

## From the EDITORS

Terrestrial pests such as possums, stoats and ferrets have become part of the New Zealand natural environment. Much time, effort and resources are spent trying to control their numbers to reduce the affect on native ecosystems and prevent the loss of more plant and animal species. The fallout from the arrival of these pests in New Zealand is well known and documented. However, they are not the only introduced species wrecking havoc on New Zealand's fragile biodiversity. Snuffly hedgehogs, doe-eyed deer, cute feral goats and pesky wild pigs are also leaving their mark.

Please contact us for further information or to make a comment on E-box issues.

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## Biodiversity and terrestrial pests

We live in a country rich with life such as animals, plants, fungi and bacteria. These life forms inhabit many different parts of New Zealand on land and in water, from the coast to the high country. This variety of life is called biodiversity.

Ecosystems are all about the relationships between the different life forms of any unique environment. If one element is removed or a foreign one added, it affects more than one thing; it affects the whole dynamic equilibrium of the system.

New Zealand's isolation means that the islands have provided protection for the indigenous flora and fauna. However, with the advancements in technology, the ability to travel around has become easier – for both guests and unwanted foreign pests.

Unwanted organisms that reach our shores usually stowaway in cargo or amongst people's possessions. When they arrive, if the climate is suitable, they will flourish – like possums and mustelids. Luckily some other invaders do not get far, as the conditions do not suit their needs – often it is too cold.

An ecosystem operates as an intricate web of inter-relationships. Therefore, if an introduced species enters, this can destroy the fragile balance of the system rather like a domino effect!

In this issue of E-Box we uncover a range of terrestrial pests and investigate the destruction they can render on unique ecological areas throughout the region. They can run but they can't hide!



### in this issue...

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# MARAUDING MUSTELIDS

Ferrets, stoats and weasels are different species but all from the same family – the **mustelid family**. You wouldn't often hear this word when people are talking pests in New Zealand!

Mustelids are carnivores (meat-eaters) and ferocious predators (hunters). With their long, thin bodies and short legs they can follow their prey into the burrow. Mustelids can catch and kill prey three times their own body weight - impressive!

In their native countries they are part of the natural ecosystem and help keep it well balanced. Unfortunately, as they have been introduced to New Zealand and are adept diggers and climbers, they are seriously impacting on the fragile biodiversity. Mustelids cause mayhem amongst New Zealand's native animals and insects (invertebrates).

## What exactly do they do that is so bad?

Mustelids are skilled hunters and breeders! They feast on rabbits, rats, reptiles, birds, eggs, insects and more. If you team this with New Zealand's reasonably mild climate then stoats, ferrets and weasels are in a mustelid paradise!

### Useful words and their meanings to use when discussing pests

**Biodiversity** – many different types of plants and animals

**Ecosystem** – the interactions between plants and animals within an environment

**Diversity** – many different types

**Habitat** – place where plants and animals live

**Evolve** – developed or grown up with

**Endemic** – belongs exclusively to New Zealand

**Indigenous** – naturally belongs and unique to New Zealand

### Did you know...?

The *Mustela nivalis*, sometimes called the Least weasel, is the smallest living carnivore on the planet?



### Did you know...?

Domesticated ferrets have been used by people for thousands of years to hunt rabbits.



## Activity

## Link the opposites

**Native** – naturally belongs to New Zealand (similar species may be found in other countries)

**feral** – an animal that is wild or otherwise unmanaged

**Terrestrial** – land-based plants and animals

**Aquatic** – growing or living in water

**Introduced** – brought into the New Zealand environment

**Domestic/domesticated** – tame and living with humans

# "CRITTER WATCH" CANTERBURY'S MOST WANTED



**Name:** *Mustela furo*

**Alias:** Ferret

- About the size of a small cat
- Longer haired coat than stoats and weasels
- from brown to cream in colour
- Varying colouration on the face often looks like a mask
- Active at night (nocturnal)

**Whereabouts:** Has been wreaking havoc all over the region since being introduced into Canterbury at the Conway River in 1879 in pasture land, scrubland and braided riverbeds.

**Diet:** Rabbits, rats, mice and birds including the wrybill, black-fronted tern and other nesting birds. They have even been known to catch and kill kiwi!

Also wanted in relation to the spread bovine TB to deer and cattle livestock on farms in Canterbury.

Don't be fooled by these cuties tricking you into keeping them as a pet, since 2002 this has been illegal.

## Did you know...?

Otters and badgers are also mustelids. The mustelid family is the largest group amongst the carnivores.



**Name:** *Mustela erminea*

**Alias:** Stoat

- Rich, medium brown colour with a cream belly
- Larger than the weasel
- Identifiable by a distinctive black tuft of hair at the end of its tail
- Nocturnal, active at twilight and often seen in daylight hours

**Disguise:** Over snow seasons this critter keeps warm and well camouflaged by growing a thick coat of white hair

**Whereabouts:** All over Canterbury including the snowy, mountainous areas

**Diet:** Rats, mice, lizards and rabbits often caught in their burrows as well as the whole family (egg to adult) of Hutton's shearwater seabirds nesting in burrows in the Kaikoura mountains.



## Did you know...?

New Zealand now has the largest feral ferret population in the world...and they are not even naturally from here!



**Name:** *Mustela nivalis*

**Alias:** Weasel

- Smallest mustelid in New Zealand
- Approximately 20cm long
- Reddish brown coat with cream under belly
- No black tip on the tail

**Whereabouts:** Throughout Canterbury although due to their patchy distribution and scarcity, their impacts on biodiversity, soil and water quality, and indigenous species is largely unknown.

**Diet:** Rats, mice, lizards, invertebrates, and birds



## Did you know...?

There were concerns that these ferrets would not have enough 'wild instinct' to survive when released in New Zealand, so they were bred with polecats on the ship out to New Zealand to increase their chance of survival. Guess it must have worked!!

## BRAIDED RIVERS BIODIVERSITY

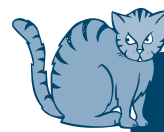
On the braided rivers of Canterbury, unique native plants and animals have evolved to survive this harsh environment. You have to be able handle regular flooding with the creation of new channels and extreme winds in order to make this place home!

Birds such as the black stilt/kaki, black-fronted tern/tarapiroe and wrybill/ngutuparore have adapted to this habitat, as have the grasshopper and gecko. These birds, invertebrates and lizards find their food, in and around the shingle beds.

The shingle riverbeds provide the ideal nesting places and homes for these creatures. However, they are not the only creatures that can survive in this environment.

Terrestrial pests have been introduced into this ecosystem with devastating consequences. If surviving the floods and nor'west wind storms were not enough, these creatures now have to survive being hunted by feral cats and hedgehogs.

## UNWANTED GUESTS...



*Did you know...?*

Animal pests can cause environmental and economic harm to the Canterbury region.



### FERAL CATS

Some of our domestic pussy cats have 'gone bush' and become wild cats. These feral cats vary greatly in size, weight and colour although most are short haired.

After basking in the sun during the day the cats become active at night especially at dawn and dusk. They need to find food to survive so feral cats stalk or lie in wait, then leap on their prey. Feral cats kill birds, bats, lizards and large invertebrates such as weta and carbide beetles.

### HEDGEHOGS

Yes, cute as they are, hedgehogs have shown that they are effective predators eating large numbers of invertebrates as well as the eggs and chicks of dotterels and other ground-nesting birds.

### WHAT'S BEING DONE?

Environment Canterbury, MAF, DoC and other concerned organisations and individuals, work together to hunt, trap and bait in an effort to reduce and eradicate terrestrial pests in the region.



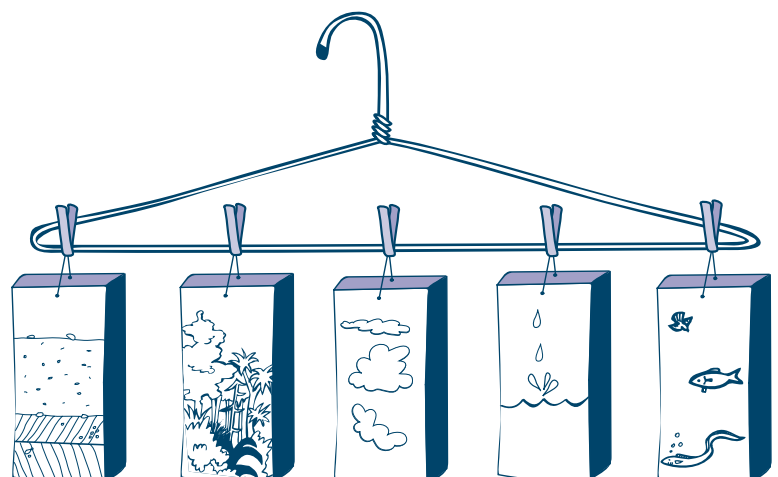
### Activity

**Construct a mobile representing nature working in balance**

Using a strong wire coat hanger, clothes pegs, string and card, make a mobile which imitates the balance of an ecosystem.

What happens when you add pests and the balance is out?

List some ways people might be disrupting the balance of nature





## Activity

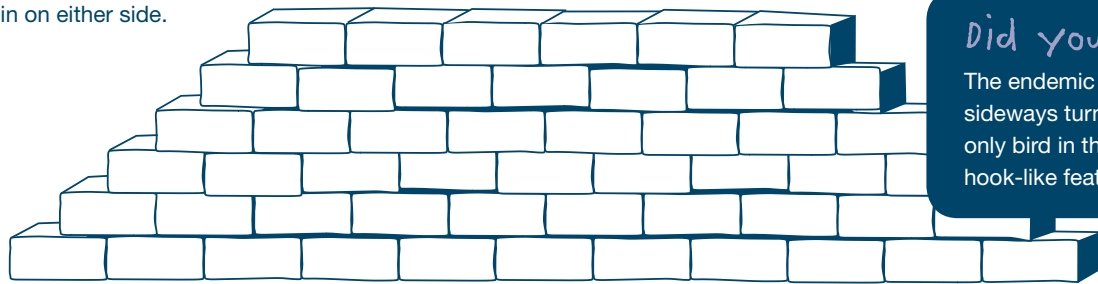
# Pyramid of Life

Make a pyramid of life to show how all living things on our planet are interconnected and dependent on other living and non-living things.

## What we need?

- 1 litre juice or milk cartons (washed thoroughly)
- used photocopy paper, 1 side clean
- nontoxic glue stick
- scissors
- newspaper
- nontoxic crayons, pencils, etc.

The pyramid has six levels.  
Each level decreases by one block, you will have a half block step in on either side.



Level	Element	No. of blocks
1	Light and heat	11
2	Air/water/land	10
3	Soil/plant and animal decomposers	9
4	Plant life	8
5	Insects and other invertebrates	7
6	Vertebrates including fish, reptiles, amphibians, birds, mammals (including humans)	6
	Total	51 blocks



## Did you know...?

The endemic Wrybill has a sideways turning bill – it is the only bird in the world with this hook-like feature.

## How do we make it?

1. Measure to 16cm from the closed end of the milk carton and mark it on each side.
2. Cut off the end of the carton at the places you have marked with your scissors.
3. Fill the carton with newspaper (or something to make it more stable/heavier).
4. Glue the photocopy paper (with clean side outwards) to cover the carton and close the open end.
5. When the glue has dried, your block is ready to decorate.

*Whatever you draw, it should show that your block belongs to your level of the pyramid.*

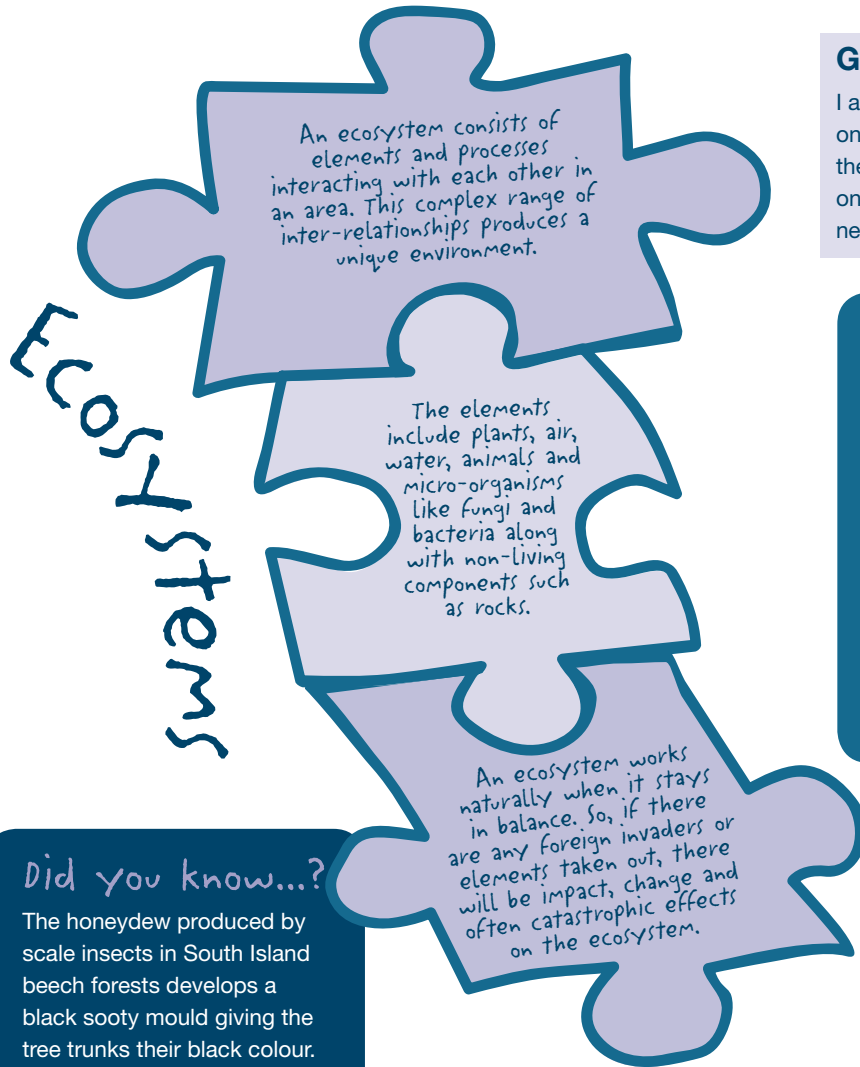
## Discussion

- Discuss how each level depends on the levels below, and in some cases above (e.g. decomposers break down plant and animal matter and also live deep down in the earth).
- Discuss why the levels get smaller as the pyramid ascends to more complex life forms.
- Discuss special terms such as detritus, decomposer, invertebrate, amphibian, reptile and mammal.
- How is human activity creating problems for each level of the pyramid?
- How are humans trying to solve some of the problems they are causing?
- What can you do to help solve some of the problems?



# Canterbury

## BEECH FOREST FRIENDS AND FOES



### Did you know...?

The honeydew produced by scale insects in South Island beech forests develops a black sooty mould giving the tree trunks their black colour.

### Sad fact

The mohua (yellow-head) no longer survives in some areas of beech forest due to food competition with rats and mice and predation by stoats. They are not able to compete with the rats and mice for food, and have not evolved (grown up) with predators such as stoats. Stoats eat nesting adults, eggs and chicks. This is a tragic loss for New Zealand biodiversity and means disturbance, and, in some cases, destruction of the natural beech forest ecosystem.



### Activity

Develop a diorama- a 3D ecosystem model using a shoe box.

1. Cut and colour background paper - include the sky/ceiling too!
2. Glue in materials to represent the different elements of this environment.
3. Attach objects to the walls and hang more from the ceiling for greater effect.

### German wasp

I am an introduced wasp. I live on honeydew produced by the scale insects. I also prey on insects and sometimes kill newly hatched birds.



### Take care!

When you pack up your camping or picnic gear take a look at everything carefully to make sure there aren't any little honey-brown coloured stowaways! This will ensure that you are not helping spread the argentine ant population around.

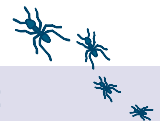
### South Island robin - kakarua

I enjoy feeding on the insects that live on and around the beech trees.



### Scale insect

I am a vital link in the food chain for all animals that live in the beech forest. I suck sap from the beech tree and produce nectar known as honeydew which the insects and birds eat.



### Argentine Ant

We work together to find our food such as aphids that live in the tree and eat the honeydew.

### Bellbird - korimako

I feed my chicks on the honeydew and insects that live on the black beech tree. I pollinate the mistletoe flowers when I search for nectar.

### Beech mistletoe (Loranthaceae family)

I am an endemic bush that grows into and along the branches of the black beech tree. I get some of the nutrients I need to survive from the tree. I provide food for bellbirds. They pollinate my flowers in return.

### Fantail – piwakawaka

I really enjoy eating insects that live on and around the beech trees, especially the ones flying through the air. I am very good at catching those!

### Native bee

I love the honeydew that the scale insects produce. It gives me energy to pollinate flowers and makes honey to feed my young.



### Activity

- Adapt the 'Dry Bones' song, i.e. "The foot bone's connected to the ankle bone"... to the interconnections of the beech forest. **Or**
- Adapt the story/song of "The old lady who swallowed a fly"... to illustrate the harmful flow on effect of damage to the food chain.



### In the army! Argentine ant (*Linepithema humile*)

This tiny terror is one of the world's most invasive and problematic ants species.

Even though they are only 2-3 mm long, their bite can hurt humans and they are very aggressive in their hunt for food. You can tell them apart from common black household ants by their honey brown colour.

Argentine ant colonies work co-operatively in an army joining forces with other colonies to form super colonies. They have strength in numbers and a combined enormous appetite. This is part of the problem with Argentine ants. They eliminate other ant species and compete with native birds such as kiwi for food like insects and worms. Lizards and young bird chicks miss out on the nectar that the ants tuck into. Argentine ants also displace and kill native invertebrates – nasty little things!

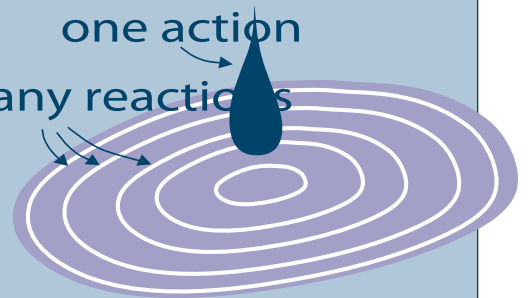
### Interesting Identification - German Wasps

These yellow and black-banded buzzy wasps look very similar to the native version but they only arrived relatively recently (1940). One difference is that the German wasp nest is a grey colour whereas the native wasp's nest is brown.



## Chain Reaction

one action  
many reactions



### BOOM

- Beech trees produce an enormous amount of seed every few years – called masting.
- Opportunities improve for native animals to feed, breed and increase their numbers.
- Other animals like rodents will increase in numbers too - with all the food (seed and birds) around.
- Mustelid numbers sky rocket, as rodents are one their favourite food.

### BUST

- Between masting years there is not enough food to support all these hungry mouths. Usually rat and mice numbers drop.
- Stoats hunt native animals such as birds and lizards instead.
- This has had a devastating impact on many New Zealand species.

## WELL, HELLO POSSUMS!



Possums (*Trichosurus vulpecula*) are an invasive species found all over mainland New Zealand with the exception of a few pockets of land around Fiordland. Possums nest in hollows of trees and, being nocturnal, forage for food at night.

Possums were introduced to New Zealand from Australia in 1837 for the fur industry. Since then, possum numbers have exploded to reach around 70 million.

In Australia, dingoes and snakes help keep possum numbers in check but with few enemies in Aotearoa they thrive.

The red/brown or grey Common Ringtail possum in New Zealand is big (5kg), cute and hungry. Possums are responsible for munching their way through 7 million tonnes of native vegetation per year. This is more than 200 container ship loads full of leaves!

Possums strip entire trees from the top canopy to the ground ingesting flowers, buds, berries, leaves and bark along the way, returning each night to the same area to feast on the new growth. With favourite fodder including northern rata, fuchsia, kohekohe and totara, the indigenous forest never has a chance to regenerate after a possum picnic.

Besides devouring the tastiest morsels of new growth from trees they are carriers of bovine Tuberculosis (Tb). This is a deadly lung disease that possums pass on to livestock. Nosey cattle and deer can contract Tb by sniffing or licking sick and dying possums found staggering across the paddock.

Possums are omnivores, therefore, they compete with native birds for habitat and food such as insects and berries. They disturb nesting birds, eat eggs and chicks of native birds such as kiwi, korero and kakapo and impact on native land snails. Mistletoe has almost been wiped out by possums stripping the trees. A further negative impact of this is that tuis and bellbirds can not get the nectar from the mistletoe to feed their young.

Possums are an ecological disaster in New Zealand. They disrupt the normal patterns of an ecosystem in the indigenous forest. Forest dynamics are changed with the addition of possums.



### In the classroom

#### Silent forests are caused by pests

There are a variety of opinions on the issue of using 1080 poison. Here is one of them:

1080 poison should be used to control possums in New Zealand native forests

Develop valuing activities such as students placing themselves physically on a continuum line, justification of their position in debate, writing summary value statements, etc.

To find information on 1080 poison, search the following sites:

[www.forestandbird.org.nz](http://www.forestandbird.org.nz)

[www.doc.govt.nz](http://www.doc.govt.nz)

[www.ahb.org.nz](http://www.ahb.org.nz)



Common NZ Possum



American Opossum

#### Interesting fact

The possum in New Zealand is a native Australian and is a distant relative to the opossum found in America.





## Activity outside the classroom

### Before you start the game

Brainstorm some ideas relating to the interconnectedness of living things within a community, particularly feeding relationships; energy flows and nutrient cycles.

### Resources

- 2+ nerf/sponge balls
- Gym/tennis court/playing field
- 10+ ice-cream container lids
- 4+ hoops
- 4+ area-markers (cones)



# Possum picnic

## A. How to play the game

Define the playing area – e.g. netball court for 20 pupils.

Everyone is a tree but these trees can ONLY walk! ONE volunteer is a possum,

Possum: chases trees and “tags” trees. The tagged tree then becomes a possum, possums must hold hands/link arms and together pursue the other trees.

Game continues for 10-15 minutes or until all the trees have become possums.

## B. Adaptations

Discuss what action might help the trees. Systematically adapt the game with the following whilst incorporating the students’ ideas.

### Introduce a hunter

Using the sponge ball “shoots” at the possums.

If hit, the possum breaks from the chain and becomes a tree again while the remaining possums all join again.

The hunter, after retrieving the balls, has to do one complete lap of the playing area before being able to shoot again to imitate tracking new prey.

### Run trial using larger area

### Introduce more hunters

### Introduce poison

Introduce ice-cream container lid poison - hunter to drop it on playing area.

If a possum steps over it then the possum is dead (becomes a tree).

Hunter may collect and redistribute at will - but ONLY by DROPPING.

### Introduce two possum populations

**Introduce Mainland Islands** – Areas where the trees are safe and the possums die if they enter and maintain the hunter and the poison.

## So what?

*Reflective questions at the end of the game*

**What strategies did the possums develop for success?**

**Why are possums so successful in this activity and in real life?**

**Why are the possums harmful to native New Zealand species?**

**Are there other introduced species in New Zealand that present a similar problem?**

**Are there any ways that you and I are contributing to this problem?**

**Is there anything that we can do to reduce this problem?**

Activity adapted from original by Barry Law and Bert Mc Connell (Christchurch College of Education). More questions relating to this activity can be found at [www.doc.govt.nz](http://www.doc.govt.nz). Type “Possum Picnic” in the search box.



## Did you know...?

The only predator that feral deer, goat and pig have are humans. Eradication of these pests is achieved by poisoning, hunting and in the case of goats, rounding up and selling to the freezing works.

## Havoc on hooves

Deer, goats and pigs are all introduced animals. Hoofed herds of domestic livestock are controlled in a farming environment around Canterbury. However, some varieties of stock have escaped and returned to the wild to become feral. They have a huge impact on the intricate bionetworks of tussock grassland, forest, scrub and riparian areas.

### Deer

Red deer are scattered throughout Canterbury (apart from Banks Peninsula) whereas fallow deer are confined to small herds on mainly private land in South Canterbury.

Deer affect the sustainability of the native ecosystem by modifying its structure and composition. They selectively feed on the under-storey and favour lancewoods (*Pseudopanax*), *Coprosma* species, broadleaf and fern (*Asplenium bulbiferum*). This delays regeneration and alters the botanical biodiversity towards the more unpalatable species that deer leave. The diet of choice for a deer competes with that of the native pigeons, therefore, deer may contribute to the decline in bird populations in Canterbury.

### Goats

Feral goats may look harmless but their effect on the New Zealand environment is similar to feral deer. They have the potential to impact on forest and shrub regeneration, particularly as they may camp out for prolonged periods in one area. They love to browse and devour many sensitive species of plants in the native ecosystem especially *Coprosma*.

### Pigs

Feral pigs are omnivores and need a broad diet that includes succulent vegetation, fruit, seeds, fungi and animals to survive. As they are introduced they are not a natural part of any ecosystem in the New Zealand environment.

The direct impact of feral pigs is by them eating plants and animals. They also indirectly affect the ecosystem by rooting up the soil and emerging seedlings along with it as well as competing for food with native animals.

Feral pig populations flourish in areas where there is a good food supply and little hunting. Unfortunately, feral pigs are continually being released into the environment to help establish larger populations for the sport of hunting.



## Activity outside the classroom

# Building a tracking tunnel

Building a tracking tunnel is a fun and effective way to find out what animal pests are living in your school grounds, backyard or 'wild' area (bush, dunes, riverbed) near you home.



## You will need:

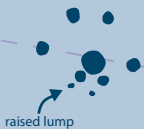


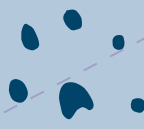

- 2 x Corflute (corrugated plastic) tree protectors
- 12 x drawing pins (long spike thumb tack type are best)
- Thin sponge
- Dye solution (mix oil with food colouring)
- 2 x sheets of absorbent paper – brown packing paper, with the shiny side down is good, or recycle some A4 that has been printed only on one side
- 2 x tent pegs or pieces of wire folded as such as a wire coat hanger.

## To construct the tunnel

1. Leave one tree protector assembled to form the tunnel.
2. Cut the other tree protector along a fold to make a base that can slide into the tunnel.
3. On this base attach a piece of paper at either end of the base, using the drawing pins on each corner.
4. Soak the sponge in the dye mixture to make an 'ink pad'. Attach this with drawing pins to the middle of the base. It will sit between the pieces of paper.
5. When you have selected some level ground that small animals may use as a path, slide the assembled base into the tree protector tunnel.
6. Secure it by pushing the tent pegs through each end and ensure the entrances are clear.

Check your tunnel daily and replace the paper as necessary.

## Footprint I.D Chart

Rat	Mouse	Lizard	Mustelid	Hedgehogs
				
Rats have 4 toes on the front feet and five on the back. They have lumps on the underside of their feet that leave clear marks.	Mouse tracks show as very small dots. Their prints are very similar in layout to those of rats.	Lizards. Do you have lizards? Their tracks are quite distinctive. Attract them through the tunnel using 50/50 banana and honey.	Mustelids. If you draw a line between toes 1 and 4 the foot pad will be outside this line.	Hedgehogs. Both feet are similar to the human hand with five digits only with a centre pad on both feet. The central pad is closer to the toes than that of a rat print.

## Check it out

Design an experiment to survey the types of pests that may go scampering through your tunnel - Was this tunnel design effective? - Can you modify it to improve the results?

# Curriculum Links

Refer to subject documents for relevant detailed achievement objectives and levels

## Environmental Education

Key concepts: interdependence, sustainability, biodiversity, personal and social responsibility for action.

## Social Studies

Strand: Place and Environment

Aim: people's interactions with places and the environment.

Strand: Resources and Economic Activity

Aim: people's allocation and management of resources.

## The Arts

### Visual

Strand: Developing Practical Knowledge of the Visual Arts

### Music

Strand: Communicating and Interpreting in the Arts

## Technology

### Technological capabilities

Aim: Evaluate designs, strategies and outcomes throughout technological practice in relation to their own activities and those of others

## Science

### Making sense of the living world

Aim: Investigate local ecosystems and understand the interdependence of living organisms, including humans and their relationship with the physical environment.

### Making sense of planet earth and beyond

Aim: investigate how people's decisions and activities change Earth's physical environment, and develop a responsibility for the guardianship of planet Earth and its resources

# Canterbury

Your Environment – Canterbury is free to all schools/teachers in the Canterbury region.

canterbury mudfish

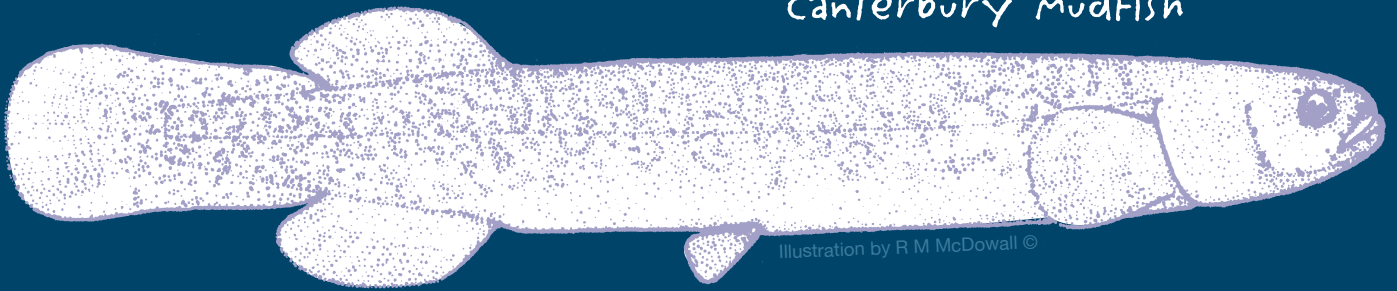
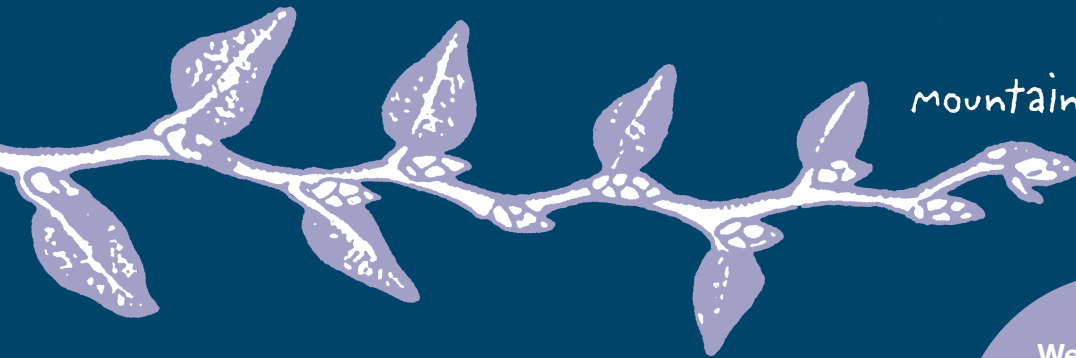


Illustration by R M McDowall ©

mountain beech



## Resources and education services

We offer a range of facilitated school programmes and environmental education resources on natural resources and their sustainable management. Environment Canterbury also produce general information and resource material, such as pamphlets, brochures and booklets, many of which are free.

If you would like to receive a 'Key to Canterbury' environmental education pack contact:

Environment Canterbury education staff on 03 365 3828 or customer services on 0800 EC INFO (0800 324 636).

## Environment Canterbury: what we do

Environment Canterbury is your regional council.

We manage 12 activities for the Canterbury region.

- Air quality
- Coastal environment
- Emergency management
- Energy
- Hazards
- Land
- Navigation safety
- Pests and biosecurity
- Public passenger transport
- Regional land transport
- Waste, hazardous substances & contaminated sites
- Water quality, quantity and ecosystems

We welcome your comments or suggestions for what you would like to see in future issues.

If you are not on the mailing list for Your Environment, Canterbury, or you would like to receive extra copies of this resource, please contact Environment Canterbury education staff at the Christchurch office.

### Environment Canterbury offices

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