

Amphibians, Reptiles and Kiwi

TEACHERS

This unit of work has been designed to support your class visit for the ‘Amphibians, reptiles and kiwi’ programme at the National Aquarium of New Zealand. Students will participate in a range of level-specific interactive activities.

The primary focus of this programme is the Living World Strand of the Science Curriculum, however when planning your unit of work, links can be made to other essential learning areas. Similarly, different essential skills can be emphasised depending on the needs of your students.

PROGRAMME OVERVIEW

The ‘Amphibians, Reptiles and Kiwi’ programme teaches students about the different features and characteristics found in amphibians, reptiles and kiwi and addresses some of the environmental issues that affect these animals.

Students will examine and discover what special features the animals have to successfully live in certain environments and why each animal has adapted to live in its environment.

ESSENTIAL LEARNING AREA: Science

STRAND: Living World

ACHIEVEMENT AIM 2 AND 3: Investigate and understand relationships between structure and function in living organisms. Investigate and understand how organisms grow, reproduce and change over generations.

Level	Essential Learning Area	Strand	Achievement Aim	Achievement Objective
1	Science	Living World	Structure and Function. Interdependence of living organisms.	Observe and identify parts of common animals.
2	Science	Living World	Structure and Function. Interdependence of living organisms.	Use differences and similarities in external characteristics to distinguish broad groups of living things.
3	Science	Living World	Structure and Function. Interdependence of living organisms.	Investigate special features of animals and describe how these help them to stay alive.
4	Science	Living World	Structure and Function. Interdependence of living organisms.	Investigate and describe special features of animals or plants that help survival into the next generation.

SCIENTIFIC SKILLS AND ATTITUDES

- Focusing and Planning
- Information Gathering
- Processing and Interpreting
- Reporting

The 'Amphibians, Reptiles and Kiwi' programme at the National Aquarium of New Zealand lays the foundations for developing the above investigative skills and attitudes.

SPECIFIC LEARNING OUTCOMES

- To understand why a particular type of animal lives in certain habitats.
- To understand, describe and identify examples of structural, functional and behavioural adaptations that help animals survive into the next generation.
- To become aware of the environmental factors that may affect amphibians, reptiles and kiwi and discuss how certain factors affect their survival.

MAJOR TOPICS COVERED BY THIS BOOKLET:

- 1) Amphibians and reptiles
- 2) Our national icon – the kiwi

Amphibians, Reptiles and Kiwi

Pre and Post-Visit Activities

Pre-visit activities

Amphibians, reptiles and kiwi are all unusual animals; ideal subjects for a class focusing on structural adaptations or identification of characteristics (similarities and differences) between varying groups of animals. Differences between amphibians and reptiles are addressed in this booklet. Activities and information about New Zealand endemic animals housed at the aquarium (e.g. kiwi, tuatara and geckos) is also included in this booklet.

Amphibians and reptiles

What's the difference?

Discuss with the class about what they know about reptiles and amphibians. Write a list on the board. Once you have completed your list discuss with the class how the animals differ. Do they have slimy skin or scales? Where do they live – in water, moist places or hot dry places? Do they lose their skin? From the class discussions are the children able to recognise any patterns in which to group the different animals?

Amphibians vs reptiles

Make class posters of amphibians and reptiles – cut pictures out from old magazines, newspapers or print pictures out from web pages. Extend this exercise by making a special poster of only New Zealand native amphibians and reptiles. How many different types of amphibians and reptiles are found in New Zealand and it's off shore islands? Hint: Information and pictures may be available from the Department of Conservation website link.

Fabulous Facts What do you know about the differences between amphibians and reptiles?

Amphibians can be distinguished from reptiles by possessing scale-less skin. The skin of amphibians often serves as a respiratory organ (i.e. absorb oxygen and water through their skins). Water evaporates rapidly through amphibians' skins and therefore they can easily die of dessication. Thus amphibians are usually found in moist environments. Amphibians and reptiles are cold-blooded. That is their body temperature depends on absorbing heat from the environment. Birds and mammals are hot-blooded animals. Birds and mammals generate their own heat when they are in a cooler environment and cool themselves by sweating and panting when they are in a hotter environment .

Amphibians, reptiles and us!

Discuss with the class how we differ from amphibians and reptiles. Do we absorb water and oxygen through our skins? What special organs do we have to allow us to breathe? Do we need to bask in the sun before we become active?

Fabulous Facts.... What do you know about...

Are there any differences between turtles, terrapins and tortoises?

Turtles are a group of reptiles whose bodies are enclosed in a box of bony plates (shell). Turtles are able to pull limbs and their head inside their shell for protection. Turtles lack teeth and lay their eggs on land (even the aquatic turtles).

The name terrapins can be applied to virtually any small freshwater turtle but is usually applied to the North American turtles such as the black terrapin (*Malaclemys terrapin*) and red-eared or pond terrapin (*Pseudemys scripta*).

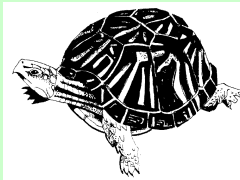
The name tortoise is usually applied to the large herbivorous turtles that live in dry habitats particularly in Africa and oceanic islands (e.g. Galapagos Islands).

Another way to distinguish turtles, terrapins and tortoise is focus on where they lived. Turtle are usually fully aquatic and have flippers suitable for swimming. Terrapin can live in both aquatic and terrestrial environments and has legs adapted for both swimming and walking on land. Tortoises are solely terrestrial and have legs adapted for walking on land.

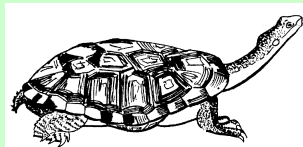
What are the differences between alligators and crocodiles?

The distinguishing feature between alligators and crocodiles is the position of teeth (not that anyone would want to inspect an alligator's or crocodile's mouth too closely!).

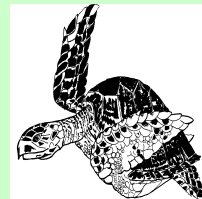
Alligators have the upper teeth lying outside the lower teeth when the month is closed. Also alligators have broader and shorter heads than crocodiles. Crocodiles on the other hand have both their upper and lower teeth in line.



Florida box tortoise
(*Terrapene caroline bauri*)



Long-necked terrapin
(*Chelodina longicollis*)



Hawke-billed turtle
(*Eretmochelys imbricate*)

Crocodiles and CITES

Crocodiles in some countries are becoming rare due to habitat destruction and hunting. Crocodiles are also taken live for private collections or used to make leathers, hunting trophies and medicines. To stop the decline of crocodiles, CITES (the Convention on International Trade in Endangered Species of wild fauna and flora) have prevented the trade of crocodiles or crocodile products within countries which are part of the international agreement (includes New Zealand). Note: some trade of crocodiles may be allowed by special permit.

Ask the class to do a research project on CITES and what crocodile products are traded within some countries. Hint: Check out the CITES web link and extra information about CITES and associated activities can be found in the Environmental issues, pre and post-visit activities under the heading 'CITES: The international way to stop the plight of biodiversity'.

The crocodile rap

Make a chant or poem about crocodiles!

For example:

**Do Crocodiles cry?
Oh, they might try!
Be careful!
Keep a watch out for crocodiles,
lurking in murky waters!
You ought to be careful,
otherwise you could end in an awful death!**

The ancient Tuatara

Watch a video that focuses on the importance of New Zealand as a piece of Gondwana and some of the associated animals, such as tuatara (for example, 'Ghost of Gondwana' - a Wild South video)

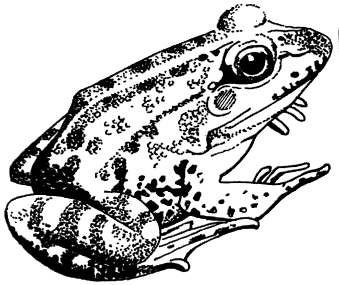
Do a class research project on tuatara and why they are so important. Hint: information on tuatara may be available on the DOC website. Extra information can be found in a 'Did You Know' box within the Environmental Issues pre and post-visit activities, under the sub-title 'introduced species'.

Frogs frolicking in NZ

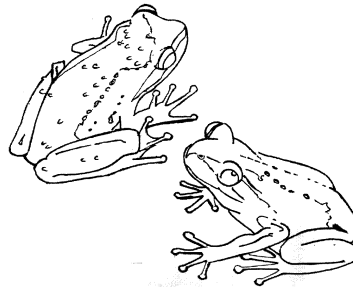
In New Zealand, there are three common frogs; the green tree frog, golden bell frog and whistling tree frog. The common frogs were all introduced from Australia. New Zealand also has three *very* special native frogs; Hochstetter's frog (*Leiopelma hochstetteri*), Hamilton's frog (*L. hamiltoni*) and Archey's frog (*L. archeyi*). The

endemic native frogs come from a very ancient lineage, not found anywhere else on Earth (apart from in the fossil record). Invite an authority on Herpetology (study of frogs) along to the school. Hint: Department of Conservation local office is probably the best line of first contact or check out their web site under 'Herpetofauna'. Have a good list of questions to ask the person and put together a class froggy 'thank you' card.

Golden bell frog



Whistling tree frog



Fabulous Facts What do you know about New Zealand native frogs and tuatara?

Gondwana relics of the past.....

New Zealand native frogs are the most primitive living frogs in the world! There are three known species of native frog; Hochstetter's frog, Hamilton's frog and Archey's frog. New Zealand native frogs are unusual in that they can not croak like other common frogs and they produce live froglets rather than a free-swimming tadpole stage.

Tuatara are living fossils that have survived without apparent modification for the best part of 200 million years! Tuatara were once wide-spread in New Zealand but are now confined to offshore islands. Tuatara are slow breeders, breeding every 4-5 years. One clutch may have up to 10-14 eggs and they may take 8-16 months to hatch. Baby tuatara possess a small beak-like structure at the tip of their nose to help them break through the egg shell when hatching. Another unusual feature of young tuatara is the 'third eye' (parietal spot) found on the top of their heads. The third eye may function as a light sensitive organ. N.B. The tuatara is *not* a type of lizard, rather it is a very special type of reptile of which the tuatara is the only surviving member. The other relatives are fossil remains found in South Africa.



Note: The Environmental Issues pre and post-visit booklet has some introductory activities that focus on Gondwana.

Your very own amphibian or reptile

Ask the class to draw their very own amphibian or reptile (use the provided sheet at the back of the booklet). What does the amphibian or reptile eat? What type of skin does it have? What features does it have to protect itself from predators?

An alternative to drawing is to cut and paste different textured fabrics (e.g. coloured cotton, leather, plastics, vinyl or packaging/bubble wrap) onto an outline of a frog or reptile (see provided sheets at back of booklet)

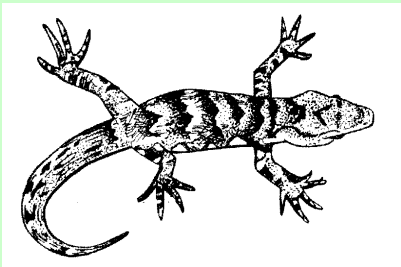
Fabulous Facts ... What do you know about New Zealand geckos?

There are approximately 17 species of gecko found in New Zealand and *all* of them are endemic!

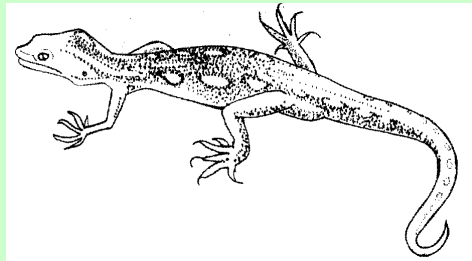
Some of the New Zealand geckos, particularly the forest gecko (*Hoplodactylus granulatus*) have an amazing vocal ability. They can produce loud croaks or barks that can be heard from some distance away.

Geckos have fused eyelids and therefore can not blink or close their eyelids. A special transparent skin covers the gecko eyes and is cleaned by licking the 'eye' with a tongue. If you watch the gecko in the aquarium display for a while you may be lucky enough to see this happen.

New Zealand geckos differ from most other geckos around the world in that they bear live young. It has been suggested that New Zealand's cooler climate caused an evolutionary change within New Zealand geckos from egg-laying (oviparous) to live-bearing (viviparous).



Forest gecko



Green gecko

Check out the aquarium gecko and skink display. What type of geckos and skinks are on display?

Amphibians and HIPPO

HIPPO is a key phrase used by World Wildlife Fund. It is recognised that habitat loss, introduced species, pollution, population growth and over-consumption are major problems world-wide and need to be addressed if ecosystems and their associated plants and animals are to have a chance of survival. Hint: More details of HIPPO and HIPPO activities can be found in the Environmental Issues pre and post-visit activities booklet.

Frogs (and other amphibians) are very susceptible to habitat loss, pollution and introduced species. Most amphibians (but not all!) require clean, green, moist, wet environments. Massive habitat loss such as forest destruction, drainage of wetland habitats and dirtying of watery habitats via sedimentation, chemical or industrial pollution has led to the decline of amphibians. Species introductions can also be a problem as new species may compete with native amphibians for food and habitat space. Some new species may carry diseases that native amphibians have yet to come in contact with and other new species may find the native amphibians a tasty snack! Amphibians are very sensitive to pollution (on land as well as within the water) as amphibians absorb most of their water and oxygen through their skins. Just imagine if you absorbed petrol spills or other toxins (fly sprays etc.) through your skin! There would be a few sick people around!

Using the provided balloon fact sheet (see back of booklet), ask the class to write a few sentences about each of the environmental issues and how they affect amphibians.

Our national icon – the kiwi

Watching kiwi

Have a discussion about what the class knows about kiwi –make a list on the board. Watch a video on kiwi, e.g. Wild South – Kiwi, TVNZ Wild South. After watching the video, discuss the video, add to the ‘already know’ facts listed on the board.

Kiwi characteristics

Using the provided picture of the kiwi (see back of booklet), write something about the different characteristics of the kiwi, Describe the different characteristics and explain what are characteristic used for?

Kiwi egg mould

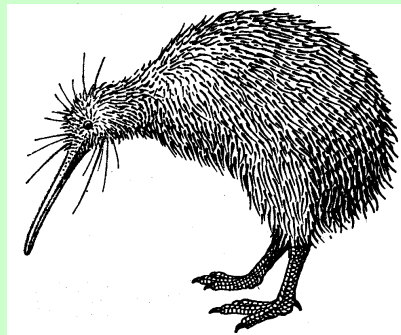
Make a kiwi egg shape out of polystyrene foam – hollow it out so that it resembles the inside of a kiwi egg. Ask the children to bring along a hens egg to school (or provide hens eggs). Find out how many hens eggs fit into a kiwi egg (break open the eggs so the egg yolks and whites fill the mould!). Hint: To get a rough idea of the kiwi egg size check out the DOC web site link or make it approximately the size of a child’s size rugby ball.

Fabulous Facts What do you know about kiwi?

There are five different species of kiwi; North Island brown kiwi, great spotted kiwi, little spotted kiwi, South Island brown kiwi and the Stewart Island brown kiwi. Kiwi can live in pairs and often mate for life (30 years). The male does most of the egg incubating.

Kiwi is a most unusual bird that has some unique features:

- Kiwi is the only bird that has nostrils at the end of its bill.
- Kiwi has the largest egg size (to body weight ratio) in the world.



Kiwi and HIPPO

Like amphibians, HIPPO issues also affect kiwi. Habitat destruction and introduction of pests are major problems for kiwi. Most kiwi live in native forest as it has preferred sleeping and nesting burrows and has a diverse range of food available. Logging of native forest has limited the range of places in which kiwi will live and survive in. Introduced species such as cats, dogs and mustellids (i.e. stoats, ferrets and weasels) all predate on kiwi (chicks, juveniles or occasionally adults) and other introduced species such as goats, deer and possums will compete with kiwi for food sources. If kiwi are to have a good chance of survival places free of introduced predators and competitors are needed (e.g. Boundary Stream has reduced numbers of pests and has successfully reintroduced kiwi into the area).

Ask the children to write a few sentences about how HIPPO affects kiwi. Use the provided sheet (see back of booklet) or create your own.

Kiwi habitat

Ask the class to design their own kiwi habitat (use provided sheet at back of booklet).
Ask the students to comment on what special features the kiwi habitat has and what type of features it does not have (e.g. predators).

Post-visit activities

Temperature and reptiles....

Temperature can have profound effects on the sex of some reptiles. For example, if eggs of tuatara are incubated at warmer temperatures, the newly hatched tuatara are likely to be all males, whereas if eggs are incubated at cooler temperatures the young tuatara are likely to be all female.

Research the topic of environmental sex determination in reptiles. Hint: to find good web sites on this topic, use keywords such as 'reptiles', 'change of sex with temperature' and 'environmental sex determination'. Make a class poster indicating the change in sex of different reptiles with temperature. Draw a large thermometer beside the poster to indicate the range of temperatures at which reptiles change their sex.

A froggy habitat

Watch the development of tadpoles over time. Set up a classroom aquarium to house the tadpoles (you may be able to get some tadpoles from pet shops or a nearby pond). Ask the class to record the changes over a period of days or weeks.

Ask the class to design an environment for amphibians (e.g. frogs) or tuatara – what features would it have? (see the back of booklet for provided sheet or make your own sheet to suit). Extend this activity by actually creating an amphibian habitat in the school grounds. Use the design or combination of designs that the class thinks is the most suitable for this type of habitat. Does the habitat have rocks, a cool well-vegetated place? ... you may even get frogs visiting!

Ask the expert

Phone the aquarium and ask an aquarist how they design habitats for amphibians or other animals. The tuatara display at the aquarium has special technological features (e.g. temperature control, humidity sensor, UV light filter and sound protection – gel centred glass) in the display to ensure the tuatara's habitat is close to that in the wild.

Visit a kiwi sanctuary

Have a class field trip to a kiwi sanctuary, for example Boundary Stream, Hawke's Bay or Rainbow Springs, Rotorua.

Alternatively invite a person involved with kiwi recovery work to the school. Hint: enquire at your nearest Department of Conservation office for contacts. Make sure the class has lots of questions to ask and make a class kiwi 'thank you' card.

Kiwi crossword

Ask the class to find the kiwi related words in the crossword provided (see back of booklet).

Some useful references:

Collins field guide, Birds of New Zealand and Outlying Islands. By Falla, R.A., Sibson, R.B. and Turbott, E.G. Illustrated by Power, E. (1993). Harper Collins Publishers, Auckland.

The Incredible Kiwi, a wild south book. By Neville Peat (1990). Random Century, Auckland.

Wild South's Living Treasures of New Zealand. By R. Morris and P. Hayden (1995), Harper Collins, Auckland.

Audio tape of kiwi calls. Department of Conservation.

"Kiwi for ever" Teachers resource. Kiwi Recovery Programme. Bank of New Zealand, Department of Conservation and Forest and Bird.

New Zealand Amphibians and Reptiles. By Joan Robb (1980). Collins, Auckland.

Freshwater Life, Mobil New Zealand Nature series. By M. Winterbourne and Karen Mason (1983). Reed, Wellington.

Activity sheets and model answers

see below

Your very own amphibian or reptile

What is your animal called? _____

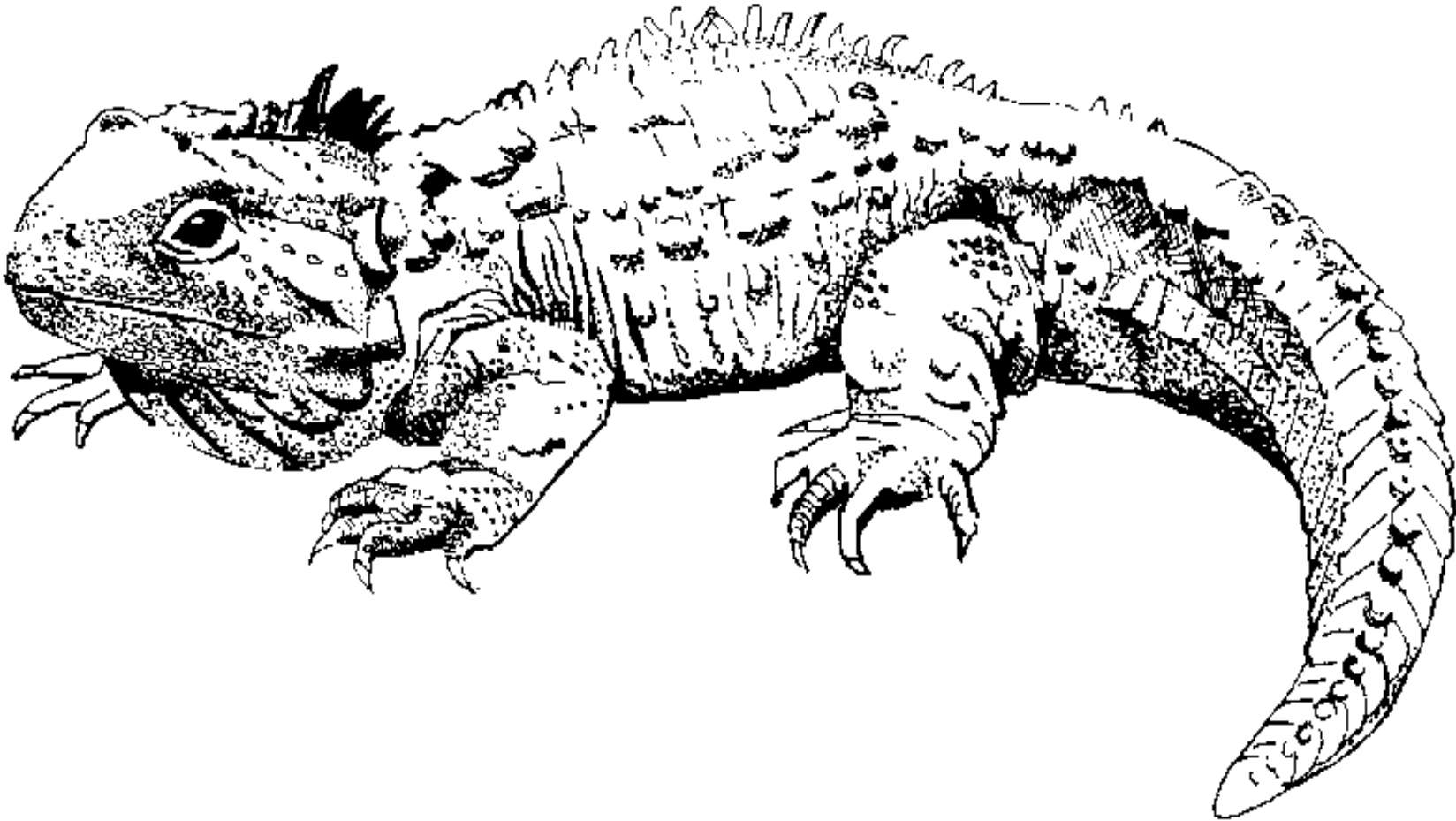
What does your reptile or amphibian eat?

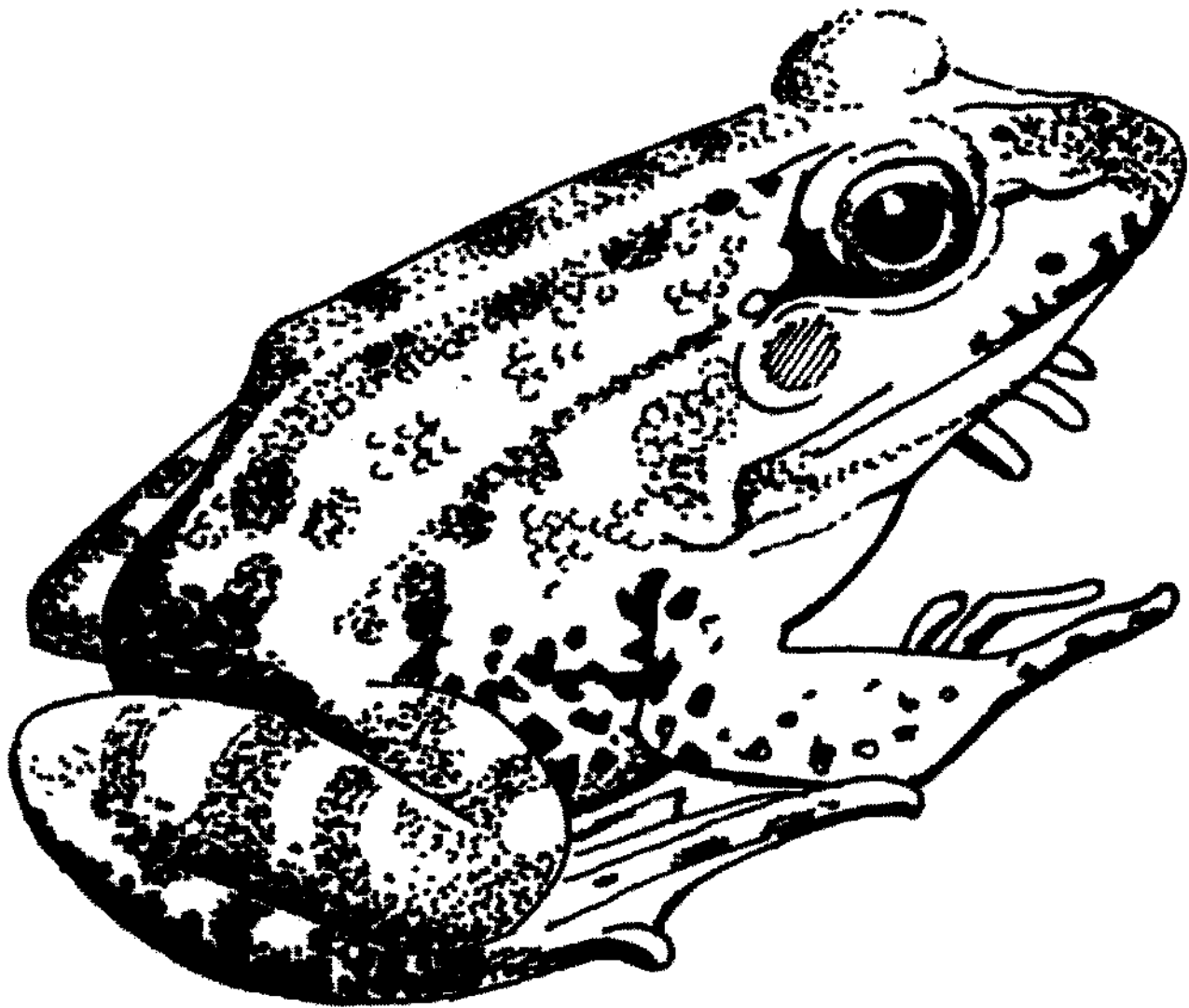
What type of skin does it have? _____

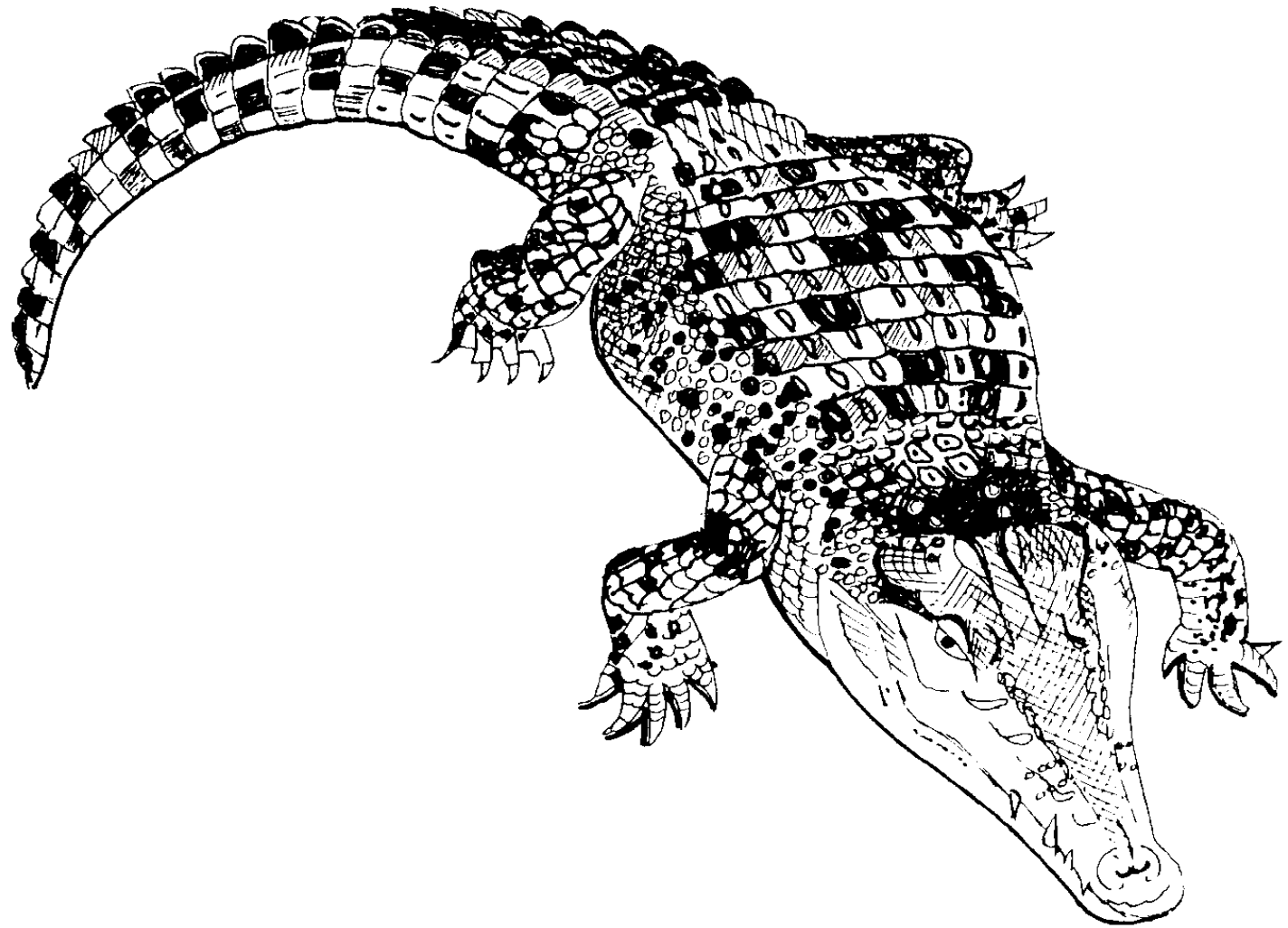
Does your reptile or amphibian have any protection from predators? Explain. _____

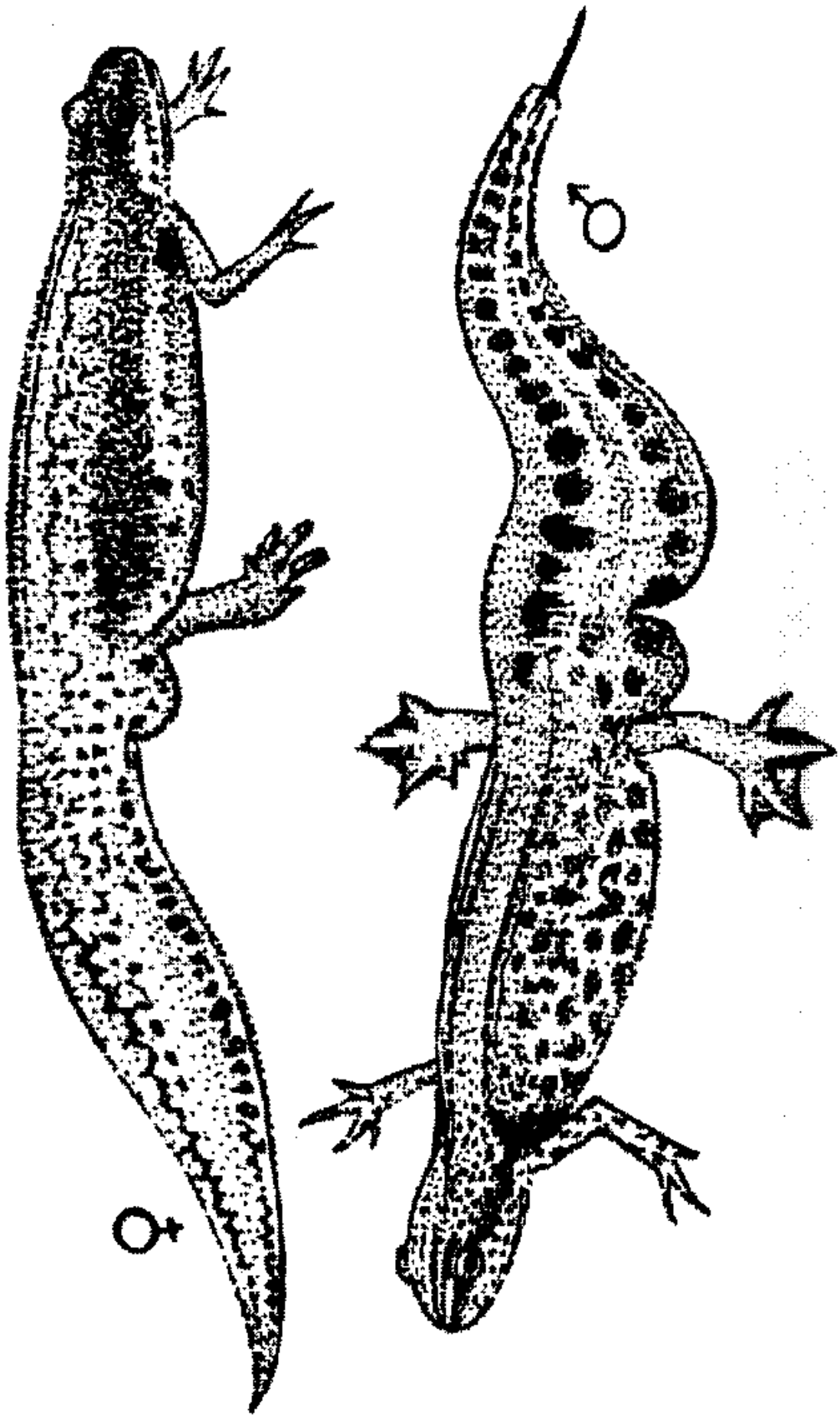


Cut and paste different fabrics to these reptiles and amphibians...







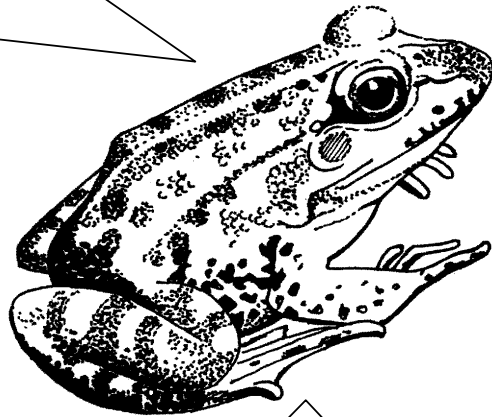


Amphibians and HIPPO

Write in the boxes how the HIPPO environmental issues affect amphibians:

P

H



I

P

O

Kiwi features

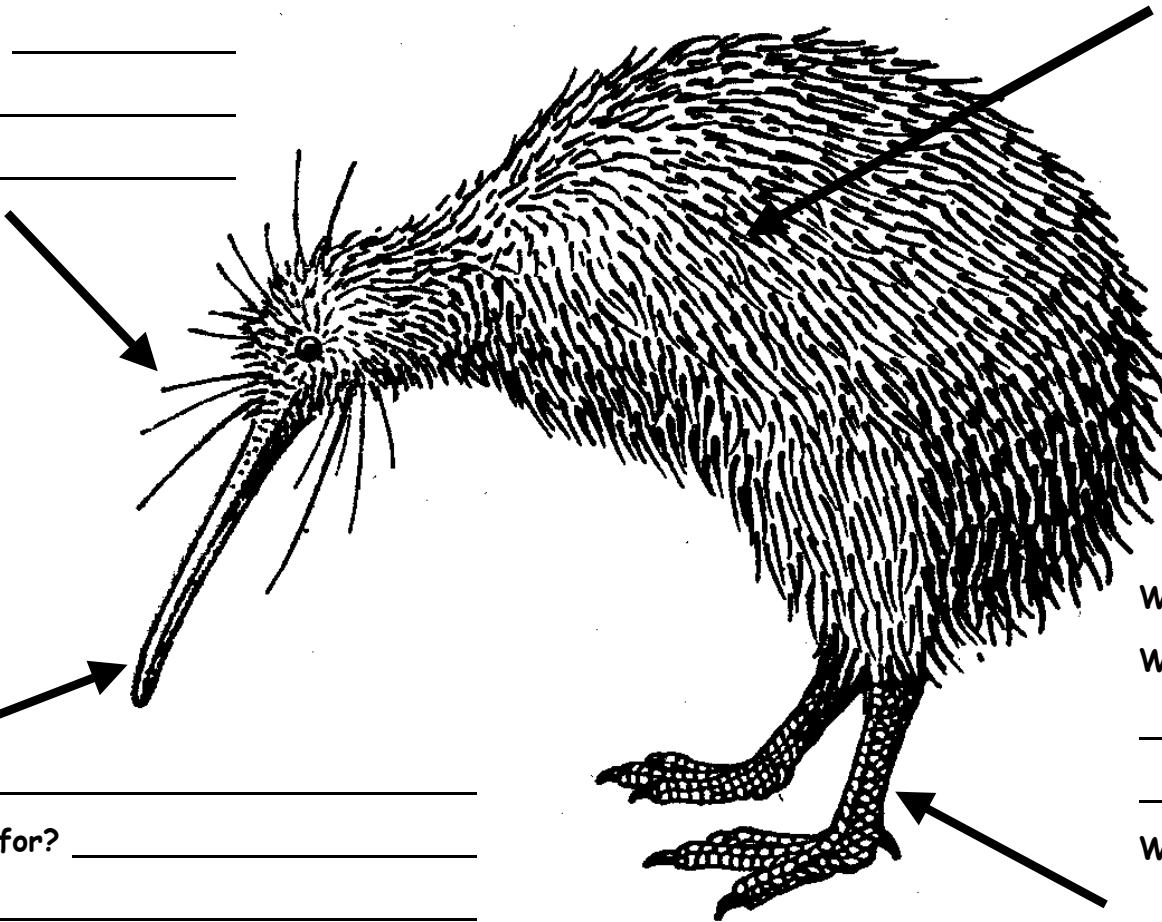
What is this? _____

What is it used for? _____

What is this? _____

What is it used for? _____

What does it feel like? _____



What is this? _____

What is it used for? _____

What is this? _____

What is it used for? _____

What does it feel like? _____

Kiwi and HIPPO

Write in the boxes how the HIPPO environmental issues affect kiwi:

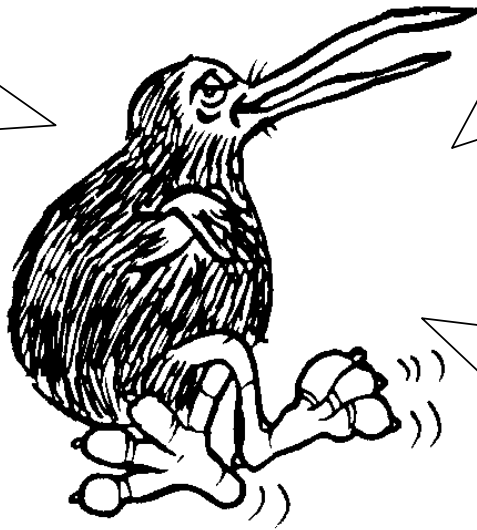
P

H

P

O

I



Design a kiwi habitat

What is your kiwi habitat called? _____

What special features does your kiwi habitat have? _____

What things does your kiwi habitat not have? _____

Put your drawing of your kiwi habitat in here:



A froggy habitat!

What is your frog or tuatara environment called? _____

What special features does this environment have? _____

Which part of the school grounds would best suit this environment? _____

Put your design of a frog or tuatara environment here:



Kiwi crossword

Find the kiwi related words in this crossword

E	A	D	O	G	S	S	D	F	G	H	J	K	L	W
N	F	Z	N	O	C	T	U	R	N	A	L	X	S	H
D	E	E	B	N	L	M	M	Q	W	X	O	R	E	I
A	R	D	E	F	A	G	H	J	E	K	O	L	L	S
N	R	I	I	T	W	O	P	R	K	T	L	M	M	K
G	E	C	E	R	S	T	P	Y	A	U	N	E	Y	E
E	T	O	P	O	I	U	Y	D	T	R	A	E	W	R
R	L	N	E	G	G	K	E	O	J	H	T	N	G	S
E	A	M	P	I	B	R	I	C	A	K	I	W	I	N
D	H	W	J	K	P	U	I	O	P	F	O	O	L	L
Q	N	O	S	T	R	I	L	A	Z	L	N	R	W	C
S	X	R	E	D	C	R	E	F	T	I	A	B	V	T
K	I	M	M	Y	I	S	G	S	I	G	L	T	T	U
I	R	S	T	O	A	T	E	E	G	H	G	I	B	A
C	A	M	E	L	I	R	F	E	A	T	H	E	R	S
K	B	U	R	R	O	W	G	O	O	L	D	A	E	R
S	T	E	P	F	H	D	O	U	G	E	S	R	A	T
B	A	N	A	T	I	V	E	T	T	S	Y	S	I	S
S	A	N	C	T	U	A	R	Y	A	S	E	N	I	F

Nostril Whiskers Eye Feet Feathers Ear Leg Egg Native Flightless Dogs
Predators Endangered Worms Kiwi Sanctuary DOC Ferret Stoat Burrow
Nocturnal Claws Forest Brown Kick National Icon

Answers:

