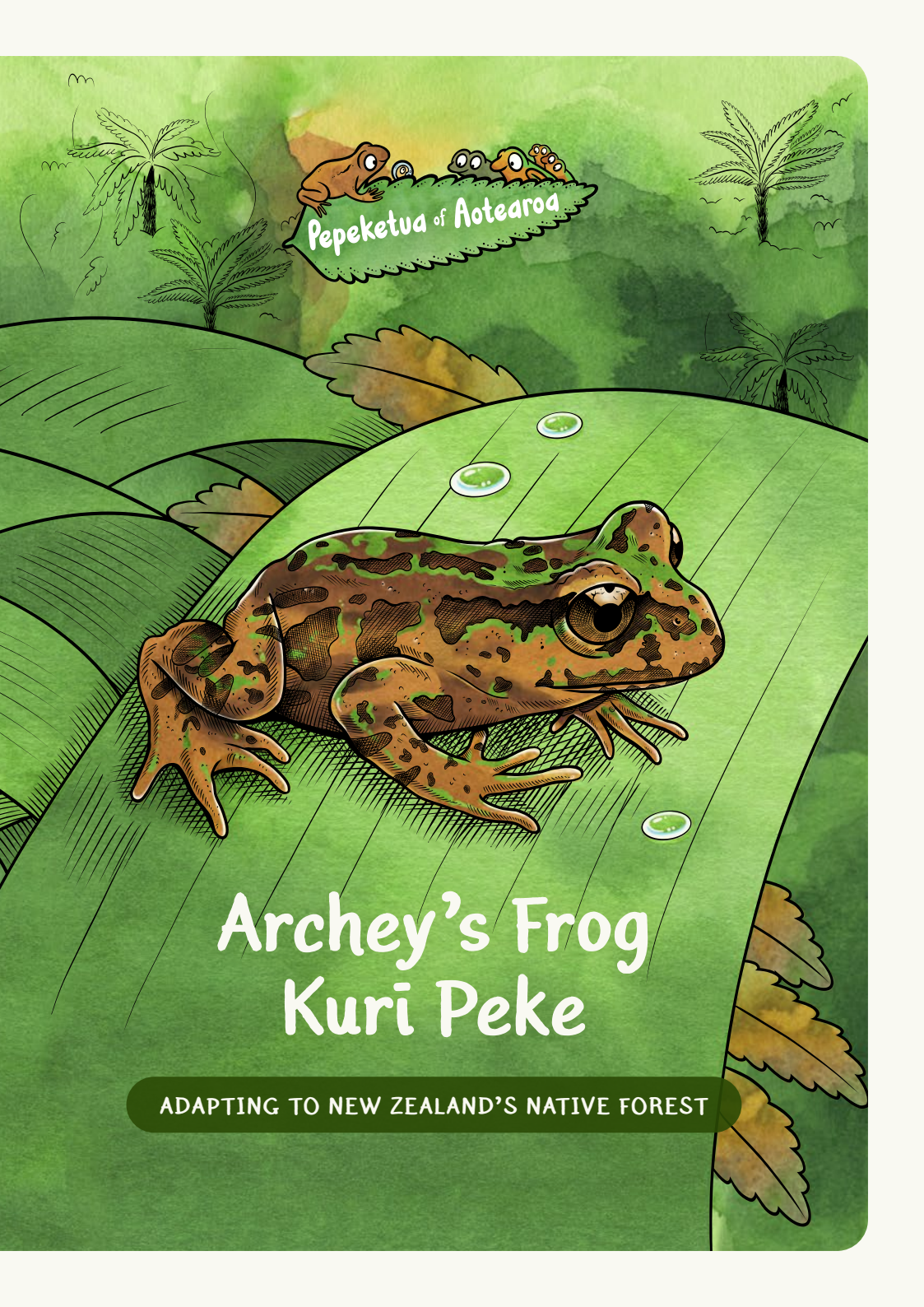




Pepeketua of Aotearoa

Archey's Frog Kuri Peke

ADAPTING TO NEW ZEALAND'S NATIVE FOREST

NZFrogs is a charitable trust which aims to help people of all backgrounds and abilities learn about, engage with and support the conservation of New Zealand's native *Leiopelma* frogs.

In 2024, NZFrogs received funding through the Unlocking Curious Minds Contestable Fund to develop a series of educational booklets and accompanying posters. The goal for these resources is to provide engaging, bilingual resources that communicate years of scientific research, to a wide age range. Hopefully, you will find these resources are useful in your community and classrooms, and appealing to anyone interested in learning more about native *Leiopelma* frogs.

The *Pepeketua of Aotearoa* series includes four booklets with accompanying posters. Additionally, there are two special topic posters: *What makes our Pepeketua special?* and *Protecting our Pepeketua*. You can find out more about NZFrogs and the *Pepeketua of Aotearoa* series at nzfrogs.org

NZFrogs worked alongside a talented team to bring *Pepeketua of Aotearoa* to life:

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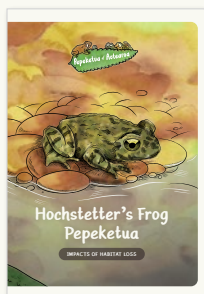
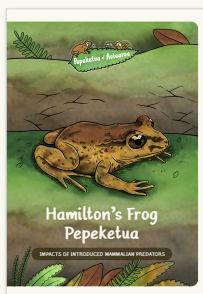
We would also like to acknowledge the following iwi for their contributions to these resources: Pare Hauraki, Ngāti Kuia, and Ngāti Koata.

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This booklet is about me!

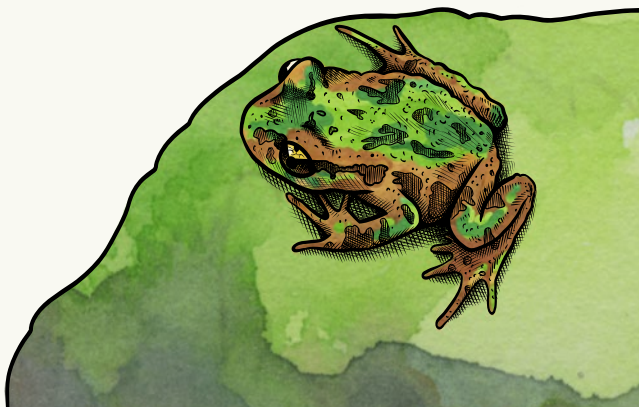


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CREATURE CARD

Archey's frog is **terrestrial**, shows parental care, and doesn't have an aquatic tadpole stage. Check out the other booklets in the *Pepeketua of Aotearoa* series or **nzfrogs.org** to learn more about New Zealand's native frogs.



Adult SVL (snout to vent/nose to bottom) measurement: 25–40mm

Distribution and habitat

Archey's frogs live in temperate rainforests along the Coromandel Peninsula and within the King Country of the North Island.

These frogs are **terrestrial**, meaning that they live their entire lives on land, spending their days hiding in damp **retreat sites**. Temperate rainforests have dense fern undergrowth, broadleaf trees, and receive high rainfall which provides cool, humid conditions. Dehydration is a constant risk, so Archey's frogs need special **adaptations**. An **adaptation** can be how a species looks, behaves, or interacts with their environment to help them survive.

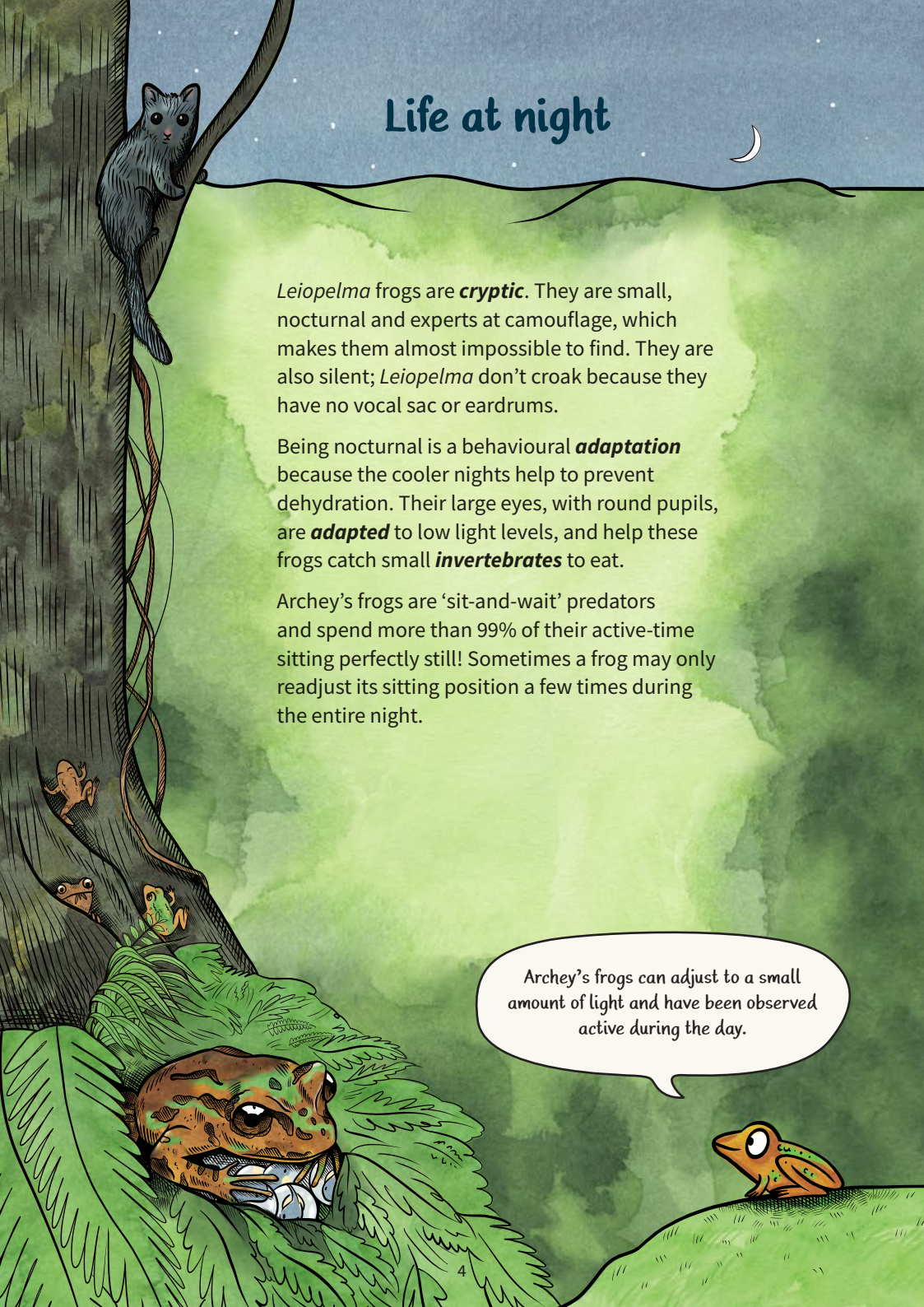
Archey's frogs are threatened with extinction because they are extremely vulnerable to habitat loss, climate change, and introduced mammals. Understanding their **adaptations** can help us become better kaitiaki, ensuring their future survival.

Archey's frogs'
current distribution



Archey's frogs and Hochstetter's
frogs are often neighbours and
have been found sharing the same
retreat sites!





Life at night

Leiopelma frogs are **cryptic**. They are small, nocturnal and experts at camouflage, which makes them almost impossible to find. They are also silent; *Leiopelma* don't croak because they have no vocal sac or eardrums.

Being nocturnal is a behavioural **adaptation** because the cooler nights help to prevent dehydration. Their large eyes, with round pupils, are **adapted** to low light levels, and help these frogs catch small **invertebrates** to eat.

Archey's frogs are 'sit-and-wait' predators and spend more than 99% of their active-time sitting perfectly still! Sometimes a frog may only readjust its sitting position a few times during the entire night.

Archey's frogs can adjust to a small amount of light and have been observed active during the day.

Predators

Archey's frogs' **cryptic** behaviour helps them avoid New Zealand's native predators which rely on sight or sound to find their prey. Native predators would have naturally included kiwi, weka, tuatara, ruru, or laughing owl.

Species that naturally live in the same area reach a balance within their ecosystem. A healthy native forest, with no introduced mammals, would have meant frog populations could sustain predation. Unfortunately, being **cryptic** is not the best strategy for avoiding introduced mammalian predators!

Introduced mammalian predators (e.g. rats and stoats) are different to native predators because they find their prey by smell. This means they can find Archey's frogs, no matter how **cryptic** they are! Introduced mammalian predators are a huge threat to the survival of all *Leiopelma* frogs. Mammalian predators can eat many more frogs in a single night than native predators.

Leiopelma can use chemical signals to communicate, but scientists are unsure what these signals mean.



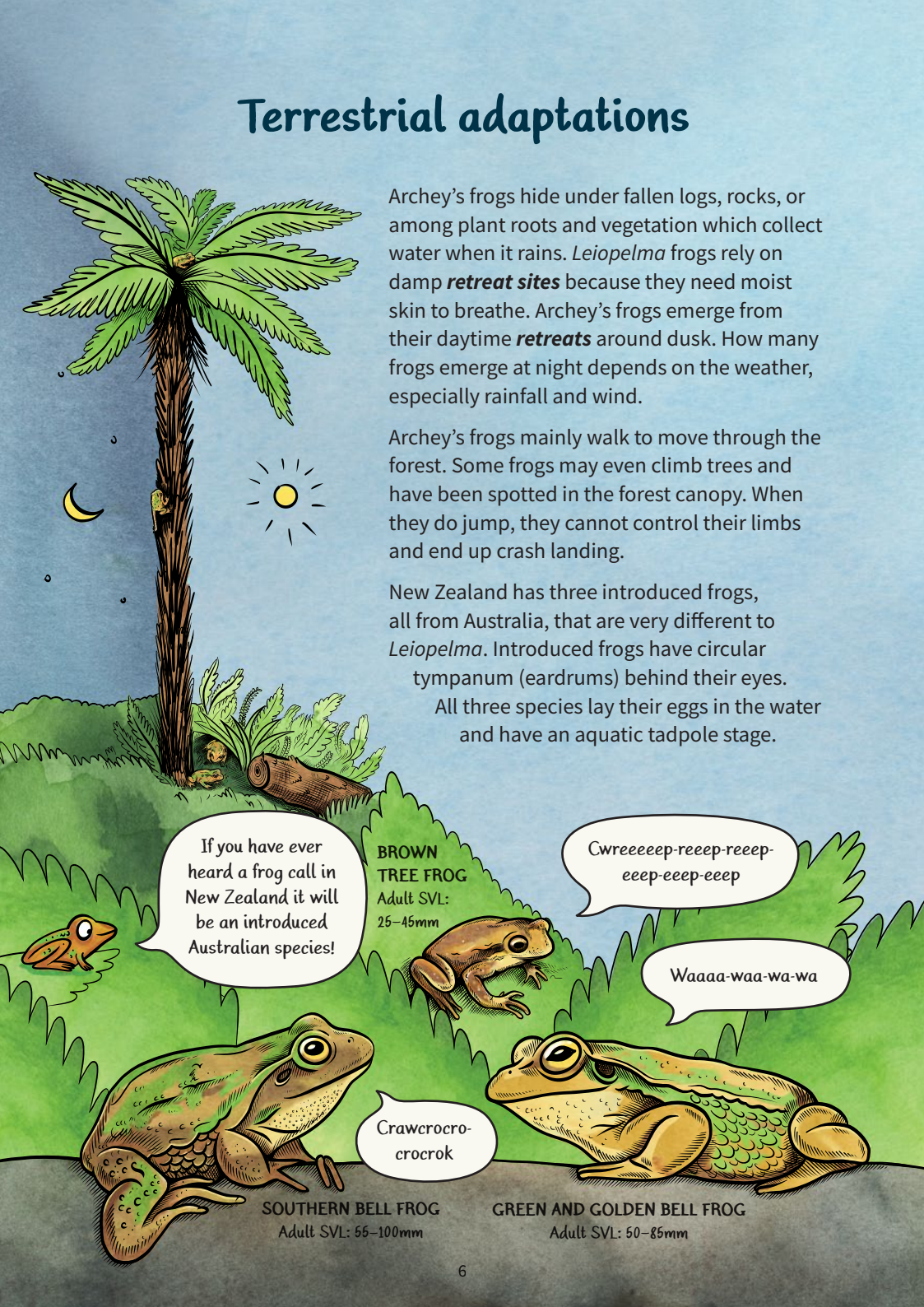
Terrestrial adaptations

Archey's frogs hide under fallen logs, rocks, or among plant roots and vegetation which collect water when it rains. *Leiopelma* frogs rely on damp **retreat sites** because they need moist skin to breathe. Archey's frogs emerge from their daytime **retreats** around dusk. How many frogs emerge at night depends on the weather, especially rainfall and wind.

Archey's frogs mainly walk to move through the forest. Some frogs may even climb trees and have been spotted in the forest canopy. When they do jump, they cannot control their limbs and end up crash landing.

New Zealand has three introduced frogs, all from Australia, that are very different to *Leiopelma*. Introduced frogs have circular tympanum (eardrums) behind their eyes.

All three species lay their eggs in the water and have an aquatic tadpole stage.



If you have ever heard a frog call in New Zealand it will be an introduced Australian species!

BROWN TREE FROG
Adult SVL: 25–45mm

Cwreeeeeeep-reeep-reeep-
eeep-eeep-eeep

Waaaa-waa-wa-wa

Crawcrocro-
crocrok

SOUTHERN BELL FROG
Adult SVL: 55–100mm

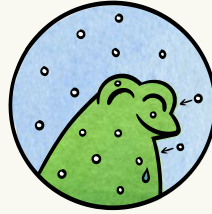
GREEN AND GOLDEN BELL FROG
Adult SVL: 50–85mm

Semipermeable skin

Amphibians have **semipermeable** skin which allows **diffusion** of oxygen so they can breathe, and **osmosis** of water to keep them hydrated.

Diffusion is a process where small molecules like oxygen or water move from an area of high concentration to an area of low concentration, until the two areas are equal. **Osmosis** is a special type of **diffusion** where water moves across a **semipermeable** membrane.

DIFFUSION
Oxygen



OSMOSIS
Water

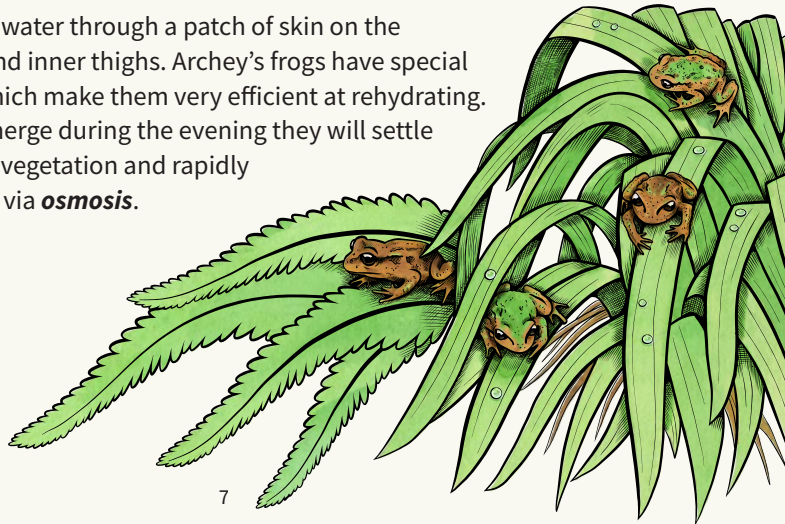


Dry



Wet

Frogs absorb water through a patch of skin on the lower belly and inner thighs. Archey's frogs have special hormones which make them very efficient at rehydrating. Once they emerge during the evening they will settle down on wet vegetation and rapidly absorb water via **osmosis**.



Archey's frog life cycle

Metamorphosis is a distinctive process seen in amphibians where they develop from a larval tadpole stage to a fully developed adult. However, Archey's frogs show parental care and embryos develop inside the egg. They have **adapted** to **terrestrial** conditions!

Archey's frogs live for up to 34 years. It will be about 4 years before froglets mature and breed for the first time.



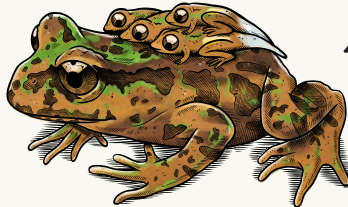
Females lay their eggs in moist **retreat sites**. Males fertilise the eggs and guard them for 2-3 months until they hatch.



After **metamorphosis**, froglets are tiny versions of adults; they are just under 1cm long!



Archey's frogs spend their entire larval stage inside the egg, feeding on a large yolk sac!



After hatching, froglets climb onto their father's back for another 1-2 months until **metamorphosis**.

Breeding and parental care

Compared to other frogs, *Leiopelma* populations take a long time to grow because they are **K-selected**. *Leiopelma* frogs reproduce less often and have a smaller number of offspring. Archey's and Hamilton's frogs also show parental care to their offspring which requires a lot of energy.

K-selected species are **adapted** to stable environments like temperate rainforests. **K-selected** species are often at an increased risk of extinction. *Leiopelma* populations struggle to recover from sudden population declines caused by mammalian predators, disease, or habitat loss.

Auckland Zoo has a small colony of Archey's frogs to learn about these **cryptic** frogs in a controlled environment. Zoo staff research supports frog conservation in the wild. Auckland Zoo is the only facility to successfully breed Archey's frogs! But the reliability of spawning and successful raising of larvae and froglets remains a challenge.

A favourite spot for Archey's frog fathers to protect their eggs is inside the hollow trunks of dead ponga, but they can also be found taking care of their eggs under vegetation, logs, and rocks.

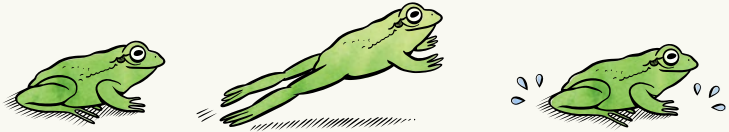


Leiopelma locomotion

Leiopelma aren't 'stereotypical' frogs, they are **primitive** so are similar to frogs that lived hundreds of millions of years ago. Some of *Leiopelma*'s **primitive** features are seen when they begin to move.

Leiopelma frogs prefer to walk, rather than jump. Check out the difference between other frogs and *Leiopelma* when they try to jump!

Most frogs

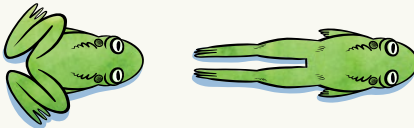


Leiopelma

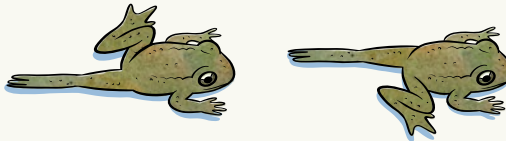


Leiopelma frogs don't swim like other frogs either. Their swimming technique is less efficient!

Most frogs



Leiopelma



Scientists discovered fossil frogs in Argentina which lived 200 million years ago, and look very similar to *Leiopelma* frogs!



There are two **terrestrial** *Leiopelma* species (Archey's and Hamilton's frogs) and one semi-aquatic species (Hochstetter's frog)!



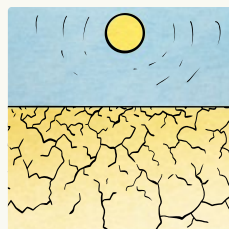
Threats to Archey's frog survival

Archey's frogs have many **adaptations** to **terrestrial** life that makes them successful in their native forest habitat. However, human-caused threats make them vulnerable to extinction. By understanding Archey's frogs' biology and ecology we can learn how to best protect them as kaitiaki.

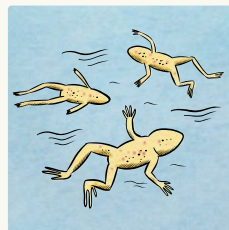
Archey's frogs are threatened by mammalian predators. Rats are believed to have the biggest impact on their survival. Supporting a predator control programme in areas where native frogs live is one way to help.



Climate change is a threat for many native species. Rising temperatures, decreasing rainfall and more frequent extreme weather events such as droughts or cyclones, could make some regions of native forest unsuitable for *Leiopelma* frogs.



Archey's frogs are also threatened by disease, especially **Chytridiomycosis** (pronounced “kit-trid-di-o-my-co-sis”), a disease caused by **chytrid fungus**. Cleaning and disinfecting boots before visiting native forests, and never moving introduced frogs for pet trade reduces disease risk.



Herbicides can be absorbed by frogs causing them to become very sick. In areas where *Leiopelma* frogs live you should avoid using herbicides in your garden or farm.

Archey's frogs require the stable conditions within temperate rainforests to survive and reproduce. Protecting and restoring their native forest habitat is essential for the survival of native frogs.

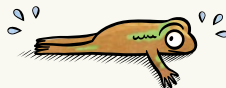


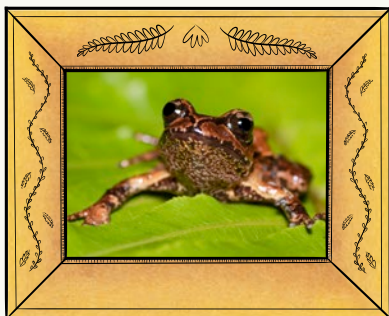
Archey's frogs are the world's most Evolutionarily Distinct and Globally Endangered (EDGE) amphibian.



Glossary

Adaptation (adapt)	An evolutionary process by which an organism becomes more suited to its environment.
Chytridiomycosis (Chytrid fungus)	A fungal disease which has devastated amphibian populations globally (pronounced “kit-trid-di-o-my-co-sis”).
Cryptic	An organism is cryptic when it possesses physical or behavioural characteristics that conceal its presence or activity.
Diffusion	The movement of molecules from an area of high concentration to an area of low concentration.
Invertebrates	Describes animals without a backbone.
K-selected	Species that are long-lived and produce few offspring.
Metamorphosis	A drastic developmental change of an animal, physically and behaviourally; for example, when a butterfly develops from a caterpillar, or a frog develops from a tadpole.
Osmosis	The free movement of water through a semipermeable membrane towards the area of high solute (salt) concentration.
Primitive	Describes organisms or traits which are similar to/occur early in a group’s evolution.
Retreat site	A site where <i>Leiopelma</i> hide during the day or in dry weather.
Semipermeable	A scientific word that describes a barrier that lets some gases (oxygen) or liquids (water) pass through it, but not others.
Terrestrial	An organism that lives on land.





How can you help New Zealand's native frogs?

Tell anyone you know everything that you've learnt about Archey's frog. The more people that know, the more that people will care!

Keep learning about native frogs. There are three more booklets in the *Pepeketaua of Aotearoa* series: *Hochstetter's Frog*, *Hamilton's Frog*, and *Extinct Native Frogs*. You can also visit the **nzfrogs.org** website.





Archey's frog (*Leiopelma archeyi*) is one of New Zealand's last remaining native frogs. These special, tiny frogs are perfectly adapted to New Zealand's native forest but are at risk of extinction! Learn about why Archey's frogs are at risk and their special adaptations to terrestrial life.

With the support of experts and specialists, the NZFrogs team have developed a set of resources to educate, inspire, and help everyone on their journey to become *Leiopelma* native frog kaitiaki!

**CURIOUS
MINDS**

HE HIIHiri | TE MAHARA



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