

New Zealand Lizards



**An environmental education
teaching resource
for levels 3 and 4**

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Introduction

What is the resource *New Zealand Lizards*?

New Zealand Lizards is an environmental education programme aimed at Levels 3 and 4 of the New Zealand Draft Curriculum, although it can easily be adapted for younger or older students. It has been developed so students can learn about lizards and then take action to help lizards in their local community.

Why use this resource?

Few New Zealanders know much about the lizards of Aotearoa and this is a shame. Lizards are wonderful animals that have lived here for millions of years but are often overlooked. There are at least 80 species of lizard that live throughout New Zealand from the far north to Stewart Island occupying a range of habitats from the coast to the mountains. All our native species are found only in New Zealand and that makes them very special. There is one introduced lizard, the Rainbow skink, which came from Australia and can be found from Auckland to Wanganui.

Lizards were once far more abundant and widespread but that all changed with the arrival of humans. We have destroyed habitat and introduced mammalian predators (eg. mice, rats, cats, stoats, ferrets, weasels and hedgehogs), which has had a devastating affect on our lizards. Three species have become extinct; some species can only be found on offshore islands that are free from the introduced predators; and many species that are still on the mainland are in decline.

Lizards, like the kiwi and tuatara, are part of New Zealand's unique biodiversity that evolved here in isolation for millions of years. If we want these animals to survive so future generations can see them we need to do something to help. Baba Dioum, a Senegalese poet wrote:

“In the end, we conserve only what we love.
We will love only what we understand.
We will understand only what we are taught.”

Here is your chance to help. Take the first step and teach you students about New Zealand's lizards.

How is this resource organised?

This resource gives students the opportunity to:

- **Investigate** about lizards
- **Explore** in the local environment to find out how suitable it is for lizards
- **Take Action** for lizards in the local area

This structure is based on the Environmental education Guidelines. Students learn about lizards and the associated issues during the **investigate** stage. Students participate in field work to find out about local lizard habitat during the **explore** stage. Students plan and carry out projects that will help lizards in the **take action** stage.

All New Zealand lizards are protected by law

You can't: trap them, keep them or relocate them
(without permission from the Department of Conservation)

You can: Enhance their habitat

Environmental Education Unit Plan

Teachers:

Unit Title

New Zealand Lizards

Learning Areas (highlight relevant areas)

English	Maths	Social Sciences	Science	Technology	Health / PE	The Arts	Maori
Listening Reading Viewing Speaking Writing Presenting	Number & Algebra Geometry & Measurement Statistics	Identity, Culture & Organisation Place & Environment Continuity & Change Economic World	Nature of Science Living World Physical World Material World Planet Earth	Technological Practice Technological Knowledge Nature of Technology	Personal Health & Phys Dev Movement Concepts & Motor Skills Relationships with Others Healthy Communities & Environments	Dance Drama Music Visual Arts	Listening Reading Viewing Speaking Writing Presenting

Values

Excellence
Innovation, enquiry, and curiosity
Diversity
Respect
Equity
Community and participation
Care for the environment
Integrity

Key Competencies

Managing self
Relating to others
Participating and contributing
Thinking
Using language, symbol, and texts

EE Guidelines (highlight relevant areas)

Key Concepts of EE

Interdependence
Sustainability
Biodiversity
Personal & Social responsibility for action

Key Dimensions of EE

Education 'about' the environment
Education 'in' the environment
Education 'for' the environment

Investigate
Explore
Take Action

Resources

Building Science Concepts

#6 Soil Animals – Diversity beneath our feet

School Journals

Patterson, G. 1994. Skinks and geckos – can you tell the difference. Part 3, Number 2: 58-61.

Books

Gill, B. & Whitaker, T. 2001. *New Zealand Frogs and Reptiles*. David Bateman, Auckland, New Zealand.

Jones, J. 2002. *Lizards*. Reed Children's Books, Auckland, New Zealand.

Jones, J. 2001. *Skinks*. Heinemann Education, Auckland, New Zealand.

Video:

Eye Witness: Reptile

CD:

Kean, M. 2000. *Adaptive Radiation of the New Zealand Geckos*. Privately made CD. Contact mkean@xtra.co.nz to purchase.

ICT Component

Digital record of action work using still camera and / or digital video footage.

Tell others about it – record action project work in powerpoints or on iMovie and present to other students / staff / parents.

Websites

Department of Conservation
<http://www.doc.govt.nz/Conservation/001~Plants-and-Animals/001~Native-Animals/Lizards/index.asp>

The New Zealand Herpetological Society
<http://www.reptiles.org.nz/links.htm>

Achievement Objectives

Science: Levels 3 and 4

Living World: Evolution (LW: Ev)

Begin to group plants, animals, and other living things into science based classifications.

Living World: Ecology (LW: E)

Explain how living things are suited to their particular habitat and how they respond to environmental changes.

Nature of Science: Participating and Contributing (NoS: P&C)

Students will use their growing science knowledge when considering issues of concern to them.

They will explore various aspects of an issue as they make decisions about possible actions.

Learning Intentions

Investigate (LW: Ev)

Investigate # 2 - Students will know the 2 main features of reptiles and the 4 groups of living reptiles.

Investigate # 3 - Students will know how to distinguish a gecko from a skink.

Investigate # 7 - Students will understand that there are different cultural traditions that help to explain the similarities and differences among animals.

Investigate / Explore (LW: E)

Investigate # 4 - Students will know the main cause of lizard decline and can identify the lizards most vulnerable.

Investigate # 5 - Students will know about the life of the common skink.

Investigate # 6 - Students will know how to protect lizards from cats.

Explore report card - Students will assess how lizard friendly a specific site is.

Explore / Take Action (NoS: P&C)

Take action - Students will plan and complete a lizard garden.

Success Criteria

Investigate (NoS: P&C)

Investigate # 2 - Students can successfully answer questions 2 and 3 on the video viewing sheet.

Investigate # 3 – Students can successfully identify the features that distinguish a gecko from a skink.

Investigate # 7 – Students can successfully answer question 3.

Investigate / Explore (LW: E)

Investigate # 4 – Students can successfully answer questions 7 – 10.

Investigate # 5 – Students can successfully answer questions 1 -6.

Investigate # 6 – Students can successfully answer question 7.

Explore report card – Students can successfully complete the report card; making conclusions and recommendations based on their findings.

Take Action (NoS: P&C)

Take action - Students can successfully complete their lizard garden project within the time allocated.

Assessment Process / Tools

Pre test / Post test

Investigate # 1 – KWLH about New Zealand lizards.

Investigate / Explore

“How skink friendly is your site” report card. (LW: E)

Take Action

Assessment of the student’s role in the creation of the lizard garden. (NoS: P&C)

Section 1: Investigate New Zealand lizards

Activities overview

The investigate section offers a range of activities that will develop students knowledge about reptiles in general, the lizards in New Zealand, how they live and the threats they face.

Investigate # 1 KWLH about New Zealand lizards (pages 8-9)

Students complete the first two columns before the unit begins. This helps the teacher to find out what the students already know and what they want to find out. The last two columns are completed at the end of the unit.

Learning intention: Students will write down what they know and what they want to find out about lizards in New Zealand.

Success criteria: Students complete the first 2 columns of the KWLH.

Investigate # 2 Eyewitness reptile video (pages 10-11)

Students view the Eyewitness Reptile video (available from libraries) and complete the video viewing sheet. This is a great introduction as it gets students interested in reptiles.

Learning intention: Students will know the two main features of a reptile and the four groups of living reptiles.

Success criteria: Students can successfully answer questions 2 and 3 on the video viewing sheet.

Investigate # 3 Fascinating facts: geckos and skinks (pages 12-14)

This is a cooperative group activity. Students cut out and discuss the statements about geckos and skinks. They decide whether the statement applies to geckos, skinks or both and then they place the statement in the appropriate place on the chart. When the students have completed their charts the teacher can discuss the answers with the class. The students can then glue the statements in the correct place on the chart.

Learning intention: Students will know how to distinguish a gecko from a skink.

Success criteria: Students can successfully identify the key physical features that distinguish a gecko from a skink.

Investigate # 4 Lizards in the Wellington region (pages 15-18)

Students read about lizard families in New Zealand and then look at the chart to learn specific details about the lizards of the Wellington region. They need to be able to interpret the chart to answer the questions on the activity sheet. This activity will initiate discussion about the decline of lizards.

Learning intention: Students will know the main cause of lizard decline and can identify the lizards most vulnerable.

Success criteria: Students can successfully answer questions 7 – 10.

Investigate # 5 Case study: common skink (pages 19-22)

Students read the information about common skink and then complete the activity sheet. This activity will get students to understand what common skinks need to survive and how they protect themselves.

Learning intention: Students will know about the life of the common skink.

Success criteria: Students can successfully answer questions 1 – 6.

Investigate # 6 Kelly, Trilly and the skinks (pages 23-25)

Students read the information about cats and skinks and complete the activity sheet. This activity could lead on to a debate about the positive and negative aspects of owning a cat.

Learning intention: Students will know how to protect lizards from cats.

Success criteria: Students can successfully answer question 7.

Investigate # 7 Punga: the father of ugly things (pages 26-28)

Students read a Maori view on how reptiles were created and then complete the activity sheet.

Learning intention: Students will understand that there are different cultural traditions that help to explain the similarities and differences among animals.

Success criteria: Students can successfully answer question 3.

Investigate # 1

KWLH about New Zealand lizards

Pre-unit questions	
What I know about New Zealand lizards	What I want to find out about New Zealand lizards

Investigate # 1

KWLH about New Zealand lizards

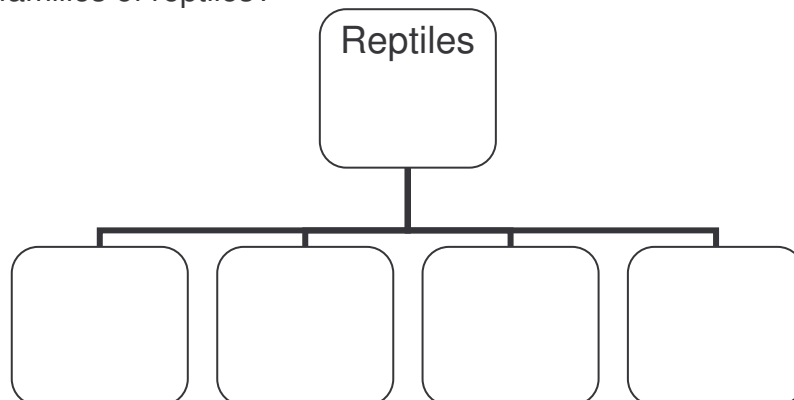
Post-unit questions	
What I have learned about New Zealand lizards	How I learned about New Zealand lizards

Investigate # 2

Eyewitness Reptile video

View the Eyewitness Reptile video and answer the questions below.

1. Reptile means
2. What are the 4 families of reptiles?



3. All reptiles:
 - a. have scaly skin
Their skin is
 - b. are cold blooded
Reptiles need % less energy from food than mammals.
4. The largest lizard is larger than a
The smallest lizard is smaller than a
5. Complete the chart to show some lizard adaptations.

Type of lizard	Adaptation
Thorny devil	
Basilisk	
Gecko	
Chameleon	
Friilled lizard	
Armadillo lizard	
Komodo dragon	

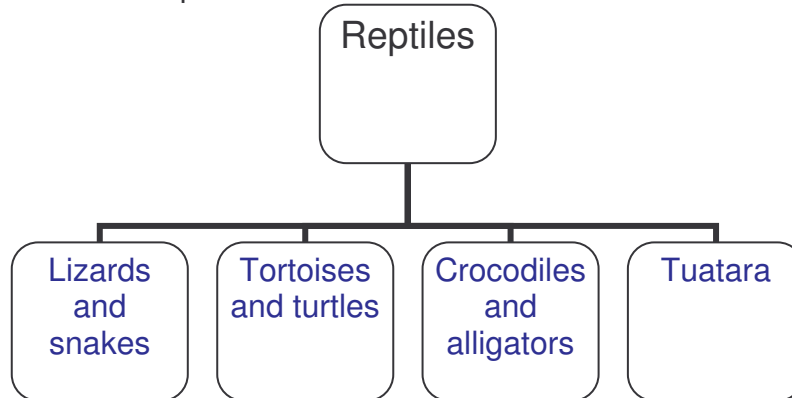
6. The reptile egg allowed reptiles to live permanently on land. The egg consists of 3 things:
 - a.
 - b.
 - c.
7. Many reptiles can of their skin.
8. Many lizards can to escape from predators.

Investigate # 2

Teacher Answer Sheet

View the Eyewitness Reptile video and answer the questions below.

1. Reptile means “things that creep.”
2. What are the 4 families of reptiles?



3. All reptiles:
 - a. have scaly skin
Their skin is **thick and watertight** (keeps water in).
 - b. are cold blooded
Reptiles need **80 %** less energy from food than mammals.
4. The largest lizard is larger than a **man**.
The smallest lizard is smaller than a **beetle**.
5. Complete the chart to show some lizard adaptations.

Type of lizard	Adaptation
Thorny devil	Spines collect dew for the lizard to drink.
Basilisk	It walks on water to escape predators.
Gecko	Small hairs on its feet allow it to grip to smooth surfaces.
Chameleon	It uses its tongue to catch prey; its eyes can move in different directions; and it can change colour.
Frilled lizard	The frill makes it look larger to deter predators.
Armadillo lizard	It bites its own tail so it is hard for other animals to eat it.
Komodo dragon	It has toxic saliva which will kill the animal it bites.

6. The reptile egg allowed reptiles to live permanently on land. The egg consists of 3 things:
 - a. **Water**.
 - b. **Bag of food**.
 - c. **Casing** so air can get in but water can't get out.
7. Many reptiles can **grow out of their skin** of their skin.
8. Many lizards can **drop their tails** to escape from predators.

Created by Richard Romijn

Investigate # 3

Fascinating facts: geckos and skinks

New Zealand has 2 families of lizard; geckos and skinks. Cut out the statements about lizards on the following page. Figure out whether each statement is about geckos, skinks, or both. Once you have decided place it in the correct place on your sheet.

Facts about geckos



Facts about skinks



Facts about geckos and skinks

Investigate # 3

Statements about geckos and skinks

I have a distinct head – body – neck.

I look like a snake with legs.

I can drop my tail when attacked by a predator.

My regrown tail is never as long as my original tail and is usually a different colour and pattern.

I lick my eye to clean it as I don't have a moveable eyelid.

I blink with my moveable lower eyelid.

Just like fish I have flat, shiny and overlapping scales.

My scales are small and granular.

I shed my skin in small pieces.

I shed my skin whole or in large pieces.

I have small eyes.

I have large eyes.

I rely on the environment to warm my body so I can hunt and feed.

I don't lay eggs but give birth to live young.

Most of my species are active during the day.

Most of my species are active at night.

I mainly eat insects and spiders.

I usually give birth to twins.

Most reptiles are silent, but I can make a chirping noise.

I am a silent reptile.

Many of my species can climb smooth surfaces.

I have very slender toes.

Investigate # 3

Teacher Answer Sheet

Cut out the statements on the following page. Figure out whether each statement is about geckos, skinks, or both. Once you have decided place it in the correct place on your sheet.

Facts about geckos



- I have a distinct head – body – neck.
- I lick my eye to clean it as I don't have a moveable eyelid.
- My scales are small and granular.
- I shed my skin whole or in large pieces.
- I have large eyes.
- Most of my species are active at night.
- I usually give birth to twins.
- Most reptiles are silent, but I can make a chirping noise.
- Many of my species can climb smooth surfaces.

Facts about skinks



- I look like a snake with legs.
- I blink with my moveable lower eyelid.
- Just like fish I have flat, shiny and overlapping scales.
- I shed my skin in small pieces.
- I have small eyes.
- Most of my species are active during the day.
- I am a silent reptile.
- I have very slender toes.

Facts about geckos and skinks

- I can drop my tail when attacked by a predator.
- My regrown tail is never as long as my original tail and is usually a different colour and pattern.
- I rely on the environment to warm my body so I can hunt and feed.
- I don't lay eggs but give birth to live young.
- I mainly eat insects and spiders.

Investigate # 4

Lizards in the Wellington Region

In New Zealand there are 2 families of lizard; geckos and skinks.

Our geckos fall into 2 groups, *Hoplodactylus* and *Naultinus*. ***Hoplodactylus*** geckos are brown or grey in colour and are usually nocturnal (active at night). They live on the ground or in trees.

Naultinus geckos are green and are diurnal (active during the day) and live in trees.

Our skinks fall into 2 groups; *Cyclodina* and *Oligosoma*. ***Cyclodina*** skinks prefer to live in shaded areas. They are nocturnal or crepuscular (active at dawn and dusk). ***Oligosoma*** skinks prefer to live in open sunny areas. They are diurnal and like to sun-bask.

Lizards on the Wellington mainland – Past and Present

Genus	Species	Maximum Size (SVL)*	Time active	Where Active	Presence on mainland
<i>Hoplodactylus</i>	Common gecko	82mm	Nocturnal	Ground & trees	Common
	Duvaucel's gecko	160mm	Nocturnal	Ground & trees	Extinct
	Forest gecko	89mm	Nocturnal	Trees	Common
	Goldstripe gecko	70mm	Nocturnal	Flax	Extinct
	Pacific gecko	94mm	Nocturnal	Ground & trees	Rare
<i>Naultinus</i>	Green gecko	95mm	Diurnal	Trees	Common
<i>Cyclodina</i>	Copper skink	62mm	Nocturnal	Ground	Common
	McGregor's skink	112mm	Nocturnal	Ground	Extinct
	Ornate skink	80mm	Nocturnal or Crepuscular	Ground	Common
	Robust skink	142mm	Nocturnal	Ground	Extinct
	Whitaker's skink	101mm	Nocturnal or Crepuscular	Ground	Rare
<i>Oligosoma</i>	Brown skink	73mm	Diurnal	Ground	Common
	Common skink	77mm	Diurnal	Ground	Common
	Speckled skink	106mm	Diurnal	Ground	Rare
	Spotted skink	95mm	Diurnal	Ground	Common

***Snout-vent length (SVL)** is the measurement from the tip of the snout to the vent, which is an opening between the back legs.

Investigate # 4

Lizards in the Wellington Region

Look at the information about lizards in the Wellington region and answer the following questions.

Find the answer:

- Which genus has the most species?

.....

- How many *Oligosoma* species are there?

.....

- What is the longest lizard? How long can it grow?

.....

- What is the shortest lizard? How long can it grow?

.....

- Name the species that you have a good chance of finding on the Wellington mainland?

.....

.....

- Why do you think scientists measure snout – vent length instead of measuring to the end of the tail?

.....

.....

Rare and extinct lizards in the region:

- Complete the chart to show the details of all the **rare** and **extinct** lizards in the region.

Species	Size (snout vent length)	Time active	Where active

- What fraction / percentage of each genus is rare or extinct on the mainland

$$\textit{Hoplodactylus} = \dots / 5 = \dots \%$$

$$\textit{Naultinus} = \dots / 1 = \dots \%$$

$$\textit{Cyclodina} = \dots / 5 = \dots \%$$

$$\textit{Oligosoma} = \dots / 4 = \dots \%$$

9. Using your answers in questions 7 and 8, make 3 general statements about our rare and extinct lizards.

- a.
.....
- b.
.....
- c.
.....

For lizard experts only:

10. Before humans arrived in New Zealand, the country was a land of birds, reptiles, frogs and the only mammals present were bats. When the Maori arrived, the rat kiore was introduced to New Zealand. Scientists believe that kiore had a huge impact on lizards causing extinctions and reducing the numbers of lizards on the mainland. If the scientists are correct and the kiore were largely responsible, what 3 things can you tell me about the kiore and its habits?

- a.
.....
- b.
.....
- c.
.....



McGregor's Skink

Investigate # 4

Teacher Answer Sheet

Find the answer:

1. Which genus has the most species? *Hoplodactylus* and *Cyclodina*.
2. How many *Oligosoma* species are there? *Four*.
3. What is the longest lizard? How long can it grow? *Duvaucels's gecko - SVL160mm*.
4. What is the shortest lizard? How long can it grow? *Copper skink – SVL 62mm*.
5. Name the species that you have a good chance of finding on the Wellington mainland?
Common gecko, Forest gecko, Green gecko, Copper skink, Ornate skink, Brown skink, Common skink and Spotted skink.
6. Why do you think scientists measure snout – vent length instead of measuring to the end of the tail? *Because lizards can drop their tails.*

Rare and extinct lizards in the region:

7. Complete the chart to show the details of all the **rare** and **extinct** lizards in the region.

Species	Size (snout vent length)	Time active	Where active
Duvaucel's gecko	160mm	Nocturnal	Ground and trees
Goldstripe gecko	70mm	Nocturnal	Flax
Pacific gecko	94mm	Nocturnal	Ground and trees
McGregor's skink	112mm	Nocturnal	Ground
Robust skink	142mm	Nocturnal	Ground
Whitaker's skink	101mm	Nocturnal or crepuscular	Ground
Speckled skink	106mm	Diurnal	Ground

8. What fraction / percentage of each genus is rare or extinct on the mainland
Hoplodactylus = 3 / 5 = 60 %
Naultinus = 0 / 1 = 0 %
Cyclodina = 3 / 5 = 60 %
Oligosoma = 1 / 4 = 25 %
9. Using your answers in questions 7 and 8, make 3 general statements about our rare and extinct lizards.
 - a. *Hoplodactylus* geckos and *Cyclodina* skinks mainly become rare or extinct.
 - b. Most rare or extinct lizards are nocturnal or crepuscular.
 - c. All rare or extinct lizards spend time on the ground or in low growing plants.
 - d. Most rare and extinct lizards are large.

For lizard experts only:

10. Before humans arrived in New Zealand, the country was a land of birds, reptiles, frogs and the only mammals present were bats. When the Maori arrived, the rat kiore was introduced to New Zealand. Scientists believe that kiore had a huge impact on lizards causing extinctions and reducing the numbers of lizards on the mainland. If the scientists are correct and the kiore were largely responsible, what 3 things can you tell me about the kiore and its habits?
 - a. *Kiore are nocturnal.*
 - b. *Kiore live on the ground.*
 - c. *Kiore can catch and eat large lizards.*

Investigate # 5

Case Study: Common skinks

Size and colour

The common skink is a relatively small skink. They can grow to a snout-vent length of 77mm (the length from the tip of the snout to the vent which is between the back legs). The skink's original tail is usually about the same size as the snout-vent length. Common skinks are usually brown with stripes; however some skinks on the coast are almost black.



Life Cycle

Common skinks are born in January and have a snout-vent length of about 25mm. As soon as they are born they have to look after themselves. They have their first hibernation from mid April until the end of August and will do this every year for the rest of their lives. The young skinks continue to grow and become adults when their snout-vent length is 41mm. This usually happens when they are 2 to 3 years old. As they grow bigger they shed their skin in small pieces. Every year adult females will usually give birth to 3-5 young in January. Common skinks will live for several years.



This is a gravid female.



This is a new born baby skink.

Habitat

Common skinks live in the lower North Island and in much of the South Island. They live in open areas where there are low growing plants with lots of rocks or logs to hide under. They can be found in grassland and low shrub areas from the coast to the mountains. Common skinks are active during the day and can often be seen basking in the sun.

Home Range

Common skinks have a home range of about 12m². A home range is the area where a skink normally lives. Many common skinks can live in the same area which may lead to fights over basking sites. Skinks will chase, head butt, lash their tails and bite each other leaving many animals with scars.



This skink has been bitten by another skink. You can see the scar on its throat.

Food

Common skinks actively hunt their prey. Their favourite foods are insects and spiders. Most of the invertebrates they eat are 1-5mm long, but they can eat larger food items. On one occasion a skink ate a caterpillar that was 21mm long, which filled its whole stomach. Common skinks also eat the fruit of some native plants (eg. *Coprosma propinqua*) but this is a very small part of their diet.

Defense

Common skinks have 3 main defensive strategies. The first is camouflage. Their striped back makes them hard to see among the grasses and shrubs. Second, if a predator disturbs them they run away quickly to hide under cover. Finally they can drop their tail if a predator catches them. This allows the skink to escape while the predator is left chasing a wriggling tail. The tail does grow back but it is usually smaller and has a different colour and pattern.



This skink has lost its tail.



This skink has a regrown tail. Notice that it has a different colour and pattern than the original tail.

Predators

Before humans arrived in New Zealand the main skink predators were birds. Birds mainly use sight to locate their prey so skinks had a good chance of escape if they could hide under cover. When humans arrived they brought mammals that eat lizards (eg. mice, rats, cats, stoats, ferrets, weasels, hedgehogs). Mammals use smell to find their prey and can hunt out the lizards in their hiding places. Lizards are not as common now because of introduced predators and because their habitat is being destroyed.

Investigate # 5

Common skink case study

Look at the information about lizards in the Common skink fact sheet and answer the following questions.

Find the answer:

1. When do common skinks hibernate?

.....

2. How many young do females usually give birth to?

.....

3. What are common skinks main food items?

.....

4. What are the 3 main defensive strategies of a common skink?

.....

5. What sense do birds mainly use to hunt?

.....

6. Why are introduced mammals such a problem for lizards?

.....

Investigate

7. Draw the size of a common skink's home range on the playground. You will need a metre ruler and some chalk.

8. What animals mentioned in the text do you think have a larger home range than common skinks? Why?

.....
.....

9. What animals in the text do you think have a smaller home range than common skinks? Why?

.....
.....

Be Creative

10. Draw a cartoon strip to show how the common skink uses its 3 main defensive strategies.

11. Make a poster to show the year in the life of an adult female.

Investigate # 5

Teacher Answer Sheet

Look at the information about lizards in the Common skink fact sheet and answer the following questions.

Find the answer:

1. When do common skinks hibernate?
From about mid April until the end of August.
2. How many young do females usually give birth to?
3 to 5 young per year.
3. What are common skinks main food items?
Insects and spiders.
4. What are the 3 main defensive strategies of a common skink?
Common skinks will use camouflage, run away or drop their tail to avoid predators.
5. What sense do birds mainly use to hunt?
Most birds use sight.
6. Why are introduced mammals such a problem for lizards?
Mammals use smell to hunt and can find lizards in their retreats.

Investigate

7. Draw the size of a common skink's home range on the playground. You will need a metre ruler and some chalk.
Draw an area of 12m².
8. What animals mentioned in the text do you think have a larger home range than common skinks? Why?
Birds and introduced mammals. They are larger animals that are warm blooded. Therefore they need to eat more often than lizards and will need to forage over a wider area.
Flying Insects, like butterflies, can travel many kilometres to mate or find food.
9. What animals in the text do you think have a smaller home range than common skinks? Why?
Spiders that make webs spend their time close to their web.
Many walking insects may not need to go far to find their food or mate.

Be creative

10. Draw a cartoon strip to show how the common skink uses its 3 main defensive strategies.
11. Make a poster to show the year in the life of an adult female.

Investigate # 6

Kelly, Trilly and the skinks

Kelly loves her cat Trilly, and Kelly loves skinks. The problem is that her cat Trilly loves skinks too.

Kelly and Trilly live in Kelburn, Wellington. In one year Trilly has brought home more than 30 ornate skinks. She was able to catch the skinks because people in the area had recently removed lots of plants where the lizards lived. This meant the skinks didn't have many good hiding places left and so Trilly was able to catch them.

Kelly has saved many of the skinks that Trilly has brought home. She also leaves things for skinks to hide under inside and outside her house. That way when Trilly brings home skinks and Kelly isn't home the skinks still have a chance to escape to safety.

Scientific studies have shown that cats only bring back a small number of the lizards they catch. Kelly knows for sure that Trilly has killed four or five skinks, but it is likely that Trilly has killed many more than this.

Kelly wanted to help the skinks. All native lizards are protected by law so she contacted the Department of Conservation and asked them what she should do. They gave her permission to keep the lizards at home until they could be sent to a safer place. On Sunday 14 October 2006 twenty-six ornate skinks were taken to Matiu/Somes Island in Wellington Harbour.

The skinks will be much safer on the island reserve because there are no introduced predators (eg: mice, rats, cats, stoats, hedgehogs). "I'm going to miss them because they're so beautiful," says Kelly. "But they're going to a fabulous place and they'll just love it."



If you are a cat owner you can help protect lizards by:

- Having your cat neutered or spayed so they can't produce unwanted kittens.
- Keeping your cat well fed and providing moving toys for it to play with, so it is less likely to chase lizards.
- Keeping your cat indoors at night so they don't catch nocturnal lizards.
- Not dumping unwanted kittens and cats - either give them to the SPCA or ask a vet to put them down humanely.
- Not keeping a cat if you live near an area known for its wildlife.

If you rescue a lizard from your cat you should:

- Put it in a box to recover overnight before releasing it back into the garden.

Investigate # 6

Kelly, Trilly and the skinks

Look at the information about Kelly, Trilly and the skinks and answer the following questions.

Find the answer:

1. What type of skinks did Trilly catch?

.....

2. Why was Trilly able to catch the skinks?

.....

.....

3. This story gives examples of the 2 main problems facing lizards today in New Zealand. What are the 2 problems?

.....

.....

4. What did Kelly do to make her place safer for the skinks?

.....

.....

5. Where did Kelly send the skinks? Why?

.....

.....

Your opinion:

6. What is your opinion about the way Kelly acted?

.....

.....

7. What do you think is the best advice for cat owners? Why?

.....

.....

Be creative

8. Make a cartoon strip to show the story.

9. Create a skit about Kelly, Trilly and the skinks.

10. Plan out and then make a poster about one of the things that cat owners can do to help protect lizards.



Investigate # 6

Teacher Answer Sheet

Look at the information about Kelly, Trilly and the skinks and answer the following questions.

Find the answer:

1. What type of skinks did Trilly catch?
Trilly caught ornate skinks.
2. Why was Trilly able to catch the skinks?
People in the area had removed plants where the skinks lived.
3. This story gives examples of the 2 main problems facing lizards today in New Zealand. What are the 2 problems?
Predation by introduced mammals and habitat destruction.
4. What did Kelly do to make her place safer for the skinks?
She left things for skinks to hide under inside and outside her house.
5. Where did Kelly send the skinks? Why?
She sent them to DOC who put them on Matiu Somes Island. She did this because they are protected animals just like Kiwi.

Your opinion:

6. What is your opinion about the way Kelly acted?
Eg. Kelly did a fantastic thing. Many cats catch lizards but how many people try to help the lizards.
7. What do you think is the best advice for cat owners? Why?
Eg. People should not own cats as they kill wildlife; people should grow plants and have things for lizards to hide under in their garden.

Be creative

8. Make a cartoon strip to show the story.
9. Create a skit about Kelly, Trilly and the skinks.
10. Plan out and then make a poster about one of the things that cat owners can do to help protect lizards.

Investigate # 7

Punga: the father of ugly things

Humans describe many creatures in the world as ugly. According to Maori tradition these creatures are the descendants of Punga, father of ugly things.

Long ago Ranginui, the sky father, and Papatuanuku, the earth mother, embraced each other so tightly that there was no space between them. The world was dark and their children weren't happy because they had no room. The children decided to split their parents apart. The children tried but no one could do it. Then Tane lay with his back on Papatuanuku, put his feet on Ranginui and pushed with all his might. He succeeded in separating his parents.

One of the children, Tawhirimatea the god of the wind, was angry with his brothers and decided to go and live with his father. From the sky he waged war on his brothers. He sent storms against Tane, the god of the forest. Trees swayed and branches came crashing down. He sent gales against Tangaroa, the god of the sea. The sea churned violently and waves crashed against the rocks. Creatures tried to find places to hide so they would be safe.

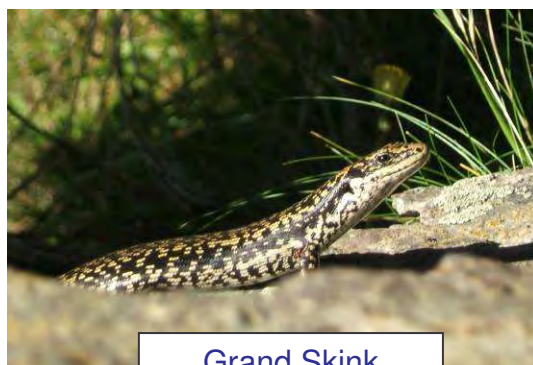
Punga who was the son of Tangaroa had two children of his own. They were Ika-tere and Tu-te-wehiwehi. During Tawhirimatea's attack they discussed where they would be safe. Ika-tere decided that he would be safer if he lived with his grandfather in the sea. Tu-te-wehiwehi decided that he would be safer in the forest of Tane. Having made their decisions the brothers said goodbye and went to their new homes. Eventually the brothers started families of their own, Ika tere's children are the fish and Tu-te-wehiwehi's children are the reptiles (tuatara, skinks and geckos).



Tuatara



Common Gecko



Grand Skink

Investigate # 7

Punga: the father of ugly things

Look at the information about the father of ugly things and answer the following questions.

Find the answer:

1. Who is the god of the forest?

.....

2. Why did Tawhirimatea wage war on his brothers?

.....

.....

Figure it out:

3. This myth explains that fish and reptiles have the same grandfather and so have some things in common. Complete the chart below to find out the similarities and differences of these relatives.

Fish only features	Shared features (Both fish and reptiles)	Reptile only features

Be creative

4. Make a family tree for Punga, the father of ugly things.
5. Make a skit based on this story.
6. Create a drawing depicting a scene in this story.

Investigate # 7

Teacher Answer Sheet

Look at the information about the father of ugly things and answer the following questions.

Find the answer:

1. Who is the god of the forest?
Tane
2. Why did Tawhirimatea wage war on his brothers?
Tawhirimatea waged war on his brothers because they separated Ranginui and Papatuanuku.

Figure it out:

3. This myth explains that fish and reptiles have the same grandfather and so have some things in common. Complete the chart below to find out the similarities and differences of these relatives.

Fish only features	Shared features (Both fish and reptiles)	Reptile only features
Live in water	scaly skin	Live on land or in trees
Gills	tail	Lungs
fins	large eyes (fish and geckos)	legs
	wriggle when they move	

Be creative

4. Make a family tree for Punga, the father of ugly things.
5. Make a skit based on this story.
6. Create a drawing depicting a scene in this story.

Section 2: Explore lizards in your school

Activities overview

The explore stage of this resource gives students the opportunity to participate in fun, hands on scientific research in their school grounds. The aim of the research is to identify and assess areas that could be enhanced for the benefit of lizards.

Report card: How lizard friendly is your site?

Students will assess a site / sites in the school grounds. The assessment involves the students completing 6 activities and using these findings to complete the report card “How skink friendly is your site?”

- Explore # 1: The presence of common skinks (Lower North Island and South Island) or Explore # 1: The presence of copper skinks (Upper North Island)
- Explore # 2: Sunshine
- Explore # 3: Skink habitat
- Explore # 4: Site connection
- Explore # 5: Skink food
- Explore # 6: Skink predators

Once all the activities are completed and the report card is filled in, the students will be able to complete the conclusion and make recommendations about whether their site should be considered as a possible option for creating a lizard garden in the school grounds.

Learning intention: Students will assess how lizard friendly a specific site is.

Success criteria: Students can successfully complete the report card; make conclusions and recommendations based on their findings.

Resources

You will need additional resources for the following activities:

- Explore # 2
Compass optional
- Explore # 5
Pitfall trap: small trowel, small plastic container, piece of wood or metal, 4 stones, 1 rock
Identifying invertebrates: small collection containers, paintbrush, tweezers, magnifying glass, key for soil invertebrates (photocopy from Building Science Concepts 6: Soil Animals – middle 4 pages).
- Explore # 6
2 Trakka Tunnels (buy from www.wildaboutnz.co.nz)
Lures: peanut butter, uncooked egg and meat.

Grouping of students

The class can be organised in a variety of ways to meet teacher and student needs. Here are some possibilities:

- Send the different groups to assess **different sites** around the school.
- Choose **one site** for all groups to assess. Some activities could be done as a class. Other activities could be done by releasing one group at a time to do their research.

On completion of research

Once the research has been completed students can:

- map potential sites on a school map
- report back to the class about the quality of their site
- compare results and discuss similarities and differences

Why research skinks?

The common skink and the copper skink are the most common lizards in the main centres.

Therefore our study will focus on them as they are what students are most likely to find. You can find out what other lizards may be present in your area by going to Appendix 1.

Common skinks	Copper Skinks
In the North Island common skinks are widespread from Hawkes Bay through the centre of the North Island across to Taranaki down to Wellington. They are also found throughout the South Island.	Copper skinks are widespread throughout the North Island and are not present in the South Island.
Study lizard for: Wellington Christchurch Dunedin	Study lizard for: Auckland

Australian invader: the Rainbow skink

The Rainbow skink arrived in New Zealand in the 1960's and has spread from Auckland to Wanganui. They are an unwanted pest. They are similar to copper skinks but can be told apart if you know what to look for. Rainbow skinks have a rainbow sheen on their back and have one large scale on the top of their head, whereas native skinks have 2 smaller scales. You can find out more about Rainbow skinks on the Biosecurity New Zealand webpage.

<http://www.biosecurity.govt.nz/pests-diseases/animals/rainbow-skink.htm>

If you think you have found a Rainbow skink you can call 0800 80 99 66 to inform the MAF Biosecurity Hotline in New Zealand.

Report Card

How skink friendly is your site?

Explore # 1: Presence of skinks

- Excellent** Skinks seen.
- Poor** No sign of skinks.

Explore # 2: Sunshine

- Excellent** North facing – with 6 hours of sunshine.
- OK** East or west facing – with 3 to 6 hours of sunshine.
- Poor** South facing – with less than 3 hours sunshine.

Explore # 3: Skink habitat

- Excellent** Dense growth of low growing plants with lots of debris (stones, logs etc) to hide under.
- OK** Patches of low growing plants with some debris (stones, logs etc) to hide under.
- Poor** Short lawn or bare soil with no debris (stones, logs etc) to hide under.

Explore # 4: Site connection

- Excellent** This site is connected to an area of dense low growing plants with lots of debris (stones, logs etc) to hide under.
- OK** This site is connected to an area with some low growing plants with some debris (stones, logs etc) to hide under.
- Poor** This site is isolated. It is surrounded by short lawn, bare soil or concrete with no debris (stones, logs etc) to hide under.

Explore # 5: Skink food

- Excellent** Lots of invertebrates (including beetles, caterpillars and spiders).
- OK** Some invertebrates (including beetles, caterpillars and spiders).
- Poor** Not many invertebrates found.

Explore # 6: Skink predators

- Excellent** No introduced mammals in the area.
- OK** Some introduced predators in the area.
- Poor** Lots of introduced mammals in the area.

Summary

Circle the words in bold type that match your results and give evidence to back up your statements in the space provided.

Skinks **have** / **have not** been observed in or around our site.

Our site provides **excellent** / **ok** / **poor** sunshine hours for skinks.

The habitat of our site is **excellent** / **ok** / **poor** for skinks because.....
.....
.....

The site connection is **excellent** / **ok** / **poor** because.....
.....
.....

The food supply for skinks is **excellent** / **ok** / **poor** because
.....
.....

Our site is **excellent** / **ok** / **poor** with regard to introduced mammals that prey on skinks.
Introduced predators include.....
.....
.....

Conclusion

Based on our research we think our site is an **excellent** / **ok** / **poor** site for skinks.

Recommendation

We recommend that our site be **considered** / **not be considered** as a possible option for creating a lizard garden in our school.

School site.....

Research team

Date / /

Explore # 1

The presence of common skinks (Lower North Island and South Island)

The first step

The first step is to find out if there are any common skinks in your site. If you see a skink that is fantastic because if you see one it means there will be others living in the area. If they have not been seen don't worry. It may just mean that they are in low numbers and have not been observed.

How to find out if skinks are present at your site

1. On a hot sunny day walk quietly around the site looking for skinks. Walk with the sun behind you so it casts a shadow on the area of vegetation where you are looking for skinks. If your shadow covers the skink it will quickly scurry for cover and you will hear rustling in the vegetation.
2. If this happens sit quietly and observe the patch of vegetation where you heard the noise. Skinks will often return to their basking spot after a couple of minutes, so if you are patient you may get to see it come back. Record where the skink was found.

Scoring System

Excellent	=	Skinks seen.
Poor	=	No sign of skinks.



Common skink

Discussion points:

Where did you find skinks? (eg. among plants, on a rock etc)

Why do you think they were in those areas?

What were the difficulties trying to find skinks?

Explore # 1

The presence of copper skinks (Upper North Island)

The first step

The first step is to find out if there are any copper skinks in your site. If you see a skink that is fantastic because if you see one it means there will be others living in the area. If they have not been seen don't worry. Copper skinks are very secretive and hide under cover most of the time.

How to find out if skinks are present at your site

1. On a hot sunny day walk quietly around the site looking for skinks. Copper skinks are secretive and seldom emerge from cover. You will have to look under debris (eg. rocks, logs, bits of wood etc) to find them.
2. If you see a skink scurry away that is good. Don't try to catch it. Just put the rock or wood back how you found it and record where you found the skink.
3. If you see small skinks basking in the sun they could be the introduced Rainbow skink. Talk to your teacher (refer page 30).

Scoring System

Excellent	=	Skinks seen.
Poor	=	No sign of skinks.



Copper skink

Discussion points:

Where did you find skinks? (eg. among plants, on a rock etc)

Why do you think they were in those areas?

What were the difficulties trying in finding skinks?

Explore # 2

Sunshine

The importance of sunshine

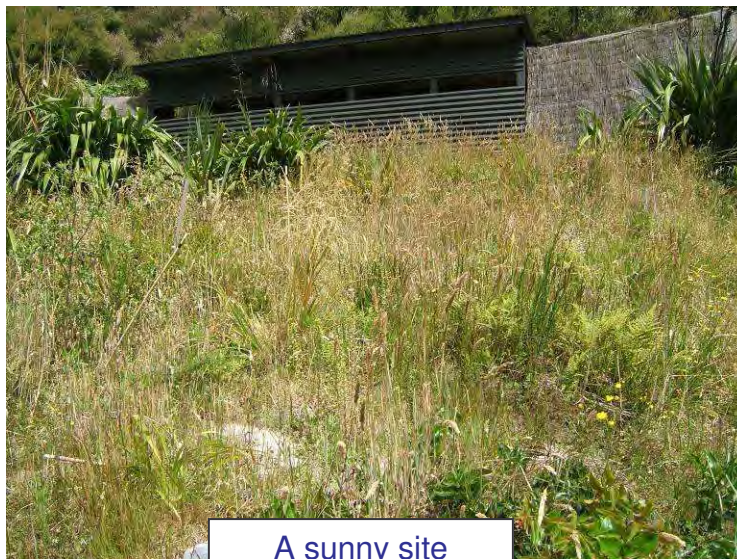
Skinks rely on the sun to warm up their bodies so they can perform their daily/seasonal activities of foraging for food, digesting food and mating. Gravid females also need the warmth of the environment to help their young develop. Some skinks spend a lot of time basking in the sun (eg. common skinks) while others bask less often (eg. copper skinks).

How to assess the sunshine of your site

1. Use a compass to assess which direction the site is facing. A north facing site is usually sunniest.
2. On a clear sunny day measure how many hours of sunshine the site gets. This can be done by checking the site every hour or so throughout the day (from 9am to 3pm) to see if it is in sunshine or not.
3. Record how many hour of sunshine your site gets.

Scoring system

Excellent	=	North facing - with 6 hours sunshine.
OK	=	East or west facing – with 3 to 6 hours sunshine.
Poor	=	South facing - with less than 3 hours sunshine.



Discussion points:

Do you think this would / would not be a good site for skinks?

Are you surprised at how much / little sun your site gets?

Do all lizards in New Zealand sun bask?

Explore # 3

Skink habitat

The importance of habitat

Common skinks like dry open areas with low vegetation or debris such as leaf litter, stones or logs. This habitat allows them to sun bask easily, provides their food supply as well as providing places to hide from predators. Copper skinks like both open sunny areas and shaded areas that have bigger trees.

How to assess the habitat of your site

1. Walk around your site carefully looking at the types of plants that are growing and the debris that is on the ground.
2. Compare your site with the scoring system and the pictures below.

Scoring system

Excellent	=	Dense growth of low growing plants with lots of debris (stones, logs etc) to hide under.
OK	=	Patches of low growing plants with some debris (stones, logs etc) to hide under.
Poor	=	Short lawn or bare soil with no debris (stones, logs etc) to hide under.



An excellent site



A poor site

Discussion points:

Why do common skinks live in low growing plant areas?

Would you find common skinks in forests?

What habitats do other lizards in New Zealand use?

Explore # 4

Site connection

The importance of areas being connected

Site connection is looking to see if your site is connected to other areas that could contain skinks. This is very important because connection allows animals to move to and from your area and so create a larger area for the skinks to use. If the proposed garden site is isolated, surrounded by short grass or concrete, it will be impossible for skinks to go in and out of your site.

How to assess the site connection

1. Walk around the outside of your site and look at what is next to it.
2. Use your eyes to see what type of habitat it is connected to.

Scoring system

Excellent	=	The site is connected to an area of dense low growing plants or bush with lots of debris (stones, logs etc) to hide under.
OK	=	The site is connected to an area with some low growing plants and some debris (stones, logs etc) to hide under.
Poor	=	The site is isolated. It is surrounded by short lawn, bare soil or concrete with no debris (stones, logs etc) to hide under.



A poor site

Discussion points:

What are the main barriers that stop skinks moving to other areas of suitable habitat?

How could you make better connections between your site and other areas where skinks may be?

How is site connection relevant to the conservation of other animals in New Zealand?

Explore # 5

Skink food

The importance of food

All animals need food to survive. Skinks are mainly carnivores, feeding on any insects and spiders that they can overpower. It is therefore important to find out what invertebrates are present at your site. Skink food supply can be assessed by searching under debris (rocks, logs etc) or by pitfall trapping.

A. Under Debris

To identify invertebrates you will need:

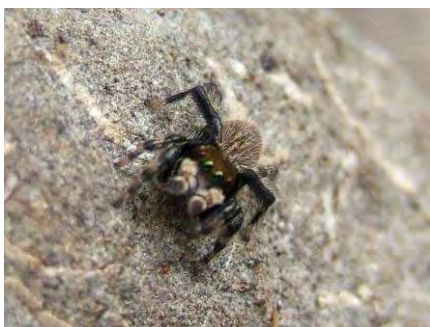
Small collection containers, paintbrush, tweezers, magnifying glass, key for soil invertebrates (from Building Science Concepts 6: Soil Animals), identification sheet to complete.

How to assess food supply:

1. Look for bricks, stones, logs or planks in your site.
2. Lift the object gently to see if anything is underneath.
3. **Gently** pick up the creatures with the paintbrush or tweezers. Put any animals you find in the small collection containers and take to class.
4. Use your insect guide to identify the invertebrates and complete the chart.
5. Release the invertebrates back where you found them.

Scoring system

Excellent	=	Lots of invertebrates (including beetles, caterpillars and spiders).
OK	=	Some invertebrates (including beetles, caterpillars and spiders).
Poor	=	Not many invertebrates found



Discussion points:

What were the main types of invertebrates you found?

Were there more or less invertebrates than you thought there would be?

Were there some invertebrates that you thought lizards couldn't eat? What were they?

B. Pitfall traps

To make a pitfall trap you will need:

Small trowel, small plastic container, piece of wood or metal, 4 stones, 1 rock.

To identify invertebrates you will need:

Small collection containers, paintbrush, tweezers, magnifying glass, key for soil invertebrates (from Building Science Concepts 6: Soil Animals), identification sheet to complete.

How to assess food supply:

Pitfall traps catch invertebrates that walk along the ground.

1. Set up pitfall traps in your site.
 - Dig a hole, put the plastic container in it making sure the top is level with the ground.
 - Put 4 stones around the top of the hole and place a piece of wood or metal on top. Put a brick on top to keep it in place.
2. Leave the traps overnight. In the morning see if anything has fallen in.
3. **Gently** pick up the creatures with the paintbrush or tweezers. Put any animals you find in the small collection containers and take to class.
4. Use your insect guide to identify the invertebrates and complete the chart.
5. Release the invertebrates back where you found them.

Scoring system

Excellent	=	Lots of invertebrates (including beetles, caterpillars and spiders).
OK	=	Some invertebrates (including beetles, caterpillars and spiders).
Poor	=	Not many invertebrates found



Discussion points:

What were the main types of invertebrates you found?

Were there more or less invertebrates than you thought there would be?

Were there some invertebrates that you thought lizards couldn't eat? What were they?

Skink food: invertebrate survey

Refer to the key for soil invertebrates in Building Science Concepts 6: Soil Animals. Your teacher will have a copy of this for you.

No Legs		Pitfall Trap	Under logs/rocks	Other
	Flatworm			
	Snail			
	Slug			
	Round worm			
	Fly larva			
	Earth worm			

3 pairs of true legs INSECTS		Pitfall Trap	Under logs/rocks	Other
	Beetle larva			
	Caterpillar			
	Grasshopper			
	Weta			
	Springtail			
	Wingless cockroach			
	Wingless aphid			
	Stick insect			
	Fly			
	Butterfly			
	Moth			
	Ant			
	Honey bee			
	Dragonfly			
	Praying mantis			
	Winged cockroach			
	Aphid lion			
	Cicada			
	Leaf hopper			
Beetle				
Weevil				
Shield bug				
Katydid				

4 pairs of legs		Pitfall Trap	Under logs/rocks	Other
	Mite			
	False scorpion			
	Harvestmen			
	Spiders			

Many pairs of legs		Pitfall Trap	Under logs/rocks	Other
	Hoppers			
	Slaters			
	Symphylid			
	Millipede			
	Centipede			
	Peripatus			

Explore # 6

Skink predators

The importance of knowing about predators

New Zealand lizards are naturally predated on by birds, centipedes, other lizards and tuatara. However, when humans came to New Zealand they brought a range of mammals (mice, rats, hedgehogs, stoats, ferrets, weasels and cats) that are efficient lizard predators. It is important to find out what introduced mammal predators are in your area.

A. How to assess mammal predators: monitoring

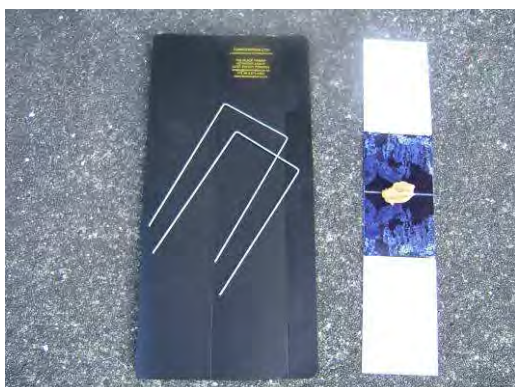
1. Set up 2 Trakka Tunnels in the area of the proposed lizard garden.
2. Bait one tunnel with peanut butter (for mice and rats) and bait the other tunnel with meat or an uncooked egg (for ferrets, stoats and hedgehogs).
3. Leave the tunnels out for 3 to 4 nights.
4. Collect the tracking cards and try to identify the footprints by using the Trakka footprint interpretation guide.

B. How to assess mammal predators: survey

1. Create a survey to find out about cats in the area around the school (include questions on number of cats, have cats ever brought in lizards etc)
2. Go to another class and get the students to complete your survey.
3. Graph results of survey

Scoring system

Excellent	=	No introduced mammals in the area
OK	=	Some introduced mammals in the area
Poor	=	lots of introduced mammals in the area



Discussion points:

- What do you think are the main introduced predators in the area?
What could be done to keep lizards safe from these predators?
What other native animals do these introduced mammals eat?

Created by Richard Romijn

Section 3: Take Action

Activities overview

The take action stage of this resource gives students the opportunity to apply what they have learned to help lizards. This is what makes environmental education different from other units of work – the students have to do something to help the environment.

Lizard garden project

Create a lizard garden in the school grounds by enhancing the habitat. The teacher and students will need to:

- Choose a garden site from the information gathered in the explore section.
- Plan a garden (plants, lizard retreats etc).
- Create the garden (Planting, mulching etc)
- Inform school community about the lizard garden (eg. assembly presentations, lizard garden sign etc).
- Look after the garden (watering plants, weeding etc)
- Monitor the ACOs to see if lizards are present.

The amount of responsibility given to the students will be dependant on year level, size of class and the ability of the class to work in cooperative groups. Individuals or groups could be assigned specific roles such as: create a sign for the garden site, design garden layout, contact nurseries for pricing and ordering of supplies, arrange and organise the planting day, media/reporting team and communications team – presentation at school assembly/opening speech etc.

Students can also actively involve the community by:

- Making the community aware of things they can do to help lizards. This can be done in many ways (eg. school newsletter, library display, local newspaper article, posters in garden centre, presentation about native lizards at a pet shop etc).

Learning intention: Students will plan and complete a lizard garden.

Success criteria: Students can successfully complete their lizard garden project within the time allocated.

Teacher checklist – project management

To ensure that your students have success with this project you need to think the project through. Discuss the project with your principal to clarify the parameters that you have to work within and work through the checklist of things to consider.

Meeting with the principal

Discuss the points below with your principal so you are clear on your parameters:

- Outline the programme and the components: investigate, explore and take action.
- What sites could be used for a lizard garden?
- What other staff can be used to assist with the project? (eg: caretaker)
- Can the students approach the principal for approval of plans etc?

The project checklist:

Think about the following aspects of the projects and write down your ideas.

The project

- How much time can you realistically allocate to this action project?
- How will you organise your class?

Funding for the garden

- What school budgets can be used? (eg: science, LEOTC)
- Can students approach local businesses or councils for sponsorship and support?

The garden

- Choose a site (based on the lizard garden notes) that will be suitable for lizards.
- Decide on the size of the garden. It is better to be smaller with compact planting than large with plants spaced out too far.
- Calculate the number of plants you need. Use plants that are at least PB3 size, which cost about \$6 each retail. Do calculations on approximately one plant per square metre.
- Do you need to spray the site initially?
- Mulch helps to keep weeds down, keeps in moisture and is good for invertebrates. Will you need to buy mulch for your garden? Mulch costs approximate \$90 per cubic metre, which covers 10 square metres to a depth of 10cm.
- Lizards need retreats. You can collect metre lengths of wood, piles of rocks or corrugated iron to make areas where they can hide. You can make stacks out of Onduline roofing material. One sheet costs approximately \$40 per and makes several lizard homes.
- Lizards need basking sites. River stones are good for this.
- Plan a planting day. Get tools, parent help etc. Take photos of before and after.

Health and safety

- What systems are in place for students working outside?

Celebrating success and informing others

- How will you promote / celebrate the official opening of your garden?
- How will you let the school community know what you have done? (eg. garden signs, assembly presentation, local news paper)

Ongoing considerations

- Arrange a roster for ongoing weeding of the garden.
- Check Onduline stacks once a month on a warm day to see if you have any lizards.

Student information sheet: making a lizard garden

A. Lizards need protective cover when foraging

Lizards need dense ground cover so they can search for food safely. This makes it much harder for predators (eg: cats and rats) to catch them. A garden with exposed soil is not good for skinks. A densely planted garden provides the best protection. To give skinks protection, use some of these plants.

- Divaricating Coprosma species (eg: *C. propinqua*, *C. acerosa*, *C. rhamnoides*)
- Pohuehue vines (*Muehlenbeckia complexa*)
- Porcupine bush (*Melicytus alpinus* and *M. crassifolius*)



B. Lizards need secure retreats

Lizards need secure cover to hide in when they are not active. They hide in cracks in the ground, under rocks or logs, in dense vegetation, under bark and in holes in trees. These retreats provide protection from predators and from extreme weather. You can provide cover by putting logs, piles of rocks, planks of wood or corrugated iron in your garden.

C. Some lizards need basking sites

Some lizards, like the common skink, need basking sites that are in the sun for several hours per day (North facing sites are best). It is best to provide several basking sites so the skinks can follow the sun. You can use stones as they absorb and retain the heat or you can use Onduline stacks.



D. Lizards need food

Lizards need to have an adequate food supply.

Invertebrates make up the largest part of a lizards diet. Some of their favourite food items are beetles, flies, caterpillars, spiders and moths. You can encourage invertebrates into your garden by allowing leaf litter to build up, mulching heavily and by not using sprays.

Fruit and berries are eaten by lizards when they are available. You can plant native shrubs and vines that produce fruit and berries and also provide cover for lizards. The plants listed above are good because they also give the lizards protection while foraging.

Nectar is popular with some lizards, particularly geckos. You can plant.

- Flax (*Phormium* species)
- Pohutukawa (*Metrosideros excelsa*)
- Kowhai (*Sophora* species)

E. Lizards need to be able to get to the garden

When choosing a site for your garden ensure that it is connected to an area where lizards are likely to be. Lizards do not like to cross open ground (eg. playground, field, bare soil) because they are vulnerable to predators. Therefore choose an area of bush, scrub or an overgrown area and link your garden to this site.

F. Monitoring lizards

Onduline stacks are a good way to monitor lizards in your garden. You can buy Onduline roofing material from Placemakers. Cut a sheet into smaller pieces (290mm x 400mm) with a saw. The pieces can then be stacked two or three high with small stones between the layers and a large stone on top so they don't blow away. Once a month on a fine day check the stacks and record what you find. It may take a while for the lizards to use the stacks.



Appendix 1

Vocabulary

adapt	Change to new situation.
bask	To lie in the sun to warm up.
camouflage	Ability to blend into to the surroundings.
cold blooded	An animal that warms its body by getting heat from the environment. All animals except birds and mammals are cold blooded. (Scientific term is ectotherm)
crepuscular	Active at dawn or dusk.
<i>Cyclodina</i>	A genus of skink in New Zealand.
diurnal	Active during the day.
extinct	When a species has died out.
gecko	A family of lizards in New Zealand.
gravid	Pregnant.
habitat	The natural home of a plant or animal.
<i>Hoplodactylus</i>	A genus of gecko found in New Zealand.
home range	The area where an animal spends most of its time.
introduced	Referring to an animal brought into New Zealand. It does not naturally occur here.
invertebrate	An animal that lacks a backbone (eg. insects).
kiore	The pacific rat.
lamellae	Scales on the underside of a lizard's toes.
mammal	Warm blooded animals that feed their young milk.
mainland	The North and South Islands of New Zealand.
native	Naturally comes from New Zealand.
<i>Naultinus</i>	A genus of geckos found in New Zealand.
neutered	A castrated male animal (testicles removed) so it can not reproduce.
nocturnal	Active during the night.
<i>Oligosoma</i>	A genus of skink found in New Zealand.
Papatuanuku	Earth mother in Maori tradition.
predator	An animal that hunts and kills other animals for food.
prey	An animal hunted and killed by another animal for food.
Punga	Father ugly things in Maori tradition.
Ranginui	Sky father in Maori tradition.
reptile	Cold blooded animals with scaly skin that use lungs to breathe.
scales	Small plates that form the body covering of reptiles.
skink	A family of lizards in New Zealand.
sloughing	When a lizard sheds its skin.
Snout vent length (SVL)	Measurement from the tip of the snout to the vent.
spayed	A castrated female animal (ovaries removed) so it can not reproduce.
Tane	God of the forest in Maori tradition.
Tangaroa	God of the sea in Maori tradition.
Tawhirimatea	God of the wind in Maori tradition.
tuatara	A reptile that is not a lizard.
Tu-te-wehiwehi	Father of reptiles in Maori tradition.
vent	Opening (in lizards) for elimination of waste and reproduction.

Appendix 2

Lizards found in the main centres

Below is a guide of the lizard species that are most likely to be found in the main centres. The copper and ornate skinks are the most common native lizards in Auckland while the common skink is the most widespread lizard in Wellington, Christchurch and Dunedin.

Auckland	Wellington	Christchurch	Dunedin
Copper skink Ornate skink Rainbow skink*	Copper skink Ornate skink		
	Common skink Spotted skink Brown skink	Common skink Spotted skink	Common skink
Moco skink Forest gecko			
Pacific gecko Green gecko	Forest gecko Common gecko	Common gecko	Jewelled gecko
	Green gecko	Jewelled gecko	

*Introduced Australian species

Common and scientific names

Skinks

Copper skink	=	<i>Cyclodina aenea</i>
Ornate skink	=	<i>Cyclodina ornata</i>
Rainbow skink	=	<i>Lampropholis delicata</i>
Spotted skink	=	<i>Oligosoma lineoocellatum</i>
Moco skink	=	<i>Oligosoma moco</i>
Common skink	=	<i>Oligosoma nigriplantare polychroma</i>
Brown skink	=	<i>Oligosoma zelandicum</i>

Geckos

Forest gecko	=	<i>Hoplodactylus granulatus</i>
Common gecko (Wellington)	=	<i>Hoplodactylus maculatus</i>
(Christchurch)	=	undescribed species related to <i>Hoplodactylus maculatus</i>
Pacific gecko	=	<i>Hoplodactylus pacificus</i>
Green gecko (Auckland)	=	<i>Naultinus elegans elegans</i>
(Wellington)	=	<i>Naultinus elegans punctatus</i>
Jewelled gecko	=	<i>Naultinus gemmeus</i>

Appendix 3

Share your success and feedback

I'd love to hear your success stories and am open to helpful feedback regarding this resource.

For example:

- Which activities worked really well for you and your class?
- How could the unit be improved?
- Did you make a lizard garden? I'd love to see a photo.
- Have you located any lizards? Which species? I'd love to see a photo.

I'm happy to answer any questions and would love to see examples of writing or work that your students would like to share with me.

If you do contact me please include:

- Teacher name
- School name and location
- Year level taught

You can send your feedback to me at:

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