Welcome to Kiwi Forever, a new education resource aimed at inspiring young New Zealanders to get out into nature and start discovering and learning about our wonderful native kiwi.

Kiwi are a symbol for the uniqueness of NZ wildlife, are a taonga (treasure) to Māori and valued in all other cultures, but are threatened with extinction unless we take action to protect them.

This resource has been designed to support teachers in facilitating student-led learning that directly connects with the New Zealand Curriculum.

It has been created by teachers and experts who understand the need for resources that provide engaging, purposeful and meaningful learning experiences. Hands-on learning and exploring nature is key and the activities are appropriate for both urban and rural schools.

This resource is written for teachers to use with their students. Suggested learning experiences have been provided as a sequence for Curriculum Level 2. In addition, there are differentiation ideas for Levels 1 and 3-4.

Kiwis for kiwi is a national charity dedicated to protecting our national bird. We do this by supporting community-led and Māori-led kiwi conservation projects as well as leading advocacy and education projects.

The future of kiwi is dependent on our actions and those of our children. Kiwi Forever has been designed as a way of educating students about kiwi, the threats they face and what we can do to help them.

Our vision is to take kiwi from endangered to everywhere. We hope you'll join us by using this resource to enhance your students' knowledge of kiwi and encourage them to get involved with their protection.

For more information on the work that we do, please visit [www.kiwisforkiwi.org](http://www.kiwisforkiwi.org) and like our Facebook page for regular updates [www.facebook.com/Kiwisforkiwi/](http://www.facebook.com/Kiwisforkiwi/).
About the Kiwi Forever Education Resource

Kiwi Forever is an integrated curriculum education resource with kiwi as the real life context for learning. The resource covers multiple learning areas of the New Zealand Curriculum. It has been developed for primary and intermediate school (Years 1–8) teachers.

The resource contains teaching and learning material to support a unit of work, grounded in Environmental Education for Sustainability (EEfS) themes and incorporating aspects of Te Ao Māori (a Māori worldview). Each chapter follows a distinct area or theme of learning about kiwi and has been developed so that background information provided supports the suggested learning experiences.

Teachers can choose to work on a single area (chapter) of kiwi learning yet still understand the importance of protecting kiwi and therefore want to take action. Or they may wish to follow the whole resource as a longer term inquiry over several terms.

What is a kiwi?

The kiwi is a unique and curious bird: it cannot fly, has loose, hair-like feathers, strong legs and no tail. It is nocturnal and an honored mammal (you’ll find out more about this in chapter 2) with nostrils at the end of its beak and enormous eggs. The kiwi has become a national icon and is well loved as an emblem to our country.

Why teach/learn about kiwi?

Kiwi birds are unique and native to New Zealand. The threat of predators and habitat decline has led to a declining population. Without our help, kiwi could be extinct within a couple of generations. The more people and communities who know about kiwi and are empowered to help them, the more successful kiwi can be in retaining and expanding their populations. These kiwi are inspiring and provide a real life context for learning.

How do I use this resource?

It is intended for teachers to use or adjust material in the resource to best suit their students’ and community’s needs. The resource can be adapted to suit a school’s own inquiry model or teaching perspectives.

The overview on p.12-13 outlines the key concepts and activities within each chapter. It is intended that this will help teachers determine which learning experiences to focus on, and form their own unit plan. Teachers could choose to focus on one chapter, or multiple chapters and work towards taking action to protect/conserve kiwi.

Chapters 1-6 contain several activity ideas that link to inquiry stages 1-6. They follow on sequentially from each other, but do not all need to be completed.

Chapter 7 extends inquiry learning into taking action to protect/conserve kiwi (inquiry stages 7-9). There are a few examples of ‘planning for action’ within some activities in Chapters 1-6, but these are designed to consolidate or extend learning about that topic.

What will students understand by the end of the kiwi inquiry?

By the end of their learning inquiry, students will have a multi-faceted, deep understanding of kiwi, beyond just facts. They will learn about:

- Kiwi ecology: where they live, what they eat, their adaptations, and how they stay alive
- How people are involved with kiwi
- Kiwi threats and how people contribute to these
- Visiting kiwi: Where to see kiwi and what we can learn by observing them
- How they can act to solve an issue for kiwi in their community
- Other information depending on where their inquiry leads.
What is Environmental Education for Sustainability? (EEfS)

Environmental Education for Sustainability (EEfS) explores values and actions to produce positive outcomes. In particular it encourages enquiry into the interconnectedness of social, cultural, economic and environmental systems and helps bridge the gap between what we know and what we do.

Structure of the resource

**Section 1: The kiwi**
- Chapter 1: Understanding kiwi
- Chapter 2: Making a kiwi
- Chapter 3: What kiwi need

**Big Idea:**
*Kiwi are unique birds with special features, adaptations and behaviours*

**Inquiry Stages 1-6**
This section relates to:
- Environmental education: Learning about the environment
- Learning areas: science, technology, English, maths, arts, health & physical education

**Section 2: Kiwi and people**
- Chapter 4: Significance of kiwi
- Chapter 5: Threats to kiwi
- Chapter 6: Kiwi in New Zealand today

**Big Idea:**
*People and their actions influence our kiwi population*

**Inquiry Stages 1-6**
This section relates to:
- Environmental education: Learning about and in the environment
- Learning areas: science, technology, English, maths, arts, social science, health & physical education

**Section 3: Helping kiwi**
- Chapter 7: Conserving kiwi

**Big Idea:**
*What we can do to contribute to a positive future for kiwi*

**Inquiry stages 1-9**
This section relates to:
- Environmental education: Learning in and for the environment
- Learning areas: science, social science, English, arts
There are 7 chapters that organise learning into different strands:

1. **Understanding kiwi**  
The biology and behaviour of kiwi

2. **Making a kiwi**  
Differences between male and female, life cycle, care for eggs

3. **Needs of kiwi**  
Understanding the conditions needed for survival – in the wild and reserves

4. **Significance of kiwi**  
Historically and their role as a symbol for New Zealand

5. **Threats to kiwi**  
What they are, how they cause harm and predator control

6. **Kiwi in New Zealand today**  
Species of kiwi, population numbers and where they are found

7. **Conserving kiwi**  
How we can help to protect kiwi – current conservation work and ideas for action projects

Each chapter is broken down into:

- **Background information for teachers**
- **Two sets of themed student-led activities**

These teacher notes provide relevant support material to read prior to embarking on the activities. The information can be shared with students and can help to generate questions in the inquiry stages of learning.

Each activity contains:
- Aim of the activity
- New Zealand curriculum links
- Equipment list
- A collection of classroom and outdoor learning experiences aimed at Curriculum Level 2
- Differentiation ideas of how to simplify and extend these activities for Curriculum Levels 1 and 3-4
Symbols are used alongside the learning experiences to guide on the type of learning involved.

**Symbols used in this resource**

- This symbol represents New Zealand Curriculum links for this activity
- This symbol represents hands-on experiences, often outdoors, that encourage student connection to the natural
- This symbol represents learning about kiwi through researching and sharing prior knowledge
- This symbol represents asking questions, investigating and reflecting on previous experiences
- This symbol represents learning experiences around Mātauranga Māori (Māori knowledge and perspectives)
- This symbol represents learning through the arts and hands-on making experiences

We hope you enjoy the learning activities contained within this resource and value your feedback.

Please share your experiences with us by emailing info@kiwisforkiwi.org
What is inquiry learning?

Inquiry learning is a constructivist approach, where the student is at the centre of learning. Students form and develop a learning inquiry to investigate aspects of the topic and build a depth of understanding through questioning, thinking and research.

This teaching model incorporates a variety of thinking and information literacy skills and integrates well with information technology.

Working through your inquiry

NB: The learning experiences within the resource are a guide only. Teachers can adjust the activities and learning sequence to suit the needs and interests of students.

The following Inquiry Model is reprinted with permission from Department of Conservation (DOC).

Stages in the inquiry model

Stage 1: Dive in

Introducing the topic and immersing students in the subject/context. Information is gathered about students’ prior knowledge in order to develop a unit plan which will meet their learning needs, prior experiences and interests. Key concepts are introduced to form a foundation of knowledge for a learning inquiry.

Key questions:

What do we know already?
What experiences have we had with kiwi?

Stage 2: Ask

Students now begin to ask questions about kiwi and explore their ideas. Questions can be grouped with one main ‘big/essential’ question and several minor questions. A big/essential question has multiple answers and is an open question, requiring extensive research to answer. This forms the foundation of the inquiry.

Key questions:

What are we wondering?
What do we want to know?
Which questions will we investigate?
Stage 3: Investigate
At this stage of the inquiry, students are investigating their questions and further exploring the topic. Their research should be driven by their interests and inquiry questions. Students can follow lines of further inquiry to find out more information from relevant sources. They begin to organise and interpret information.

Key questions:
How will we answer our questions?
Which information is relevant to our inquiry?
How can we organise the information?

Stage 4: Extending thinking
At this stage of the inquiry, students are encouraged to use specific thinking skills to further explore a topic and seek a deeper understanding. Students now take the information they have gathered and begin to compare, contrast and sort. The information connects to what they already know or supports them forming new concepts. At this stage, students also look into aspects of social inquiry: values and perspectives and consider people’s responses and decisions.

Key questions:
What does the information tell us?
Can we see any patterns/trends?
Do we need more information?

Stage 5: Coming to conclusions
Next, students take a holistic view of information they have gathered, compared and organised. They begin to draw conclusions. Students make decisions about the current situation for kiwi and which issue is most engaging and relevant to them.

Key questions:
What did we find out?
What new ideas have come from this information?
What are we going to do with these new ideas?
Stage 6: Sharing our findings

Students can now share their ideas, information, conclusions and observations with a selected audience. This can be a powerful link to community and lead to collaboration and further information sharing. Sharing also helps students to consolidate their learning.

Key questions:

*Who do we want to share this information with?*
*How can we communicate our knowledge and ideas?*
*What does our audience think?*

Stage 7: Planning for action

Students now create a brief, outlining their action and how it will target the focus issue. Now there is a focus for action they can begin to plan how to to take action for kiwi.

Key questions:

*What can we do to help this situation – what action will we take?*
*What issue will this address?*
*What will we need?/Who will help us?*

Stage 8: Implementing action

Now it’s time to have fun for kiwi. Students do real work to help kiwi and apply their learning and understanding to take action. The action should target the focus issue and aim to create a positive future for kiwi.

Key questions:

*Are we following our brief and criteria?*
*Is our action making a difference?*

Stage 9: Review and reflect

After carrying out an environmental action students can now reflect on how it went. This may lead to further inquiry.

Key questions:

*Did we do what we set out to do?*
*How did it go? What are the next steps?*
Inquiry cycle

1. Dive in
   - What do we know already?
   - What experiences have we had with kiwi?
   - Introducing knowledge

Reflecting and evaluating

2. Ask
   - What are we wondering?
   - Which questions will we investigate?

Reflecting and evaluating

3. Investigate
   - Finding out more information
   - How will we answer our questions?
   - Understanding new concepts
   - Sorting and organising information

Reflecting and evaluating

4. Extending thinking
   - Exploring values/perspectives
   - What does the information tell us?
   - Thinking about patterns, trends
   - Do we need more information?

Reflecting and evaluating

5. Coming to conclusions
   - What did we find out?
   - Problem solving/creating new ideas
   - What are we going to do with this new information?

Reflecting and evaluating

6. Sharing our findings
   - Who is our audience?
   - Sharing knowledge and experiences
   - Obtaining feedback

Reflecting and evaluating

7. Planning for Action
   - What can we do to help?
   - What action will we take?
   - Which issue will this address?

Reflecting and evaluating

8. Implementing action

9. Review and reflect
   - How did it go?
   - What did we learn?
   - How did our action help?
   - What are the next steps?
Overview of Kiwi Forever

The following table can be adapted to use as a unit plan for a class/school programme. Each chapter is designed to lead on from the previous. However, with suitable background information provided, learning can be focussed on any area that fits in with students learning needs and interests.

| Learning Outcomes:       | • Build knowledge and understanding of kiwi  
                          | • Raise awareness of the current situation for kiwi  
                          | • Understand how people are involved in kiwi recovery  
                          | • Contribute to a positive future for kiwi  |
|--------------------------|--------------------------------------------------|
| Values                   | Ecological sustainability • Respect • Inquiry and curiosity • Innovation • Diversity • Community and participation  |
| Key Competencies         | Thinking • Using language • Symbols and text • Managing self • Relating to others • Participating and contributing  |
| Principles               | Learning to learn • Cultural diversity • Community engagement • Future focus  |
| Main Ideas               | Kiwi have unique features, hold significance for tangata whenua and are our national icon.  
<pre><code>                      | However, kiwi are in decline due to introduced predators and our role as New Zealanders is to help support the work needed to preserve and protect kiwi for future generations.  |
</code></pre>
<table>
<thead>
<tr>
<th>Learning sequence</th>
<th>Inquiry stage/s</th>
<th>Curriculum links</th>
<th>Key concepts</th>
<th>Outline of activities</th>
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<tbody>
<tr>
<td>1. Kiwi biology and behaviour</td>
<td>1. Dive in 2. Ask questions 3. Investigate</td>
<td>Science: Physical world (sound, vibration and music), living world (life process and evolution) Technology Maths Arts: Music</td>
<td>Kiwi use their senses, in particular touch (through their beak) and smell (through their external nostrils) in order to survive. Kiwi are nocturnal and forage for food using their beak. Adaptations (special features) include a long slender beak, strong legs, tiny wings and ‘fur-like’ feathers.</td>
<td>Identify the features of a kiwi and the importance of their senses. Learn about kiwi calls and listen to nocturnal creatures in your area. Examine soil to identify, group and classify invertebrate creatures that are active at night. Go on a daytime ‘listening walk’ and create a sound map, record sounds and make a podcast. Understand how vibrations help kiwi to find food. Develop knowledge of sound and vibration through experiments. Create musical instruments and sounds using nature.</td>
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<tr>
<td>2. Making a kiwi</td>
<td>1. Dive in 2. Ask questions 3. Investigate</td>
<td>Arts: Visual arts Health and physical education Maths Science: Living world (life processes) Material world (compare materials and how they change)</td>
<td>Female kiwi create an egg six times bigger than expected for its size. The egg is incubated for 75-90 days, depending on the type of kiwi, this may be done more by the male or together. Kiwi are born with a large yolk sac and become independent at an early stage. Chicks are vulnerable to attack in the first 6 months. Kiwi often find a mate who they stay with for many years.</td>
<td>Investigate eggs: their features, structure and purpose. Compare kiwi eggs with other animals and make models with a similar weight or thickness of shell. Carry a kiwi egg (20% bodyweight) for a day and night. Investigate how kiwi have adapted to survive. Try eating like a kiwi. Explore kiwi life cycles. Try incubating eggs.</td>
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<tr>
<td>4. Significance of kiwi</td>
<td>1. Dive in 2. Ask questions 3. Investigate 4. Extending thinking 5. Coming to conclusions 6. Sharing our findings</td>
<td>Arts: Visual arts and Drama Social Science English: Literacy Technology</td>
<td>Understand the importance of kiwi to Māori and the role that kiwi had historically in New Zealand. Kiwi feathers differ from other birds as they lack barbs and barbules which interlock feathers, a feature necessary for flight. Explore why kiwi feathers were used in creating kahu kiwi (Māori ceremonial cloaks) and the significance of kiwi and other native bird feathers. Develop knowledge of Māori legends and express the ideas within them through drama and story.</td>
<td>Explain how Māori are connected to kiwi and the significance of kahu kiwi (cloaks). Experiment with weaving techniques. Understand how kiwi feathers are unique and go on a ‘feather hunt’. Create a modern ‘kahu kiwi’ which is personalised to represent class/school values. Learn about how kiwi were created in Māori tradition. Create and perform a drama telling the story of Tāne’s eldest child.</td>
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### Inquiry Stage/Sequencing

**Curriculum Links**

- **English:** Literacy, Health and Physical Education
- **Science:** Living World (Life Processes)
- **Arts:** Visual Arts, Drama

### Key Concepts

- Threats to Kiwi
- Introduced predators
- Uncontrolled dogs
- Car strikes
- Incorrect trapping techniques
- Other pests (rodents)
- Predators identified by appearance, droppings (scats), or footprints
- Land clearance and loss of habitat

### Outline of Activities

1. **Dive In**
   - Discuss the importance of kiwi conservation
   - Explore the role of kiwi in the ecosystem

2. **Ask Questions**
   - Identify the key questions about kiwi conservation
   - Formulate hypotheses based on initial research

3. **Investigate**
   - Conduct field observations
   - Conduct surveys
   - Analyze data

4. **Extending Thinking**
   - Compare kiwi populations in different locations
   - Evaluate the effectiveness of current conservation strategies

5. **Coming to Conclusions**
   - Summarize findings
   - Draw conclusions based on evidence

6. **Sharing our Findings**
   - Present findings to the class
   - Share findings with the community

### Additional Activities

- **Make Tracking Tunnels**: Collect data and share using NatureWatch
- **Create a PE Game**: "Predator versus Prey"
- **Set up a School Trapping Programme**: Connect with Zealandia and Predator Free NZ
- **Explore how and why land clearance has occurred**: Understand the impact on kiwi populations
- **Collaborate with other organisations**: Focus on reversing population decline
- **Research and compare kiwi species**: Create a quiz or news bulletin
- **Develop mapping skills**: Identify where kiwi live in New Zealand
- **Explore the role of Operation Nest Egg**: Understand why some species are more actively managed than others
- **Conduct a local bird survey**: Investigate other native birds under threat

### Activity 3

**Planning for Action**

- **Implement Action**
- **Review and Reflect**

**Curriculum Areas**

- **Social Science**
- **English:** Literacy
- **Art**

**Proposed Outcomes**

- Students will be able to:
  - Identify different ways to help protect kiwi
  - Understand the significance of kiwi for tangata whenua
  - Gain experience of being kaitiaki of kiwi
  - Calculate how kiwi populations respond to management programmes
  - Design a kōhanga kiwi programme
  - Investigate the role of genetics in maintaining healthy kiwi populations

**Questions**

- How can we encourage kiwi to return to areas where they have become absent?
- How can we improve kiwi populations?
- What are the challenges in managing kiwi populations?

**Research and Compare**

- Compare kiwi life in the wild with actively managed areas
- Compare kiwi life in captivity with active management

**Plan for an Action Project**

- Develop a plan to encourage kiwi back to an area they have become absent from
- Apply previous learning to develop a kiwi action inquiry
- Gain experience of learning in and for the environment through helping kiwi

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| Conservation | 6.5 Kiwi in NZ today
| 7. Planning for action
| 8. Implementing action
| 9. Review and reflect |

**Questions to Stimulate Discussion**

- What do you think are the most important threats to kiwi populations?
- How can we work together to protect kiwi?
- What role can you play in kiwi conservation?
Chapter 1: Understanding kiwi - biology and behaviour

One thing that makes kiwi so special is their biology, which is very different to most birds. Biology is the science of life - the structure, function, growth, origin, evolution and distribution of living things. So how do kiwi differ?

**Key Vocabulary**

Biology - evolution - invertebrates - omnivores - nocturnal - senses - territorial - vibration

**Senses of the kiwi**

**Smell:**
Unlike other birds, a kiwi’s nostrils are external and at the end of its beak. Kiwi have large olfactory bulbs (area of the brain specifically responsible for smell) as this is an important factor for them to be able to locate food and investigate their surroundings. The kiwi is sometimes given away by the sound of its uniquely placed ‘noisy’ nostrils at the tip of its beak. As it walks, it taps the ground with its beak, probing the soil and sniffing loudly.

**Sight:**
It is a myth that kiwi are blind. They have small eyes with reduced visual fields (the surrounding area it can see), and can see things in close proximity. The area of the brain responsible for vision is tiny and researchers suggest kiwi evolved differently because the energy they would need to support large eyes would not be balanced by the information gleaned from a dimly lit forest floor, especially since most of their food is hidden underground.

**Touch:**
With its sensitive beak, the kiwi moves along tapping the ground as someone who is blind or has low vision may do with a cane. Kiwi have cat-like whiskers on their face and around the base of their beaks. These tactile, super-sensitive way-finding whiskers probably evolved to help the bird feel its way in the dark.

As well as containing the nostrils, the beak also has sensory pits which feel the vibrations prey create as they move. This vibration sensing organ might be more valuable in finding food than a kiwi’s sense of smell. Godwits and sandpipers are two other probe-feeding birds with similar sensitive bill-tip organs.

**Hearing:**
Kiwi have big ear openings to hear the sounds of other kiwi calling. Kiwi use calls to express their spatial positioning, like a personal GPS coordinate, so that other kiwi do not invade their territory. This also helps individual kiwi to relate to where they are if they become lost or chased.
Senses of the kiwi

- Ears for hearing
- Sensory whiskers for touch
- External nostrils for smell
- Eyes for sight
Body Parts

Beak:
At around 12cm this is nearly 1/3 of the kiwi length and is made up of keratin. Through sniffng and tapping the kiwi can locate an earthworm up to 3cm underground and is able to push its beak deep with a lever like movement to create a hole. To protect the opening, the tip of the upper beak overlaps the lower one.

Wings:
The kiwi has tiny wings but cannot fly. New Zealand has more flightless birds than any other country: kiwi, kākāpō, takahē, penguin, weka, moa, three flightless wrens and two adzebills.

Legs:
Kiwi legs are heavy and marrow-filled, like a mammal’s, and make up a third of the bird’s weight. This makes kiwi legs very strong and sturdy. It differs from most other birds whose skeletons are light and filled with air sacs to enable flight.
They use their strong legs and sharp claws to defend themselves when threatened.

Plumage:
Kiwi feathers are different to those of most birds as they are shaggy and hair-like. From a distance they look more like fur, although when stroked you can feel the feather structure. The feathers hang loose; keeping the rain out and the warmth in. Unlike other birds, these feathers moult throughout the year and are constantly being renewed. The feather patterns allow kiwi to disappear into the dark and fade into the forest vegetation. When distressed, a kiwi freezes, disguising itself from aerial predators. Importantly, kiwi feathers do not have barbs which enable feathers to join together to create a greater surface area for flying.
**Behaviour**

**Nocturnal:**
Nocturnal means being active during the night instead of the day. One reason kiwi are nocturnal is the food they hunt. When the sun goes down, many of the underground invertebrates that kiwi like to eat such as insects grubs and earthworms, move closer to the soil’s surface. Kiwi also eat fallen fruit and native plants. It is thought that kiwi evolved and sought the shadow of night to avoid being spotted by the hunting birds that once ruled New Zealand’s daytime skies such as the now extinct goshawk and giant Haast eagle.

**Territorial:**
Far from being a shy night creature, kiwi are bold and territorial, which means they fiercely guard and protect the area where they live. This might involve high jumps and slashing blows, kicks and tears. A kiwi’s sharp claws and powerful legs and feet can inflict fatal wounds. It is vital for a kiwi to have their own territory in order to attract a mate. Kiwi mark the edge of their territory by calling to one another, the sound of which can carry several kilometers.

**Diet:**
Kiwi are omnivorous (they eat food found from both plants and animals) and although worms form a major part of their diet, they will also readily eat woodlice, millipedes, centipedes, slugs, snails, spiders, insects, seeds, berries and plant material. Kiwi feed at night and probe into the ground with their beak up to a depth of 12cm.

**Finding a mate:**
Kiwi often find a partner for life and traditional gender roles are reversed with the larger female bird dominating the male.
We know kiwi are nocturnal, which means they are active at night when their prey moves up closer to the surface of the ground. The night’s cooler temperatures, dampness and cover from sharp-eyed predators provides ideal conditions for many native species. When humans turn in for the night, many of our wild creatures are just waking up. In this activity, your mission is to explore what nocturnal creatures we can hear and see in the local area.

**Activity 1: Night time noises and actions**

**Learning intentions**
*Students are learning to:* Share their prior knowledge and experiences about kiwi and other nocturnal creatures. Investigate using their observation skills and record their findings in a variety of ways.

**Success criteria**
*Students can:* Plan an investigation to observe and record sounds they can hear at night. Use reference material to help identify which nocturnal creatures they heard.

**Science**
Explore and act on issues and questions that link their science learning to their daily living. Living world: Recognise that there are lots of different living things in the world and that they can be grouped in different ways.

**Technology**
Investigate a context to communicate potential outcomes. Evaluate these against attributes; select and develop an outcome in keeping with the identified attributes.

**Maths**
Conduct investigations using the statistical enquiry cycle: gathering, sorting, identifying patterns and communicating findings.

**Equipment needed**
Camera, torch, sound recording device, recording sheets, magnifying glass, garden trowel, pencil, tray, print out copies of invertebrate ID guide, large garden fork
1: What sounds do nocturnal creatures make?
Investigate what creatures are nocturnal in New Zealand and the sound clues they make.
• Listen to calls made by different kiwi, weta, possum and morepork.
  www.kiwiforkiwi.org/about-kiwi/kiwi-facts-characteristics/kiwi-calls/
• Listen to kākāpō, morepork (ruru), kākā, tui, grey warblers, blue ducks (whio) and little blue penguins who are also active at dawn and dusk.
• Read the description of sounds made by the night prowlers: Possums, rats, mice, stoats, weasels, ferrets, cats and hedgehogs.
  www.pestdetective.org.nz/clues/other-clues/sound/
• Do any of these other night time creatures make sounds? Long and short tailed bats, mosquitoes, flying insects, snails, slugs, earthworms, spiders, cockroaches, crickets, huhu beetles, weta, moths, skinks, geckos, frogs, fish (inanga, bullies, kōkopu), crayfish (koura), eels and tuatara.

2: Listening at night
Now you know the sounds made by some nocturnal creatures, go out into your garden or an outdoor space at night with an adult and listen carefully. Print out a copy of recording sheet www.doc.govt.nz/Documents/conservation/native-animals/birds/5mbc-standard-data-form.pdf and note down any sounds you can identify. Take an audio recording to share in class.

3: What can you see in the soil at night?
Start digging in the soil to remove the top 10cm. Think of what could represent the kiwi beak in this process. Turn over bits of wood or stone.
Using a head torch, try and spot any creatures which you can gently lift to a tray for identification (remember you need to be quick as they will move away from the light). Use a magnifying glass, take photos and draw sketches in a notebook. Remember to gently put the bugs back where you found them.

Invertebrate ID guide and sampling method:
www.doc.govt.nz/education-experiencinginvertebrates
ID guide suitable for younger children:
www.landcareresearch.co.nz/resources/identification/animals/bug-id/what-is-this-bug

4: Checking our results
Repeat on a different night – maybe when there is no moon, or after it has been raining. Do you find any differences? What about at different times of year?

5: Reflecting on our night time investigating
Bring back your findings to class and discuss your results.
• Make a list of all the creatures a kiwi could have eaten if they lived in your garden.
• Listen to any recordings taken at night, can you confirm the creatures?
• Print out certificates for the class
Chapter 1: Understanding kiwi

Listen to bird calls during the day time
Can you see the birds calling? Discuss ideas about why birds communicate by calling and think about why humans use their voices. Try replicating bird calls.

Compare the sounds you can hear in an outdoor space (such as a child’s garden) during the day and night
Brainstorm words to describe the sounds (rustling, scratching, shrieking, calling, tapping etc) and make a list or poster. Are there more noises in the day or night? Why do you think this might be?

Simple creature spotting
Instead of identifying soil creatures, count them, group by features like if they have legs/wings or not, compare if there are more or fewer under leaves or stones?

Visit a local kiwi area to see if you can hear a kiwi
Contact DOC and ask if any local areas kiwi have been recorded – organise a visit and have a go at informal reporting using a card: www.kiwisforkiwi.org/resources/call-count-monitoring/

Create a podcast from all the night sounds recorded and publish on school website

Explore food chains and interdependence of soil invertebrates
Use Building Science Concepts MOE booklet 9: Soil Animals – Diversity beneath our feet.
Kiwi can sense an earthworm 3cm below ground. This activity is exploring and creating sounds and vibrations with our voices, musical instruments and materials we can find in nature.

**Learning intentions**
*Students are learning to:* Develop listening skills and experiment in making sounds. Understand how vibrations are created and methods used to detect them. Experiment making sounds in nature with natural resources.

**Success criteria**
*Students can:* Explain the relationship between vibrations and sound. Plan, carry out and evaluate their own investigations into sound and vibrations.

**Science**
Investigate and extend experiences and personal explanations of the natural world through exploration, play, asking questions, and discussing simple models.

- Explore everyday examples of physical phenomena, such as movement, forces, electricity and magnetism, light, sound, waves, and heat. Seek and describe simple patterns in physical phenomena.

**Arts - Music**
Explore and share ideas about music from a range of sound environments.

- Explore and identify how sound is made and changed.

- Explore ways to represent sound and musical ideas.

- Share music making with others.

**Equipment needed**
- Notebook, pens, pencils, paper, camera, recording device, paper cups, straws, drum, rice, recycled plastic bottles bag to collect nature materials
**Student Learning Experiences**
(aimed at Curriculum Level 2)

**1: What is sound?**
What is sound and how do we describe it? Loud/soft, high/low, short/long, representing a feeling or mood. What kinds of sounds can we make with our hands, feet or mouth?

Sit in a circle and play an improvisation game where someone creates a sound pattern for everyone to copy.

*Ideas for body percussion game:*
[www.carolgreene.com/education/music/body_music.html](http://www.carolgreene.com/education/music/body_music.html)

**2: What are vibrations?**
Vibrations are created by movement (of an object or air back and forth) and can travel as sound waves. Experiment in class to see how vibrations are created:

- **Hear vibrations** – making a paper cup telephone.
- **Feel vibrations** – humming with your hand on your voice box or the feeling on your lips as you play a straw kazoo.
- **See vibrations** – see grains of rice bouncing on the surface of a drum after it has been hit.

*Videos:*
[www.pbslearningmedia.org/resource/phy03.sci.phys.howmove.lp_sound/soundvibrations](http://www.pbslearningmedia.org/resource/phy03.sci.phys.howmove.lp_sound/soundvibrations)

**3: How sound waves travel**
Kiwi feel the movement of worms in the ground due to vibrations of the soil particles as the worm moves. Sound waves can travel through different mediums (air, water, solids) – explore the effectiveness of different solids to transmit sound vibrations.

[www.pbslearningmedia.org/resource/phy03.sci.phys.howmove.lp_sound/soundvibrations](http://www.pbslearningmedia.org/resource/phy03.sci.phys.howmove.lp_sound/soundvibrations)

**4: Worm investigation**
One theory is that worms respond to vibrations and move towards the surface of the ground. Conduct your own investigation based on a previous scientist’s study (see link below) to check what happens in your environment.

5: How powerful is our detection of vibrations in the ground?

How powerful is our detection of vibrations in the ground?

- Working with a partner, find a plant pot with pencil sized holes in the bottom and fill with soil.
- On the top of the soil mark the spots which match where the holes are. Your partner chooses to push the pencil into one of the holes and you feel at the surface, as soon as you can feel the pencil shout ‘kiwi’.
- Mark how far into the soil the pencil was pushed and then subtract this from the depth of soil.
- Repeat for a fair test and compare with your partner.

You can also try filling the pot with different materials such as sand or twigs and leaves, does this make a difference?

6: Listening to sounds in nature

Listening to sounds in nature.

Go for a walk and find a spot to sit, close your eyes and listen for a few minutes. Next, create a sound map by taking a piece of paper and putting an X in the middle to represent where you are. Add words or pictures and use lines to show direction and distance.

Which sounds did you like most? Least? What else did you hear? What might have caused the sounds you heard?

Record some sounds to return to class.

7: Making instruments using nature

Making instruments using nature.

The first musical instruments were probably created in nature, collecting sticks and hearing the sound or beat as they knocked together.

- Have a go at making simple percussion instruments by collecting natural things on a walk. For example, a tambourine using 2 paper plates stapled together with pine cones in between; a rattle using a recycled plastic bottle filled with different sized twigs, rocks or leaves; a xylophone with taped different length twigs; chimes with rocks; or a sistram with a Y shaped branch, jewellery wire and jangly items found around you.
- Experiment to see how many different instruments and sounds you can make.
- Can you identify them blindfolded?
Chapter 1: Understanding kiwi

Student Learning Experiences

**Differentiation for Curriculum Level 1**

- **Make paper cup ears before going on a listening walk**
  Make a list of all the sounds the children can hear and group in different ways: natural or man-made, loud or quiet, high or low etc.

- **Explore different ways of putting sounds together**
  Visit the link [artsonline2.tki.org.nz/resources/units/music_units/into_music_1/creating.php](http://artsonline2.tki.org.nz/resources/units/music_units/into_music_1/creating.php) which contains a variety of musical learning experiences of exploring sound, putting sounds together and sharing.

- **Have fun with sound experiments**

**Differentiation for Curriculum Levels 3-4**

- **Consider how making music and sound can tell stories about nature**

- **Compose a nature song**
  This can be done using recordings taken from nature walk and the finished result could be made into a podcast which is shared with the school community.

- **Try out more sound experiments**
  Explore from a range of activities taken from Building Science Concepts Book 19: Properties of sound.
Chapter 2 - Making a kiwi

Kiwi are unique birds. Most females are 20-30% heavier than the males and often the dominant partner, leaving the job of looking after an egg or young chick to the male. A kiwi egg is about six times as big as what would be expected for a bird its size, with a large yolk sac that enables a chick to mature before hatching. This means that kiwi can be independent from a few days old.

Key Vocabulary
Breeding - clutch - gestation - incubation - ovaries - monogamous - plumage - predators - species - yolk sac

Breeding
Female kiwi have two functional ovaries and can breed successfully from just one-year-old, although three to five years is more common.

The number of eggs a kiwi produces per year varies from species to species. The term ‘clutch’ is used to refer to how many eggs are produced at a single time. Brown kiwi can have two clutches of two eggs a year, whereas other species may only produce one clutch of one egg.

The main breeding season usually occurs between June and March each year, although the brown kiwi can produce eggs at any time. The mating procedure is not as glamorous as other birds but involves the male following the female and grunting. The female is in charge and the smaller male climbs on top of the female. Mating can take place three or four times a night.

Afterwards, the duty of preparing the nest and incubating the egg often involves the male more than the female.

The Egg
Approximate size of a brown kiwi egg.
Creating an enormous egg

Imagine a smooth, thin, white or greenish-white shell about 120 millimetres long and 80 millimetres in diameter. This is the kiwi egg, and it is big for a reason. Kiwi eggs contain the largest proportion of yolk for any bird, 65% compared with 35-40% for most birds. This yolk is very important as it contains the protein chicks need for the first 10 days of their life so they are not dependent on their parents to feed them.

It takes 30 days for an egg to form inside the female. It is not an easy job to create such a large egg and the female kiwi has to eat three times as much as usual. Her belly bulges to touch the ground which makes it harder for her to move. She soaks her belly in cold water to soothe the inflamed stretched skin and have a break from carrying an egg that is 15-20% of her total weight. This compares with ostriches whose eggs are 2% of their body weight, and humans, where a full-term baby is about 5% of the mother’s body weight.

Laying the egg is done quickly, although for those final few days beforehand the female is so full she cannot eat. The egg weighs approximately 450g and the shell is only 1mm thick.

In two-egg clutches, the second egg will already have begun to develop inside the female and will be laid about 25 days after the first. Kiwi can lay up to 100 eggs in their lifetime.

Incubating the egg

Kiwi invest a lot of energy into incubating eggs and this can take anything from 74-90 days. This is a lot longer than for other similar size birds and is more like a mammal’s gestation.

Once an egg is laid, brown and little spotted female kiwi leave the burrow and the male takes over incubating the egg. For other kiwi species, the male and female kiwi share the incubation duty.

In order to keep the egg warm, the adult develops a bare patch on its belly which exposes the skin and blood vessels close to the surface. Kiwi use their beak to keep tucking the egg in as it grows so that it can be kept warm.

The male will leave the egg unattended to go and feed at night which is why having a camouflaged entrance helps to protect against predators. Getting their feathers wet helps them to maintain appropriate humidity levels inside the burrow. In the final few days before hatching, the adult stays still on the egg and consequently uses up a lot of fat stores.
**Hatching**

Kiwi chicks kick and peck their way out of the egg in a slow and energy-consuming process, often taking up to 3 days. First, they get the tip of their beak out, breathe and then sleep for 12-48 hours. This continues and you can see the egg jiggle and hear mewing from inside. Once the chick is born the parent stamps on the empty shell and then eats it for a source of calcium.

**Development of a kiwi chick**

Unlike chicks of other birds, the newly hatched kiwi is not covered in down. Instead, its feathers are covered in a slimy coat that dries and flakes off within 24 hours, leaving the chick as a miniature version of its parents. After two or three days, enough of the yolk sac has been absorbed to allow the baby kiwi to stand and shuffle around the nest.

On about day five, the chick begins to venture out of the burrow, initially only eating pebbles and tiny twigs that will be stored in its gizzard to help with food digestion. On its second trip out of the burrow, the chick might eat its first meal. Because its beak is not yet strong enough to dig into the ground, it forages in the leaf litter. All this time it continues to draw nourishment from the yolk sac, and can easily survive two weeks of partial fasting.

During its first three or four weeks, the baby kiwi feeds at night, and sometimes during the day. This makes it extremely vulnerable to predators. Around 90% of kiwi chicks born in unprotected areas in the wild die within their first six months due to predators.

When young kiwi leave their parents territory depends on the species. Some chicks stay for only a few weeks whereas others may stay for several years to support younger siblings.

Once kiwi find their breeding mate, they often remain monogamous for up to 20 years. During this time they will come together every 3 days to share the burrow and call to one another. Kiwi are long-lived, and depending on the species, can live for between 25 and 50 years. See chapter 6 for more information on kiwi species.

See the table below for information regarding kiwi appearance:

<table>
<thead>
<tr>
<th>Kiwi Species</th>
<th>Weight</th>
<th>Average Length</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>1.5 – 3kg</td>
<td>45 - 50cm</td>
<td>Varies from grey/brown to black/brown or reddish brown</td>
</tr>
<tr>
<td>Little spotted</td>
<td>1.2 – 2kg</td>
<td>40cm</td>
<td>Overall grey colouring with mottled irregular pattern of black/brown plumage across body</td>
</tr>
<tr>
<td>Great spotted</td>
<td>1.2 – 3.3kg</td>
<td>45 – 50cm</td>
<td>Similar to little spotted but chestnut tinge on upper back and mottled bands of brown/black plumage</td>
</tr>
<tr>
<td>Tokoeka</td>
<td>1.6 – 3.9kg</td>
<td>45 - 55cm</td>
<td>Reddish brown</td>
</tr>
<tr>
<td>Rowi</td>
<td>1.5 – 3kg</td>
<td>45 - 50cm</td>
<td>Greyish brown</td>
</tr>
</tbody>
</table>
Activity 1: Enormous eggs

This activity involves learning about eggs, why they exist, how they are made and what is inside them.

Learning intentions

Children are learning to: Understand the kiwi life cycle and the development of a kiwi egg. Compare the features of an egg with its function. Investigate how to make an egg of a similar size.

Success criteria

Children can: Describe the life cycle of a kiwi and the unique features of a kiwi egg.

Arts
Explore a variety of materials and tools and discover elements and selected principles.

Health & Physical Education
Describe their own and others developmental needs and demonstrate increasing responsibility for self-care.

Maths
Create and use appropriate units and devices to measure length and weight (mass).

Science
Recognise that all living things have certain requirements so they can stay alive. Observe, describe, and compare physical and chemical properties of common materials and changes that occur when materials are mixed, heated, or cooled.

Equipment list
Ruler, weighing scales, computer, chicken eggs, straw, bowl, torch, balloon, newspaper, paper mache paste, paint, feather, tape, glue, vinegar, fridge
Chapter 2: Making a kiwi

1: Investigating eggs
Why are some creatures born live and others as eggs?
How big are the smallest and largest eggs and who do they belong to?
What are the contents of a kiwi egg and why are they important?

2: Kiwi egg facts
Make a factfile about the kiwi egg:
- Length
- Diameter
- Weight
- Thickness of shell
- Colour
- Contents

3: Create a kiwi egg
What materials can be used to create an egg that is the same weight as a kiwi egg? Source materials from home, school and in nature.
Make your kiwi egg, aiming to make it a similar size and weight to a real one, and consider how to decorate it to look like it belongs to a kiwi.

4: Be a pregnant kiwi for a day
Find a way to attach your egg to your body as a kiwi pack and wear it for a whole day and night. Is there a comfortable position to sit and sleep?
A kiwi egg takes up 20% of the female body. Calculate what 20% of your body weight is. Weigh out this amount and try carrying it in a daypack. How does it feel?

5: Inside an egg
Take a chicken egg and try to blow out the contents to see the thin shell.
www.youtube.com/watch?v=dr2AHB5LX9A
Explore the contents of a regular egg
www.exploratorium.edu/cooking/eggs/eggcomposition.html
And try using a torch to identify an air sac on a chicken egg.

6: Understanding the egg shell
Egg shells are made out of calcium carbonate. Soak a dozen chicken eggs in vinegar for 48 to 72 hours in a refrigerator. The acid in the vinegar will decalcify the shells making them soft and semi-permeable.
Handle the eggs and compare the differences between an ordinary egg shell and the decalcified shell. Find examples of other things made out of calcium carbonate.

7: Making an egg shell
This can be done using a balloon and paper mache. Devise a way to measure how thick your egg shell is. Can you make it a similar thickness to a real kiwi egg?
Chapter 2: Making a kiwi

Student Learning Experiences

Differentiation for Curriculum Level 1

Create a lifecycle of a kiwi
Make a flow chart to show the stages of a kiwi life and add a fact for each step.

Chick life diary
Create a diary entry to show what a chick might be doing and feeling in the early days of its life finding its feet.

Read together Te Hua Tuatahi a Kuwi (Kuwi’s First Egg)
Read together this Te Reo Māori children’s picture book and discuss what Kuwi does to look after her egg.
Available at libraries or from www.illustrated.co.nz/product/te-hua-tuatahi-a-kuwi

Go on a nature walk
Look to see what birds are in your area. Identify if they are native or introduced.
Now look for any evidence of bird nests where eggs are incubated and chicks may be raised. www.backyardbirds.co.nz/bird_feeding3.htm

Differentiation for Curriculum Levels 3-4

Birthday games
Using a calendar, investigate when a kiwi’s birthday will be. We know making an egg takes 30 days and it is incubated for 70-80 days. Calculate when kiwi need to mate to create a chick on your birthday.

Eggs around the world
Choose three other birds or animals that create eggs and compare how long eggs take to make and how long they are incubated for.
Investigate why these times differ between animals? Record findings in a venn diagram or compare/contrast chart.

Egg Experiments
Learn more about eggs through a range of scientific experiments. See collier.ifas.ufl.edu/4H/Publications/4-H%20Egg%20Guide%20for%20leaders%27s.pdf p.30 for meringue making and p.46 comparing raw and hard-boiled chicken eggs.

Native Nests
Encourage more native birds to make their nests in your school grounds www.doc.govt.nz/get-involved/conservation-activities/attract-birds-to-your-garden/
Activity 2: Make your own kiwi

This activity involves analysing the different body parts of a kiwi and understanding how they have adapted to suit a kiwi’s needs. Compare a kiwi with other birds and experiment swapping body parts to match other living conditions.

**Learning intentions**

*Children are learning to:* understand how and why living things adapt to suit their living environment.

**Success criteria**

*Children can:* explain how a kiwi’s body parts suit its needs. Describe the functions of the different parts of a kiwi.

**Science**

Recognise that living things are suited to their particular habitat. Recognise that there are lots of different living things in the world and that they can be grouped in different ways.

**Literacy**

Make meaning of increasingly complex texts by identifying main ideas. Make connections between texts and personal experiences.

**Art**

Share ideas about how and why their own and others’ works are made and their purpose, value, and context.

**Equipment list**

Thick paper or card, scissors, paint, large stone fruit, stones, binoculars, feathers, (incubator equipment and eggs).
1: Understanding beaks

Discuss why birds have beaks. Compare findings at projectbeak.org/adaptations/beaks.htm

Kiwi have long, slender, pointed, down curved beaks that are around 12cm long. How does a kiwi’s beak help it survive? List the functions of a kiwi beak.

www.kiwisforkiwi.org/about-kiwi/kiwi-facts-characteristics/an-unusual-beak/
www.youtube.com/watch?v=yTtShI89KjQ

2: Adaptations of kiwi

Why do kiwi have strong legs and claws? Is there a reason why kiwi do not fly?

What are the advantages to a kiwi having no barbules on its feathers?

Why do some birds have curved beaks and others have straight beaks?

Think of other questions to research. Use the template to help record your research docs.google.com/document/d/1uzPyyptFwi4C1b-DIfDCTLwY6Ma_NmevxcVyXQkvino/edit?usp=sharing

3: How birds vary in their body parts

Read The Bush Supermarket – Judy Stoud [School Journal – Pt 03 No.2 1995 – 10-12yrs - Article] to see how having different equipment (eyes, wings, tail, beak, and feet) and by choosing different living areas, the birds share out the food available at different levels in the bush.

4: Mix and Match bird body parts

Pick four other native birds and examine their beaks, legs, claws, wings and any other significant body parts. How do they look different?

Sketch and cut out these body parts from a kiwi and the four other native birds to make a collection of different beaks, legs etc. Create different conditions for your bird to live in and mix and match its body parts to suit.

5: Design a new kiwi

Consider different scenarios a kiwi might face if they had evolved differently. Examples could be: living in an estuary; having to change diet to tear bits of live prey to digest, their prey only living high in trees. Use the different body parts to make a new kiwi which has adapted to this new life.

6: Understanding how kiwi eat

Kiwi eat their food whole and use stones in the gizzards to break down invertebrates. Try and represent this using a large soft fruit and lots of stones in your hand - is it possible to grind the food into a pulp and does it take a lot of effort?

7: An honorary mammal

Despite being a bird, kiwi are also referred to as an honorary mammal. This is due to some features such as their legs and body temperature, which are more similar to a mammal than a bird. Investigate what other features of a kiwi make it similar to a mammal. Why do you think kiwi evolved this way?

www.kiwisforkiwi.org/about-kiwi/kiwi-facts-characteristics/honorary-mammals/
Student Learning Experiences

Differentiation for Curriculum Level 1

1. Understanding body parts
   Identify the different body parts of a kiwi and compare them with a bird found locally.

2. Design a new native bird for NZ
   Where would the bird live and how do its body parts help it to survive?

3. Bird Spotting
   Take a walk to look for local birds. Using binoculars, can you identify the different body parts. How do they compare with a kiwi?

Differentiation for Curriculum Levels 3-4

1. Understanding keratin
   Find out why feathers on kiwi and other birds are often brown and black. Is this the most economical colour the body can create using keratin? What other body parts are made out of keratin and why do we need keratin?

2. Incubating eggs
   Have a go at incubating chicken eggs at school. Investigate the conditions required, source equipment and monitor what happens over time. Is the incubation and hatching process similar to that of a kiwi?

Chapter 3: Needs of kiwi

Like all living things, kiwi require certain conditions in order to survive and are only found in specific places in New Zealand where a suitable habitat exists. Kiwi spend all night foraging for food, eating large quantities of worms and invertebrates found in leaf litter and the forest floor. Although kiwi have to rove large territories to find enough food, they also need to have day shelters to rest in and to create burrows to prepare for breeding.

Key Vocabulary
burrow - camouflage - ecosystem - gizzard - habitat - invertebrates - keratin - leaf litter - nocturnal omnivore - predator - species - territory

Food and water

Kiwi are omnivores that eat both plant and animal material. They source food at ground level and use their beak to reach up to 12cm below the surface. Different species of kiwi have slightly different diets, although all kiwi like to eat worms and other invertebrates such as spiders, slugs, snails, cicadas, woodlice, beetles, weta, crickets and ants. Kiwi have 178 species of worms to choose from and these can be up to 50cm long. Some species of kiwi have a more varied diet and can also eat frogs, eels or koura.

In terms of plant matter; berries, seeds and leaves from tōtara, hīnau, miro, various cosprosma and hebes are popular with kiwi. Because of this varied diet, kiwi gizzards usually contain grit and small stones to help with mastication and digestion.

To gain further understanding, scientists have examined droppings looking for teeth, mandibles, legs, antenna segments or skin to help identify individual species. A study investigating the three most common species found in kiwi droppings according to frequency and weight of matter were cicadas, beetles and worms.

Kiwi get all the water they need from their food – juicy earthworms are 85% water. This adaptation means they can live in dry places such as Kapiti Island. When a kiwi does drink, it immerses its beak, tips its head back and gurgles down the water.

© Department of Conservation
These invertebrates are part of a brown kiwi’s meal.
A place to call their own... territory

Although kiwi are very shy around humans, this is not the case when around other kiwi. A male kiwi needs a territory before it can attract a mate, and it gains this by fighting other kiwi already in a desired area or by finding a vacant piece of land.

Kiwi fiercely protect their patch and fights can be rough, using their powerful legs and sharp claws. Once a kiwi has established a territory, they maintain it by ‘calling’ - a warning to other kiwi who may be intruding. Kiwi use these calls to monitor borders and an invading kiwi would run and return to the border before returning the call.

This territory will become their home containing food, shelter and a place to create a burrow. The size of their territory depends on the species and location, considering factors such as how much food is available. If a kiwi has a large territory, they may need four - eight burrows to shelter above and below the ground.

Habitat

A habitat refers to the area or natural environment in which a population lives. Huge changes to New Zealand’s original forest cover has meant that kiwi have adapted to live in a variety of habitats and conditions. The area included within a kiwi’s territory varies in size depending on food supply, with larger areas needed when food is more scarce. The kiwi can swim well and this enables them to cross streams and rivers within their territory in order to reach food. Here are some examples of kiwi habitat:

- Lowland in coastal native forest, flax, mixed scrub and sand dunes.
- Exotic forest plantations like Pinus radiata provide a canopy for native species and insects.
- Sub-alpine forested areas up to 1500 metres – tussock grasslands, beech forests, podocarp, forests, scrub. Kiwi can even dig burrows in the snow.
- Rough farmland.
Burrows and Shelters

Kiwi create burrows where they breed and look after eggs. The burrow is dug into the earth of a bank or slope using their strong legs and claws and is lined with nearby matter such as leaves, grass, sticks and moss.

Kiwi eggs need to be kept warm and moist to survive so kiwi burrows are created to provide these conditions. Kiwi usually block the entrance to their burrow behind them by pulling sticks and leaves across, which also acts as camouflage. Most kiwi create burrows with one entrance but great spotted kiwi create elaborate labyrinths of tunnels which provides a safer and extended home and shelter.

If a kiwi is not preparing to breed, they may use a day shelter to sleep in such as under a rock, in a hollow tree or among low lying scrub. Kiwi sleep standing up, tucking their beak under their tiny wing.

Being nocturnal

Kiwi are active at night and sleep during the day. Insects and worms that kiwi feed on are also active at night and come closer to the surface, making them easier to find. The job of finding food is also easier at night as it’s cooler and kiwi do not get too hot or require extra water to stay hydrated.

Being active at night provides safer conditions for the kiwi to travel around looking for their food as they cannot be seen as easily by potential predators. However, during the summer in the South Island, nights are much shorter and kiwi can be seen early morning and evening trying to find enough food to meet their requirements.
Activity 1: Digging Time

This activity involves exploring your school grounds by digging down like a kiwi to find out what soil conditions are like and identifying tasty invertebrates.

**Learning intentions**

*Students are learning to:* Identify special features of kiwi and explain how these features help kiwi to live and survive in their habitat. Use support information to identify the features of different invertebrates.

**Success criteria**

*Students can:* Experiment with materials to make a kiwi beak and evaluate how effective it is. Make observations about soil quality and identify invertebrates found in soil. Understand the role of invertebrates in an ecosystem.

**Science**

Find out about the uses of common materials and relate these to their observed properties. Recognise that living things are suited to their particular habitat.

**Technology**

Understand that models are used to explore, test, and evaluate design concepts for an outcome to match a purpose.

**Maths**

Conduct investigations using the statistical enquiry cycle; asking and answering questions; gathering, sorting and displaying data, communicating findings with others.

**Literacy**

Organise texts, using a range of structures. Uses visual language when creating texts. Develops and conveys personal voice.

**Equipment list**

Variety of materials to make a beak (plastic, plaster, paper, fabric, metal, wood, tape, glue etc), hard copy of ID invertebrate guide, camera, computer, magnifying glass, children’s shovel.
Student Learning Experiences
(aimed at Curriculum Level 2)

1: Beaks are made out of a hard protein called keratin
What materials can make a replica beak strong enough to dig and reach a depth of 12cm into the earth? Working in pairs or small groups, construct kiwi beaks.
Add attachments so the beak can be worn.

2: Take the beak to a local outdoor space such as your school grounds or a local forest, and start digging
Compare class beaks - which one is the strongest, sharpest point, quickest at reaching deeper soil? How do the materials chosen cope with the soil conditions?
Evaluate how well the beaks work and discuss any improvements that could be made.

3: Use an invertebrate ID guide to help identify creatures in the soil and decide if a kiwi would eat these.

www.doc.govt.nz/Documents/getting-involved/students-and-teachers/experiencing-invertebrates-in-your-green-space.pdf (page 30) and
www.landcareresearch.co.nz/resources/identification/animals/bug-id/what-is-this-bug

Total how many different invertebrates were found in the soil. What statistical way can findings be presented?
Use a children’s shovel to ensure you have reached a good sample size at 10cm depth.
Try sampling a different area - why might there be differences?

4: Soil Poetry
Look carefully at the soil and think of words to describe it. Is it soft, crumbly, hard, soggy, clay, sandy, full of leaf matter? Make up some new words to describe how the soil feels in your hands.

Use observation skills to write what is seen in a new or different way. Create a Haiku, a Japanese form of poetry that reflects on nature and feelings. There are three lines with five syllables in the first line, seven syllables in the second, and five syllables in the third.

Form a circle outside where everyone can hold some soil and share your poems together.
5: Use NatureWatch to share soil sampling results

Upload your data findings to NatureWatch

naturewatch.org.nz/projects

For guidance on how to use NatureWatch, see


6: Create a menu to attract kiwi to come and have 'dinner' in your local environment

Be creative, include pictures and descriptions of why a kiwi would benefit from eating particular invertebrates.

What happens if prices are added to the menu? Would the biggest or rarest invertebrates cost the most?

7: Investigate why we need invertebrates in our soil

www.doc.govt.nz/education-experiencinginvertebrates

Find out what can be done to your local soil to increase the number of invertebrates living in it. Talk to local experts, visit a community garden, research online, or speak with your local council.

A local DOC office can be contacted via email at conserved@doc.govt.nz
Student Learning Experiences

Differentiation for Curriculum Level 1

1. **Using a sticky beak**
   Use sticks to represent a kiwi beak and mark 10cm to help digging, compare with measuring to other simple depths.

2. **Identify bugs by simple features such as number of legs, presence of wings**

3. **Compare kiwi beaks with other native NZ birds**
   Create a mix and match display for your classroom.

4. **Understanding what it means to look and observe**
   Read the book 'Sam and Dave dig a hole' and discuss what it means to 'look and observe' so that children use all their senses when observing and investigating. See link to online version [www.youtube.com/watch?v=Qjsht-GwXjg](http://www.youtube.com/watch?v=Qjsht-GwXjg)

Differentiation for Curriculum Levels 3-4

1. **Investigate soil microbes**

2. **Soil moisture levels**
   Learn how to find the moisture content of a soil sample and compare samples taken from different locations around the school. Record your data and share it on a national database [www.sciencelearn.org.nz/resources/736-investigating-soil-moisture-content](http://www.sciencelearn.org.nz/resources/736-investigating-soil-moisture-content)

3. **Experiment making a leaf litter garden in your school to improve the quality of your soil**

4. **Making a wormery**
   Learn more about worms, a kiwi favourite, by making your own wormery [kcc.org.nz/portfolio/make-a-wormery/](http://kcc.org.nz/portfolio/make-a-wormery/)
Activity 2: Burrow Building

Kiwi build burrows like a tuatara or a mutton bird (oi, tītī). In this activity, your challenge is to make a burrow in your playground that would be suitable for a kiwi to live and nest in.

Learning intentions

Students are learning to: Think critically and creatively to design and make a shelter for a kiwi. Conduct mathematical investigations to develop knowledge of kiwi behaviour.

Success criteria

Students can: Choose materials for their properties and evaluate the success of their work. Investigate about kiwi connecting science, maths and learning in the environment.

Science

Find out about the uses of common materials and relate these to their observed properties. Recognise that living things are suited to their particular habitat.

Technology

Understand that functional models are used to explore, test, and evaluate design concepts for potential outcomes and that prototyping is used to test a technological outcome for fitness of purpose.

Maths

Create and use appropriate units and devices to measure length, area, volume and capacity, weight (mass), turn (angle), and direction.

Literacy

Organise texts, using a range of structures.

Equipment needed

Camera, timer, computer.
Chapter 3: Needs of kiwi

Student Learning Experiences
(aimed at Curriculum Level 2)

1: How to create a kiwi burrow

Discuss what a burrow is and make a list of animals that use them.

Consider the reasons why kiwi need a burrow.

Investigate how large a kiwi burrow would need to be to recreate in your school ground.

Your burrow should be big enough to fit an adult kiwi and an egg. Remember, kiwi sleep standing up with their long beak tucked under their wing.

Watch www.youtube.com/watch?v=3bP3qhc790A and www.youtube.com/watch?v=bmFhT85fa60#t=43.60731912 to see kiwi in their burrows.

2: Identify potential spaces to create a burrow in your school grounds and source materials

Kiwi commonly use materials like soft grass, moss and sticks to cover the entrance to a burrow and offer protection from the elements.

Collect suitable materials you can use for the burrow but remember noise might attract predators.

Create success criteria for kiwi burrow design and usage, then split into groups to complete a timed challenge to make them.

3: Imagine a kiwi requires a territory that is the size of your school grounds

Use Google Earth to find out the size of the area defined by your school grounds.

Translate the measurements between metres and kilometres. What is the perimeter?


Stand in the middle of the grounds and do a kiwi call, can others hear you that are standing on the boundaries?

4: Design a small home/burrow that you would be happy to live in

As humans, we are beginning to choose to live in smaller homes with the evolution of ‘tiny houses’.

www.livingbiginatinyhouse.com/tiny-house/

Brainstorm the needs humans have for their shelter - what are the similarities and differences?

Create your own home that you could comfortably live in by drawing, mapping, make a sculpture or online tools.
Student Learning Experiences

Differentiation for Curriculum Level 1

Match the animal with the home/shelter
Print pictures of different types of shelters such as a nest, burrow, web, tree hollow, kennel, stable or chicken coop. Separately print off pictures of the animals that live in them. Mix and match the pairs.

Learning about measuring the volume or capacity of an area
See how marbles fit into different sized containers (predict and check).

Using materials for a shelter
Provide children with a range of materials such as grass, leaves and sticks. Experiment with different ways to weave, tie, twist or stick them together to make an example entrance cover for a kiwi burrow.

Differentiation for Curriculum Levels 3-4

Learning about space and volume
Experiment using cardboard boxes to measure what is the smallest space you could sleep in. Make mathematical connections to find out what the volume of your box is.

Research the different types of shelters native animals live in
Why do they create these shelters and what methods do they use to create them?

Mapping Maths
Explore the features on Google Earth via www.brightpips.com/here-are-15-amazing-things-your-kid-can-discover-with-google-earth/
Find out more about your local community, map your house, or experiment with different units of length. Work out the area of your home. Calculate how far it is to school. Learn about perimeters.
Chapter 4: Significance of kiwi

Kiwi are known as the hidden bird of Tāne, the god of the forests in Māori tradition, who created them to care for the forest and Papatūānuku. Kiwi hold spiritual importance for Māori and are taonga. Historically, kiwi were hunted by Māori and their unique feathers added to weaving to create cloaks called 'kahu kiwi' which were used for important ceremonies.

Key Vocabulary
barb - barbule - kahu kiwi - mammal - Papatūānuku - Ranginui - Tāne - tikanga - whānau

Creation of kiwi (Whakapapa)

In Te Ao Māori, Ranginui (the Sky Father) and Papatūānuku (the Earth Mother) had children who are atua (deities or gods). The atua look after the different elements and domains of the Earth. Tāne Mahuta, also known as Tāne, (one of Ranginui and Papatūānuku's children) is the atua of trees and forests. After the great separation of Ranginui, the sky father, and Papatūānuku the earth mother, Tāne set about clothing his mother in vegetation and trees. With this work complete, Tāne produced a variety of birds to care for the forest. The first was kiwi, mothered by Haere Awaawa. The bird tribe became known as Ngā Aitanga Kapakapa a Tāne, the wing flapping children of Tāne.

It is said that when Tāne asked which of the birds would live in the ground and take care of his mother Papatūānuku, none would offer except kiwi, who Tāne blessed with a long beak for detecting food and sharp claws for protection and scratching the earth. Tāne also gave kiwi strong legs to run quickly over long distances. Tāne then gifted kiwi the most special of feathers for warmth and for hiding amongst the undergrowth. These feathers would become treasured and much sought after. For this reason, kiwi are called Tāne’s Eldest Child.

How we are connected to kiwi

When Tāne had produced birds and insects to care for the forest he set out to gain the aptitude and knowledge to create people. In the form Tāne Nui a Rangi, Tāne travelled through many storms and battles to reach the supreme 12th heaven, where he secured three baskets of knowledge and returned to Papatūānuku. The baskets held knowledge of all things and Tāne was able to form Hineahuone, the first woman, carefully moulding her beauty from soil. When complete, Tāne breathed life into Hineahuone and their union began human life.

This is why it is said; “The birds are our brothers and sisters as are all living things, as we are all descended from Tāne.”

See more at www.kiwisforkiwi.org/about-kiwi/kiwi-Māori/tanes-eldest-child/
Our relationship with kiwi over time

**Spiritual importance**

In the ancient Māori world, birds were as important as the moon in announcing changes in weather patterns and the beginning of seasons. Certain birds acquired spiritual status, bringing news of the birth or passing of relatives. Research more information on the importance of birds in Māori life here: [www.teara.govt.nz/en/nga-manu-birds](http://www.teara.govt.nz/en/nga-manu-birds)

The importance of kiwi can also be seen in ancient rock drawings (toka whakairo) depicting an unborn kiwi chick in a kōwhaiwhai pattern discovered on the Waitaki River in South Canterbury.

**How kiwi were hunted**

Kiwi used to be hunted for meat using the Māori dog (kurī) that could easily detect their strong scent. Special chants and rituals took place before a kiwi hunt as the kiwi were under the special protection of Tāne Mahuta, god of the forest. The bird’s ceremonial name is te manu huna a Tāne – the hidden bird of Tāne. To cook them, birds were preserved in their fat and steamed in a hangi/earth oven. Once the musket, arrived kiwi numbers suffered a huge decline as they were sought after for foreign museums and a fashion industry that coveted their fine and unusual feathers.

**Kahu kiwi (traditional kiwi cloaks)**

Initially, in the early 19th century, dog fur was the preferred material used in weaving. However, the Māori dog soon became extinct and feathers from native birds such as the kiwi were chosen instead. Traditionally, weaving was considered a sacred skill passed from mother to daughter. Girls would enter the whare pora (house of weaving) at adolescence to formally learn weaving skills. The mana of a craftswoman would be retained within the garment and the first line of weaving considered especially important and referred to as the ‘aho tapu’ - the sacred first line. Traditionally, to finish a kahu kiwi specific patterns were added as a signature of the creator. See [talesresource.tepapa.govt.nz/resource/017.html](http://talesresource.tepapa.govt.nz/resource/017.html) as an example of this.

Birds display their feathers for mating ceremonies and this idea connected to people wearing and displaying feathers on cloaks for public ceremonies.

©Alfred Martin Frank Denton and Mark Lampe Tesla Studios Ref 11 021027 G. Alexander Turnbull Library Wellington.
Using kiwi feathers in kahu kiwi

Feathers were added to weaving to create cloaks that were used for important ceremonies. Kiwi feathers are special as they create an insulating blanket when woven together. Being a flightless bird, kiwi do not have barbs or barbules on their feathers (used to interlock adjacent feathers for flight) and this means they create a fluffy material and act like a natural barrier ‘insect repellent’. These properties are also found with emu and ostrich feathers. All other birds have feathers with barbs ‘bindings’ which enable them to be unzipped and zipped up again to provide a canopy for flight.

To find out more about feathers and flight see [www.sciencelearn.org.nz/resources/308-feathers-and-flight](http://www.sciencelearn.org.nz/resources/308-feathers-and-flight)

Today, the tradition of kahu kiwi is continued using feathers gathered from kiwi that die naturally or through road accidents or predation. The feathers are then sewn onto flax material and are so fine that three or four feathers are bound together to weave into the flax garment. The feathers are woven upward against the natural fall of the feather, showing the underside of the feather and giving a thick and soft finish.
Chapter 4: Significance of Kiwi

The kiwi has long been a military emblem. A number of First World War regiments adopted the kiwi as their badge, but it was not until the 1960s that the Royal New Zealand Air Force made the kiwi their official emblem.

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‘Kiwi’ the bird

The name ‘kiwi’ for our native bird is thought to originate from Polynesian travellers who already knew of the kiwi, a bird with a similar beak for digging marine worms in and around the tropics. As different species of kiwi were discovered, they received specific Māori names.

‘Kiwi’ the person

The term ‘Kiwi’ referring to people from New Zealand formed after the easy to draw kiwi shape bird started to be used in trademarks – for shoe polish, medicines, insurance and other products. It is also used on coins and stamps. In the early 1900s, cartoonists began to use the kiwi as a symbol for New Zealand. Then in the First World War, people began to call New Zealand soldiers Kiwis, and the name has stayed, even though most New Zealanders have never seen a real kiwi in the wild.
Activity 1: Wearable Weaving

We now understand the significance of using kiwi feathers in ceremonial cloaks. In this activity, your mission is to create a weaved garment using natural materials including feathers and think about how the materials used can signify meaning to a cloak.

**Learning intentions**

*Students are learning to:* Understand the importance of kiwi to Māori and the role that kiwi had historically in New Zealand. Explore the properties of materials and how they can be combined together.

**Success criteria**

*Students can:* Explain how Māori are connected to kiwi and share knowledge of weaving practices. Use a variety of weaving techniques to create a cloak out of natural materials and explain why they were chosen.

**Arts**

Explore a variety of materials and tools and discover elements and selected principles. Investigate and develop visual ideas in response to a variety of motivations, observation, and imagination. Share the ideas, feelings, and stories communicated by their own and others’ objects and images.

**Social Sciences**

Understand how the past is important to people and how the cultures of people in New Zealand are expressed in their daily lives. Understand how cultural practices reflect and express people’s customs, traditions, and values. Understand how time and change affect people’s lives. Understand how the status of Māori as tangata whenua is significant for communities in New Zealand.

**Literacy**

Show some understanding of how to shape texts for different purposes and audiences. Use language features appropriately, showing some understanding of their effects.

**Equipment needed**

Hessian sack, feathers from a variety of birds, hot glue gun, needle and thread, flax, natural items found in the forest or beach. (Do not source kiwi feathers as they are taonga and you require a permit to hold them.)
Student Learning Experiences
(aimed at Curriculum Level 2)

1: Explore materials
Explore why and how different materials have been used to make ceremonial cloaks.
www.collections.tepapa.govt.nz/topic/3605
Brainstorm in class what materials are available now to make a modern cloak suitable for your class.

2: Learn about weaving
Weaving forms a crucial part in creating a kahu kiwi. Explore the historical importance of weaving by Māori.
To see how materials such as kiwi feathers were added to these cloaks see video www.teara.govt.nz/en/video/23949/weaving-a-cloak
Contact people in your whānau to see if there is anyone with experience of weaving who could come and talk about their experiences and demonstrate weaving work. Alternatively, contact a local marae and see if it is possible to arrange a visit and meet with kaumātua to talk about the significance of kiwi.

3: Practice weaving
Trial weaving techniques using construction paper or flax.
images.tvnz.co.nz/tvnz_images/tvone/programmes/good_morning_2010/craft/fifi-flax-fish-24jul.jpg
Please follow tikanga when using sourcing flax.

Tikanga and Pa Harakeke
The harakeke (flax bush) is a living whakapapa and represents a whānau, hapū and iwi. The rito (centre blade) is the baby. It is surrounded by its parents, siblings, cousins, aunts, and uncles, and they are surrounded by grandparents. Try to find the whānau, hapū and iwi groups on flax. Having someone to lead and say a karakia is an important tikanga practice which clears the way to cut the blades for the purpose of weaving. It is important that only the external blades are removed. To cut the flax, use a downward motion away from the centre of the plant. For more information see my.christchurchcitylibraries.com/harakeke/

4: Feather Hunt
Kiwi feathers are different in their structure as they do not contain barbs, instead being more like fluffy blankets providing insulation. Go on a feather hunt and observe the similarities and differences between feathers. Try to identify the parts of a feather.
5: Find out about the spiritual significance of feathers from different birds

For example, the kiwi is nocturnal and elusive. Its mysterious nature gives kahu kiwi cloaks particular mana (prestige).

Research the birds that have provided the feathers for kahu huruhuru - kiwi, kākā, kererū and ruru. What makes these children of Tāne (god of the forest) so special?

collections.tepapa.govt.nz/topic/3625

See Māori legends that connect our native birds to the origins of New Zealand.


6: Create a modern cloak

Discuss the desired values and meaning that the class cloak will have.

• Is it important that the cloak would hold the love or aroha of the hands that created it, and the aroha of your ancestors?
• When would it be worn?
• The cloak could be a representation or update of a class treaty. Will it have an overall design made collaboratively or different parts joined?
• What are some taonga artifacts that are significant for being a member of your class and connect to your school values?

Link shows example of lesson plan.

www.caritas.org.nz/sites/default/files/all%20levels.pdf

7: Personalising the cloak

Collect materials from nature that can be added (e.g. feathers, paua shells, cockle shells, pumice, flax leaves and toetoe) to the cloak.

Use a hessian base and weave, staple, tie, glue, twist or plait materials to the cloak base. Involve members of the wider community, welcoming them to come in and weave their aroha and blessing into the cloak. Design how the cloak will be signed and how it will be used in class as a toanga (treasure).
Student Learning Experiences

Differentiation for Curriculum Level 1

Make a cloak using a template paper feather
Children add words to describe the qualities they value in order to create a cloak of wisdom and power. See page 16 for an example and page 23 for a paper feather template.


Paper weaving ideas

Differentiation for Curriculum Levels 3-4

Weave a putiputi flax flower
See my.christchurchcitylibraries.com/making-a-putiputi/ or create a flax wristband alibrown.co.nz/blog/bands-for-the-boys-and-girls

Plan and write a narrative telling a story connecting to the power of your cloak
Watch http://talesresource.tepapa.govt.nz/resource/071.html to see how a kahu kiwi offered protection to an English orphan.
Māori legends contain information rich in history and with important meaning. In this activity, you explore the story of Tāne’s eldest child and recreate and modify this to make it unique to your school and its values.

Learning intentions

_Students are learning to:_ Develop their knowledge of Māori legends and express their ideas of this through drama and story.

_Success criteria_

_Students can:_ Retell the story of Tāne’s eldest child and explain its meaning. Create and perform a drama telling the story of Tāne’s eldest child. Use a variety of drama techniques to explore and express character.

Arts

Identify and describe how drama serves a variety of purposes in their lives and in their communities. Explore and use elements of drama for different purposes. Develop and sustain ideas in drama, based on personal experience and imagination. Share drama through informal presentation and respond to elements of drama in their own and others’ work.

Literacy

Recognise and understand the connections between oral, written, and visual language. Thinks critically about texts with developing confidence.

Construct texts that demonstrate a growing awareness of audience and purpose through appropriate choice of content, language, and text form.

Technology

Understand the relationship between a material used and its performance properties in a technological product.

Equipment needed

An assortment of wearable props for drama, video recorder, selection of percussion instruments (can use nature instruments created in Chapter 1), arts and crafts for set design.
Student Learning Experiences
(aimed at Curriculum Level 2)

1: Read the story of Tane’s Eldest Child

www.kiwisforkiwi.org/about-kiwi/kiwi-maori/tanes-eldest-child/

Discuss the meaning of this Māori legend.
Why did Tāne need someone to protect the earth and why did the other birds not want the ‘job’ of looking after the earth?

2: Explore birds and their behaviour

Some of the reasons why the other birds said they could not look after the earth was that they were scared of the dark or getting their feet wet.

• What birds are not scared of the dark?
• What birds are not scared of getting their feet wet?
• What were the sacrifices that the kiwi had to make and how did this make the kiwi feel?
• What qualities did the kiwi demonstrate by accepting this special ‘responsibility’?
• Is it fair that the other birds received consequences for not helping?

3: Create a drama version of this story

Make a character list and consider how Tāne and the birds will move and sound.

Cast members of the class (the play can be done in several small groups or as a whole class).

Consider the other jobs involved in producing the drama and assign roles:

ROLES CHECKLIST

- Set design
- Prop makers
- Camera operator
- Costumes
- Sound effects
- Director
- Script checker
- Credits
- Marketing (including poster)
4: Learn different drama techniques

Carry out whole class drama techniques such as decision alley or hot seating to gain more insight into the characters personalities, the problem which Tāne was trying to solve, and the consequences for all of the birds.

Explore and choose techniques to try as a class from:

www.dramaresource.com/drama-strategies/

5: Rehearse the drama

Film practices and view to gain feedback to make improvements.

Try to find an outside location around the school to represent the forest.

Organise a performance.

This could be in school assembly, to a junior class, to whānau.

Design a poster to advertise the performance and what can be learnt from this Māori legend.

6: Sharing the story

Consider how to share this story and its message for a lasting memory

• put a video on school website,
• create a class display showing the processes in making the drama,
• add to a blog, interview actors and members of the production team.

7: Freeze frame drama

Imagine being a kiwi. Using the ‘freeze frame’ technique, portray what it has been like from a kiwi perspective from the 1880s to present day and what you imagine the future will be.
Chapter 4: Significance of kiwi

Student Learning Experiences

Differentiation for Curriculum Level 1

Create a cartoon strip to retell the story of Tane’s Eldest Child


Design a front cover picture and title for the story showing all the characters

Make an outdoor drama
Create freeze frames to show the different birds in the story and add descriptive words to show the different birds personalities and characteristics.

Differentiation for Curriculum Levels 3-4

Create a stop-motion version of the story using a digital camera
Take a photo for each movement and use Powerpoint to create a slideshow with an image for each slide. Record a narration to play at the same time.

Produce a film of the drama
Using MovieMaker, produce and edit a film of the story adding in narration, sound effects and titles.

Write a modern day version of this story using alternative native animals found in New Zealand
Chapter 5: Threats to Kiwi

Hundreds of years ago, millions of kiwi could be heard in the night forest across New Zealand, but unfortunately today the story is very different. With approximately 68,000 kiwi left, all species are under threat due to three main problems: predators and pests, loss of habitat, and people. In fact, people are responsible for all of the threats to kiwi. To counteract this decline, intensive management of kiwi populations and control of threats is being focused on through work by DOC, community-led projects, and offshore island sanctuaries.

Key Vocabulary


Mustelids (stoats and ferrets), possums and wild cats are all introduced species in New Zealand that eat kiwi eggs, or kill chicks or adults in the wild.

Uncontrolled dogs are the biggest killer of adult kiwi.

Other pests have adverse effects through competing for the same food as kiwi: hedgehogs, rodents, and weasels. These pests are also prey for the same animals that attack kiwi, helping to keep the number of kiwi predators high.

Historically, kiwi decline resulted from them being hunted for meat, skins and feathers. Present day issues include traps being set incorrectly and uncontrolled dogs.

Kiwi can be injured or killed through the land clearance process. Land clearance results in smaller habitats that create concentrated kiwi populations living alongside their predators, territorial disputes, and kiwi being pushed out into farmland, where there are greater risks of dogs.
There were no mammalian predators before people introduced them, but now, kiwi eggs, chicks and adults are all vulnerable to attack.

### Native species and the THREAT OF PREDATORS

<table>
<thead>
<tr>
<th>Predator</th>
<th>Why were they introduced</th>
<th>How do they cause harm?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stoats (mustelid)</td>
<td>Control rabbit population in 1870s</td>
<td>Eat young chicks up to 7-9 months old</td>
</tr>
<tr>
<td>Ferrets (mustelid)</td>
<td>Control rabbit population in 1870s</td>
<td>This larger mustelid also attacks chicks and can attack adult kiwi</td>
</tr>
<tr>
<td>Possums</td>
<td>Boost fur industry and to increase NZ’s biodiversity in 1837</td>
<td>Chase adult kiwi out of burrows to eat eggs or chicks</td>
</tr>
<tr>
<td>Wild Cats</td>
<td>Control rat numbers on early explorer ships (1700s) and rabbit populations in 1870s. Domestic cats that are dumped when not wanted can also become feral.</td>
<td>Eat chicks</td>
</tr>
</tbody>
</table>

19 out of every 20 kiwi chicks hatched in the wild die before they reach breeding age (their 4th birthday) without predator control.

Up to 60% of kiwi chicks survive to breeding age in areas that have predator control.

The estimated rate of decline per year for the national kiwi population is 2%.

The number of human generations within which kiwi are estimated to disappear in the wild if the current population decline continues is 20.
How Predators Harm Kiwi

Stoats
Stoats are the mid-sized mustelid and the most abundant and widespread in New Zealand. They are light brown with a white belly and have a long black-tipped tail. Stoats are active during the day, and have a fast metabolism, therefore requiring lots of food. They are especially good climbers and swimmers. They are opportunists and will eat anything – rodents, birds, weta, lizards and kiwi chicks. They kill more than 50% of all chicks that hatch in areas where the stoats are not being controlled.

Ferrets
Ferrets are the largest mustelid and about the size of a small cat. They are usually brown or black with creamy underfur and a darker mask across the eyes. They hunt mainly at night and prefer open areas and bush edges. They eat small animals, such as rabbits, rodents, lizards and frogs. They can easily kill a kiwi chick and can also kill adult kiwi.

Other Pests
Rodents are a problem for kiwi as they are prey to the same predators that kiwi face. This means if there are more rats, there is more food for stoats. As more stoats survive, there is more risk to kiwi. Because of this, pest control that targets pests such as rats and hedgehogs is beneficial to kiwi.
Chapter 5: Threats to kiwi

**Possums**

Possums destroy native trees and shrubs, and eat the berries needed by native birds. They also eat New Zealand’s native land snail, lizards and insects, and chase birds off their nests to eat the chicks and eggs.

Watch [www.youtube.com/watch?v=eHNAeyw_av0](http://www.youtube.com/watch?v=eHNAeyw_av0) to see how a kiwi defends itself against a possum.


**Wild Cats**

Wild cats look like domestic cats but are often solitary and territorial, marking their area with a scent and hunting at night time. Their prey includes fish, mice, rats, birds such as young kiwi chicks, lizards and rabbits.


**Predator Control**

Management plans depend on the number of kiwi affected, habitat type and size, which pests are present and time of year.

1. **Trapping**


   However, an important consideration is how to set a trap correctly so that it cannot harm any kiwi in the area. [www.kiwisforkiwi.org/wp-content/uploads/2016/12/Predator-Control-Kit-Updated.pdf](http://www.kiwisforkiwi.org/wp-content/uploads/2016/12/Predator-Control-Kit-Updated.pdf)

   With technological developments, new traps are evolving to ensure the most effective killing of predators without harm to other important wildlife or domestic pets. See more about trapping at [www.predatortraps.com/traps.htm](http://www.predatortraps.com/traps.htm), [www.traps.co.nz/traps](http://www.traps.co.nz/traps) and [www.goodnature.co.nz](http://www.goodnature.co.nz)

2. **Poisoning**

   In areas where there are no other mammals which could be harmed, use of biodegradable 1080 targets kiwi predators. [www.doc.govt.nz/nature/pests-and-threats/methods-of-control/1080-poison-for-pest-control/](http://www.doc.govt.nz/nature/pests-and-threats/methods-of-control/1080-poison-for-pest-control/)

3. **Shooting**

   This can be used for cats and possums under appropriate safety guidelines.

   Predator-proof fencing is used alongside these methods to keep pests out of areas where they have been eradicated. [www.teara.govt.nz/en/photograph/13935/predator-proof-fence](http://www.teara.govt.nz/en/photograph/13935/predator-proof-fence)

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**Pest control IN NEW ZEALAND**

A range of tools is used to manage pest populations.

- **1080** is biodegradable, breaks down quickly in the environment and does not leave permanent residues in water, soil, plants or animals. The active component occurs naturally in many plants found in Australia, South America and Africa as a defence against browsing animals.

- Conventional and re-setting traps and bait stations are used for longer term and localised suppression of pest populations.

- New methods of control are constantly being researched.

- The number of times traces of 1080 has been found in reticulated water supplies. Since 2008, more than 530 water samples from drinking water catchments and other water bodies have been analysed. Operations pose no risk to water supplies.

- The number of kiwi that have been monitored throughout 1080 operations since 1990.

- The number of kiwi that have died as a result of 1080 poisoning.

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The Department of Conservation is planning to manage pests in response to a predicted predator plague this year. For more information visit: [www.doc.govt.nz/battleforourbirds](http://www.doc.govt.nz/battleforourbirds)
Effects of Dogs

Dogs are a big problem for kiwi and are the main predator of adult kiwi, killing the important breeding birds and threatening the future of kiwi. Kiwi lack a raised central keel on their breastbone, making them vulnerable to being crushed by even the gentlest bite, and dying from internal bleeding. This is also a feature of other flightless birds such as emus and ostriches, which belong to a group known as ratites.

Dog owners have a responsibility not to let their pets roam anywhere near areas where kiwi might be present.

In the case of working dogs, kiwi aversion training has been developed which is approximately 65% effective. Watch www.youtube.com/watch?v=GA2ZrfStyRA to learn more about how dogs are harmful and the kiwi aversion training programme.


Loss of habitat

Loss of habitat has resulted from forest clearing by early settlers, more land being converted to pasture for the dairy industry, and infrastructure development of towns and cities.

This impacts kiwi as it can reduce their territory, leading to fatal conflicts or kiwi being pushed out into pasture land, or more densely inhabited areas, where they are more vulnerable to dogs. An altered habitat causes change across an ecosystem, meaning that kiwi might not find suitable food or that the soil structure is altered e.g. compacted ground from livestock which a kiwi could not probe with its beak.

Kiwi can survive quite well when predators are controlled, enough shelter and feeding places are available and the ground is not too dry or compacted. Watch www.youtube.com/watch?v=j9dPXPUwa0c to learn more about how loss of habitat has impacted on kiwi numbers, advice on how to encourage kiwi in your area by fencing native bush, and the benefits of long-term protection through covenants.
Activity 1: Predator Detectives

Understanding the threats to kiwi is the first step in working out the best way to protect them. In this activity, you will be investigating the local pests in your community and learning how to detect them.

**Learning intentions**

*Students are learning to:* Identify the predators and pests for kiwi and understand the need to control their numbers. Develop knowledge of methods used to identify predators such as appearance, droppings (scats) or footprints. Learn about ways that we can help reduce predators for kiwi.

**Success criteria**

*Students can:* Identify predators and pests for kiwi and understand ways in which to reduce them.

**Literacy**

Select and use sources of information and prior knowledge with growing confidence to make sense of increasingly varied and complex texts.

**Health and physical education**

Participate in and create a variety of games and activities and discuss the enjoyment that these activities can bring to them and others.

**Science**

Recognise that there are lots of different living things in the world and that they can be grouped in different ways. Investigate and extend their experiences and personal explanations of the natural world through exploration, play, asking questions, and discussing simple models.

**Equipment needed**

2 large plastic milk bottles, craft knife or scissors, piece of wood, gladwrap, red food colouring, sponge, small plastic tray, peanut butter or raw meat, sheets of white paper, piece of wire, torch, notepad and pencil, camera, computer
Chapter 5: Threats to kiwi

Student Learning Experiences
(aimed at Curriculum Level 2)

1: Identifying local predators

Use links in the background notes to research four main kiwi predators: stoats, ferrets, possums and cats.

Create a chart that describes what they look like (size, colour) and their behaviour (when they are active, how they target kiwi, their diet). Template at docs.google.com/document/d/17xLsVwmjImQzY5qSW8qlpe_Tv36itznV82TsthPTf7c/edit?usp=sharing

2: Predator clues

Not all predators are easily seen but can be found by looking for clues. These clues might be footprints, scats (droppings), fur/hair, den sites, damage to nearby trees or plants, or prey damage e.g. tooth marks on a damaged egg shell.

Use www.pestdetective.org.nz to find out how kiwi predators differ from one another.

3: Tracking predators

Using knowledge from the previous task, go outside and see what pests can be found.

Repeat the hunt at night-time in your garden with a torch if you can.

4: Which predators are near your school?


Collect other animal footprints and make a school display.

Encourage others to make tracking tunnels to test at home – are different pests found?

Analyse your results: what the most common pests? Which pests are in certain locations?

Explore ways to present your findings graphically.

5: Other ways to detect a pest

6: Sharing your pest detective findings

Use NatureWatch (or the iNaturalist app) to upload your data results and connect with others to compare pests in the local area. naturewatch.org.nz/projects/animal-footprints-in-nz

Explore NatureWatch and chat with experts to identify any pest clues that you would like to check naturewatch.org.nz/pages/about-naturewatch and www.inaturalist.org/pages/getting+started

For more instructions about using these tools, see: blog.core-ed.org/blog/2016/02/contributing-to-your-community-as-a-non-scientist-using-naturewatch.html

7: Create a ‘Predator Vs Prey’ game

Make up a ‘tag’ PE game with students being kiwi and introducing ‘taggers’ who are predators.

Investigate what happens to the number of free kiwi as more predators are added in.

Create rules to differentiate how dangerous this predator is for kiwi, e.g. A stoat can run to tag others, a possum can skip.

Determine how your kiwi might be freed once tagged - do they have to freeze for a period of time to represent how the population has to wait for new kiwi to be born?

See an alternative possum game at www.doc.govt.nz/get-involved/conservation-education/resources/possum-picnic/

Create your own environmental PE game.

For more predator activities see Activity Two parts 4 and 5
Student Learning Experiences

Differentiation for Curriculum Level 1

**Whose footprint is this?**
Print off copies of pest animals and their footprints. Make a mix and match puzzle to complete.

**Be a pet detective**
Make a poster showing the clues you could find to spot a dog. E.g. fur, scats, dog chew.
- Visit [www.stat.auckland.ac.nz/~fewster/CatchIT/](http://www.stat.auckland.ac.nz/~fewster/CatchIT/) to find out more about the CatchIT school trapping and data programme.

**Bring a pet pest to your classroom**
Find out if anyone has a pet rat or ferret that can come stay in the classroom for a few days. Learn about their diet – do the all eat cat food? Where do they find their food out in nature?
Test their footprints through tracking tunnels. What food is the most tempting to lure the rat or ferret through the tunnel?

Differentiation for Curriculum Levels 3-4

**Set up a trapping programme at your school**
Research [www.Trap.NZ](http://www.Trap.NZ) an app for recording data relating to the trapping of pests or use of bait stations.
Set up trapping projects, map your trap lines and traps, and enter your trapping results (via web or a mobile app). Use the app to examine and understand your trapping data.

**Take part in the Zealandia tracking and trapping programme**

**Support Predator Free, an ambitious, nationwide goal to rid New Zealand of possums, rats and stoats by 2050**
See [www.predatorfreenz.org](http://www.predatorfreenz.org) for case studies and examples of what other schools have done to achieve a predator free community.
For example [predatorfreenz.org/urutichildren-are-kiwi-kids/](http://predatorfreenz.org/urutichildren-are-kiwi-kids/)
Kiwi only live in select areas of New Zealand where their requirements of food and shelter can be met. In this activity, you explore how land clearance and the actions of people have influenced kiwi numbers. There are also tasks using ICT to share learning about kiwi threats.

**Learning intentions**

_Students are learning to:_ Understand how people and loss of habitat has influenced kiwi numbers. Develop knowledge of how introduced pests can harm native flora and fauna.

**Success criteria**

_Students can:_ Explain how people’s actions and loss of habitat affects kiwi numbers. Identify predators and pests to kiwi and explain how they cause harm. Understand methods used to control kiwi predators in New Zealand.

**Arts**

Develop and sustain ideas in drama, and explore and use elements of drama for different purposes. Investigate and develop visual ideas in response to a variety of motivations, observations, and imagination.

**Maths**

Statistical literacy exploring features of simple data displays from statistical investigations or probability activities undertaken by others.

**Social sciences**

Understand how people make choices to meet their needs and wants. Understand how time and change affect people’s lives.

**Literacy**

Uses oral, written, and visual language features to create meaning and effect and engage interest.

**Equipment needed**

Maps of New Zealand, computer, print outs of infographic examples, modelling clay, historical maps of local area.
Student Learning Experiences
(aimed at Curriculum Level 2)

1: Effects of land clearance
Find out what the land used to look like where your school is now: collect evidence and photos.
Could kiwi have lived there? What were the reasons for clearing land in your local area?

2: Imagine being involved in land clearance
Through drama, hold a class debate showing the different sides for/against land clearance imagining you were living at this time.

3: Create an infographic on the effects of land clearance in NZ since the arrival of people
See [www.kiwisforkiwi.org/about-kiwi/threats/losing-habitat/](http://www.kiwisforkiwi.org/about-kiwi/threats/losing-habitat/) to research important statistics that can be included in the infographic.
See p.57 of the resource for an example of what an infographic looks like.

4: Border Control - Wanted Dead or Alive
These are all introduced species to New Zealand. Imagine being on border control where you have been assigned the job of eliminating them.
Create a visual wanted poster for each animal and give the group a catchy name. Make up new vocabulary to describe the animals.
Think where these posters should be placed in the local community for maximum effect.

5: Spot the pest quiz
Test your knowledge of kiwi pests on this quiz created by DOC [docs.google.com/presentation/d/1KefTIP38aegwicnOfOxee8liq5NdPbrY9GQxAEIsTXA/edit#slide=id.g1bd2ee9ff1_1_98](http://docs.google.com/presentation/d/1KefTIP38aegwicnOfOxee8liq5NdPbrY9GQxAEIsTXA/edit#slide=id.g1bd2ee9ff1_1_98)
Working in pairs, design and make some additional quiz slides that could be added onto this quiz.
Student Learning Experiences

**Differentiation for Curriculum Level 1**

- **See the change in the amount of forest in New Zealand over the last 1,000 years.**
  

  Shade in the forested areas on a map of New Zealand for these different time periods. Use Google Earth to see where your school is and mark on the map.

- **Make a model of a kiwi pest**
  
  Using plasticine or modelling clay make a model of a kiwi predator. Add colour if possible.

  Discuss what features of the predator make it a threat to kiwi.

**Differentiation for Curriculum Levels 3-4**

- **Perform a report explaining the importance of trapping techniques so that kiwi are not harmed**
  
  Kiwi can unintentionally be harmed by incorrect trapping techniques that are targeting their predators. Research www.kiwisforkiwi.org/wp-content/uploads/2016/12/Predator-Control-Kit-Updated.pdf to find out how kiwi are vulnerable and how to stop mistakes happening.

  Decide on a creative way to share your knowledge e.g. write a poem, create a rap, make a poster.

- **Learn about Mr Potts who first questioned deforestation by early settlers**
  

  Film a news report or recreate Mr Potts’ discussions with the government.
Chapter 6: Kiwi in New Zealand today

Hundreds of years ago, there were millions of kiwi, but now their survival is threatened. Hands on work within sanctuaries and captive rearing facilities is aiming to reverse the decline of each species and to start growing their numbers. In ten years time, the aim is for each kiwi species and subspecies population to be growing by 2% per year.

Key Vocabulary

conservation - DNA - evolution - genetics - management - predator - population - resilience - species - status level - subspecies
Species of kiwi

Based on what kiwi look like, it was originally thought there were only three species of kiwi – great spotted, little spotted and brown kiwi. However, when genetic research started to analyse kiwi DNA in the 1980s, scientists realised that there were more varieties than this and divided them up into five kiwi species.

Great spotted kiwi  
Little spotted kiwi  
Brown kiwi

Rowi (a type of brown kiwi)  
Tokoeka (a type of brown kiwi)

Scientists found that there are even more variations within the brown and tokoeka species because they have been geographically isolated and have made evolutionary changes over time. These variations have allowed kiwi species to be further divided into 10 different types, or ‘subspecies’ of kiwi (see table 6.1).

Each subspecies differs in their appearance and may have differences between their breeding habits, number of eggs and clutches, incubation behaviour, care for chicks, and preferred habitat conditions.
Kiwi populations

Kiwi are able to live in a diverse variety of habitats and different species are found in particular locations. The size of each kiwi population depends on the habitat, the predators found this area, and the work being done by DOC and community organisations to protect and manage kiwi numbers through a variety of methods (see Chapter 7).

We know estimated population numbers for each subspecies of kiwi and each is assigned a survival status level (depending on whether the population is declining, stable or increasing).

See [www.doc.govt.nz/nature/conservation-status/threatened-species-categories/](http://www.doc.govt.nz/nature/conservation-status/threatened-species-categories/) for more information on how the conservation status level of a species is assessed e.g. critical, vulnerable etc.

<table>
<thead>
<tr>
<th>Kiwi subspecies</th>
<th>Location</th>
<th>Status</th>
<th>Estimated population in 2015</th>
<th>% under active management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little spotted</td>
<td>Offshore islands</td>
<td>At risk</td>
<td>1,800</td>
<td>100%</td>
</tr>
<tr>
<td>Great spotted</td>
<td>South Island</td>
<td>Vulnerable</td>
<td>14,800</td>
<td>12.6%</td>
</tr>
<tr>
<td>North Island brown Northland</td>
<td>Northland</td>
<td>Vulnerable</td>
<td>8,200</td>
<td>49.7%</td>
</tr>
<tr>
<td>North Island brown Coromandel</td>
<td>Coromandel</td>
<td>Vulnerable</td>
<td>1,700</td>
<td>74.7%</td>
</tr>
<tr>
<td>North Island brown Eastern</td>
<td>Eastern</td>
<td>Vulnerable</td>
<td>7,150</td>
<td>21%</td>
</tr>
<tr>
<td>North Island brown Western</td>
<td>Western</td>
<td>Vulnerable</td>
<td>7,500</td>
<td>43.7%</td>
</tr>
<tr>
<td>Rowi (Okarito brown)</td>
<td>Haast</td>
<td>Critical</td>
<td>500</td>
<td>100%</td>
</tr>
<tr>
<td>Tokoeka Haast (southern brown)</td>
<td>Haast</td>
<td>Critical</td>
<td>400</td>
<td>80%</td>
</tr>
<tr>
<td>Tokoeka Rakiura</td>
<td>Rakiura (Stewart Island)</td>
<td>Endangered</td>
<td>13,000</td>
<td>8.8%</td>
</tr>
<tr>
<td>Tokoeka Fiordland</td>
<td>Fiordland</td>
<td>Vulnerable</td>
<td>12,500</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

In total, the kiwi population in New Zealand is estimated to be around 68,000, a decline from the last population estimate in 2008 which was 73,000 kiwi. The rarest subspecies are rowi and tokoeka Haast, and the commonest species is the North Island brown.
Kiwi distribution

Although the national population of kiwi is declining, the four rarest types of kiwi have been increasing due to intensive management. This is possible because the population sizes are relatively small. Overall though, we have 76% of our kiwi living in habitats which have no predator control.

Current distribution of kiwi in New Zealand (2016).
Map provided by Department of Conservation.
How kiwi populations are monitored

**Kiwi Call Count** - Specific sites in kiwi habitat are visited at specific times (yearly, every 5 years) to listen and record the number of kiwi heard and their location. These records allow patterns to be seen over time.

**Transmitters** - Some captive kiwi have transmitters attached to their legs to track their activity, telling us where a kiwi is, when an egg is laid and when a chick hatches.

See [www.backyardkiwi.org.nz/monitored-birds/monitoring-techniques](http://www.backyardkiwi.org.nz/monitored-birds/monitoring-techniques) Collecting this data can take many days of groundwork.

A data collection software called ‘Sky Ranger’ has been developed that gathers these transmitter signals during a two-hour flight and is now being used to monitor rowi.

Chapter 6: Kiwi in New Zealand today

Activity 1: Pick a kiwi

There are five known species of kiwi: brown, little spotted, great spotted, rowi and tokoeka, which differ in genetics as kiwi have evolved and adapted to changes in their habitats over time. In this activity, you are designing and creating a fun quiz which will educate other students about a particular species of kiwi.

Learning intentions

_Students are learning to:_ Develop knowledge of the similarities and differences between kiwi. Ask and answer questions choosing language which is appropriate for the audience.

_Success criteria_

_Students can:_ Create a quiz to share their knowledge and encourage others to learn about kiwi.

**Maths**

Conduct investigations using the statistical enquiry cycle: posing and answering questions; gathering, sorting, and displaying category and whole-number data; communicating findings based on the data.

**Technology**

Understand that technology both reflects and changes society and the environment and increases people's capability.

**Equipment needed**

Computer, paper, pens, kiwi costumes and props, certificates

**Literacy**

Use sources of information (meaning, structure, visual and grapho-phonetic information) and prior knowledge to make sense of a range of texts. Constructs texts that demonstrate a growing awareness of audience and purpose through appropriate choice of content, language, and text form.
Student Learning Experiences
(aimed at Curriculum Level 2)

1: Choose your favourite kiwi species
Compare the characteristics of different kiwi species and choose one to create a quiz.
www.kiwisforkiwi.org/about-kiwi/kiwi-species/
To help choose, research two different species and display findings in a Venn diagram
www.learninggamesforkids.com/graphic_organizers/writing/venn-diagram.html

2: Decide on quiz content
Generate questions and test them on other students. Remember to include some further information so players learn as they do the quiz. Make sure your quiz is accurate by checking with a teacher.

3: Create an interactive kahoot quiz
Use getkahoot.com/ to create a quiz that can be shared and played as an individual or in a competition with friends.
Add in photos, weblinks and videos of kiwi to make your quiz more interesting.

4: Involve others in learning about kiwi
Expand sharing knowledge about kiwi with your school whānau. For example, host an after-school event where adults can do the kahoot quiz, interactive displays, presentations etc. Hold a kiwi dress-up day at your school for a chosen kiwi species.
Chapter 6: Kiwi in New Zealand today

Student Learning Experiences

Differentiation for Curriculum Level 1

Simplify quiz format to true/false questions
Generate class questions through a guided session. Students create written quiz with lift up flaps to reveal the answers.

Create a kiwi report
Research a kiwi species and create a shared class factfile.
Film a presentation and describe images collected that can be published on school website. Alternative, present to another class and hold a Q&A session afterwards.

Differentiation for Curriculum Levels 3-4

How populations have changed over time
Figure 4.3 shows how the range of four native birds (kōkako, mohua, kiwi, and kākā) has shrunk since the middle of the 19th century. The range (size of area within New Zealand) where kiwi live has changed dramatically over time.

- Which native bird has seen the biggest reduction in range?
- How much has the kiwi range changed between 1840s and 2000s?
- What reasons are there for this reduction in range?
Investigate the reasons why these other native species are declining. Are there similarities to the situation for kiwi?

Design quiz as a reading comprehension activity
Write the text and add in diagrams/photos followed by open and closed questions.

Film a news report on a kiwi species
Design a follow-up activity to consolidate learning for viewers. E.g. team quiz, mix and match activity.

Figure 4.3 The range of a species is the geographical area within which it can be found. Kōkako, mohua, kīwi, and kākā are all deep endemic birds that once roamed over much larger areas than they do now.

Data: Department of Conservation
Activity 2: How many kiwi?

The number of kiwi in New Zealand is estimated to be around 68,000, a decline from the last population estimate in 2008 of 73,000 kiwi. In this activity, you investigate kiwi subspecies populations and explore why kiwi have been assigned conservation status levels.

Learning intentions

*Students are learning to:* analyse and draw conclusions about data showing kiwi subspecies populations. Develop mapping skills to identify where kiwi live in New Zealand.

Success criteria

*Students can:* share their knowledge about kiwi populations and why some subspecies are more actively managed than others. Identify and name locations on a map where kiwi live.

Maths

Posing and answering questions. Gathering, sorting, and displaying category and whole-number data. Communicating findings based on the data.

Health and Physical Education

Contribute to and use simple guidelines and practices that promote physically and socially healthy classrooms, schools, and local environments.

Art

Share the ideas, feelings, and stories communicated by their own and others’ objects and images.

Science

Recognise that there are lots of different living things in the world and that they can be grouped in different ways.

Equipment needed

Computer, notebook, paints, print out map of New Zealand, collage materials (magazines, newspapers, scrapbooks), glue, scissors, bird survey recording sheets, bird call count recording sheets, recording device, binoculars.
Student Learning Experiences
(aimed at Curriculum Level 2)

1: Explore what 68,000 looks like
Find examples of other birds that have a similar population. Is there a town or region in NZ which has a similar population of people living there?

2: Create an infographic to show each kiwi subspecies population
See page 57 for an example of an infographic. Create an infographic poster or use an online tool such as www.canva.com

3: Understanding threat rankings for native birds
Using criteria created by DOC, each native species is assigned a threat ranking which determines how important the need is to intervene and manage populations.

Imagine a new native bird has been discovered (make up a name). It has a population of 300 but this is declining by 60% each year. What threat status will it be?
Create several new species and design a fact file describing their population, population trend % increase/decrease and threat status. Draw an image to match your bird.

Abbreviations:
Dec = Declining
NC = Nationally Critical
NE = Nationally Endangered
NT = Not Threatened
NU = Naturally Uncommon
NV = Nationally Vulnerable
Rec = Recovering
Rel = Relict
RR = Range Restricted
Student Learning Experiences
(aimed at Curriculum Level 2)

4: Understanding role of bird genetics
A recent report into native birds has highlighted the importance of bird genetics, and how this impacts on resilience and restoration. Small geographically isolated populations of kiwi have a risk of becoming in-bred.


5: Conduct a school bird survey
Find out which birds live in your local area and how common they are by taking part in the NZ garden bird survey.

See www.doc.govt.nz/education-experiencingbirds for more information and links to school resources.

6: What is the rarest bird in your region? What is the rarest bird in NZ?
Generate ‘I wonder’ questions to conduct a class research project. For example: how many birds are there? Why are they under threat? Where might you spot them? Is there an action we could take to increase numbers? Why is this bird important for New Zealand?
Student Learning Experiences

**Differentiation for Curriculum Level 1**

- **Putting kiwi on the map**
  Colour in areas on a blank New Zealand map where kiwi live. Mark your school location.

- **Collage kiwi**
  Research the appearance of each kiwi species and create images which highlight how the birds differ from each other. E.g. length of beak, height, weight, plumage colour.
  Use recycled magazines, newspapers, scrapbooks etc to create a kiwi artwork.

**Differentiation for Curriculum Levels 3-4**

- **Conduct a five minute bird count**
  Organise a trip to a local forest and carry out a DOC bird call count. Analyse data recording forms before you go [www.doc.govt.nz/Documents/getting-involved/students-and-teachers/experiencing-birds-in-your-green-space.pdf](http://www.doc.govt.nz/Documents/getting-involved/students-and-teachers/experiencing-birds-in-your-green-space.pdf) (p.20) and discuss why the different information you are asked to record is important.

- **Threatened native species**
  Find another native New Zealand species which has a similar population to all kiwi (68,000). Investigate why the population is that size, any known threats, and what is being done to support and protect the species. Create a report to present or share online.

- **Using genetics against predators**
Chapter 7: Conserving kiwi

Our current government has expressed a desire to increase all kiwi subspecies at 2% per year. This has increased the focus on reversing kiwi population decline and speeding up kiwi population growth rates through a range of active management programmes. Helping kiwi is costly but crucial in order for us to protect them into the future.

Key Vocabulary
active management - captivity - carrying capacity - conservation versus restoration - kōhanga kiwi - mainland sanctuary - Operation Nest Egg - tangata whenua - taonga

Managing kiwi populations

Across all 10 kiwi subspecies, the proportion of each population with active management programmes varies greatly. In general, the bigger the population, the smaller the percentage with active management. For example, there are an estimated 4,075 Northland brown kiwi (nearly 50% of the population) actively managed, but Rakiura tokoeka has only around 250 birds out of an estimated population of 13,000 being managed, which is 1.9%.

Effective management involves coordinating and collaborating organisations and community efforts and resources (see spotlight on p.9 www.doc.govt.nz/pagefiles/169845/threatened-species-strategy-draft.pdf and Predator Free NZ predatorfreenz.org/about-us/pf-2050/)

Methods of enhancing kiwi populations

- Mainland sanctuaries: Five kiwi sanctuaries with effective predator control through fencing, poisoning and trapping are maintained by DOC.
- Community-led projects: More than 100 community-led projects are underway, many involving tangata whenua, that focus on pest control through predator trapping and community education with volunteers.
- Kōhanga kiwi: Using sites where kiwi conservation has been so successful that surplus birds can be used to boost existing wild populations or establish entirely new wild populations in places where kiwi would once have roamed.
- Operation Nest Egg: A tool to boost target populations through taking eggs, hatching and caring for chicks in captivity and then releasing them into safe habitats when they are old enough to fend off stoats and cats.
Mainland sanctuaries:

These sanctuaries were created in response to the overall rate of decline for unmanaged kiwi populations, estimated to be 3% per year for brown kiwi, and 2% for great spotted kiwi and tokoeka. Within their boundaries, more young kiwi survive each year, allowing the populations to increase and research and monitoring of new techniques to be implemented. This has taught us that there is no ‘one-size-fits-all’ answer. Therefore, how we manage kiwi needs to be tailored to each site and to each species.

See [www.kiwisforkiwi.org/what-we-do/who-are-kiwis-for-kiwi/kiwi-sanctuaries/](http://www.kiwisforkiwi.org/what-we-do/who-are-kiwis-for-kiwi/kiwi-sanctuaries/) to find out more about the five sanctuaries.

Community-led projects:

Through expertise, commitment and donations of volunteers, kiwi conservation projects are running across the country. A critical element of these projects is setting up effective trapping and having the resources to maintain this. New projects are encouraged and more information about community projects can be found at [www.kiwisforkiwi.org/what-we-do/who-are-kiwis-for-kiwi/community-efforts/](http://www.kiwisforkiwi.org/what-we-do/who-are-kiwis-for-kiwi/community-efforts/).


Kōhanga kiwi:

‘Kōhanga kiwi’ sites are usually pest-free islands or mainland sanctuaries where kiwi have successfully bred and survived to reach carrying capacity. New homes need to be found for young birds to avoid pressure for food and territories.

Kiwi taken from kōhanga kiwi sites are transferred to supplement existing wild populations, or are used to establish entirely new wild populations in places where kiwi would once have roamed. Many kōhanga sites originated as crèches (e.g. Motuora, Maungatautari, Cape Sanctuary), ‘safety’ sites (e.g. Kāpiti Island) or were simply intensively managed (e.g. Puketukutuku Peninsula, Lake Waikaremoana).

The potential for kōhanga kiwi to boost kiwi populations in habitats which are being protected but have a low density of kiwi is great, which is why they will play a key part in achieving a 2% growth in kiwi populations on the North Island over the next few years.

Kiwis for kiwi is helping achieve this by using the network of community led projects on the North Island to ensure kōhanga sites are filled up and able to start supplying kiwi to new predator control areas.
Chapter 7: Conserving kiwi

Operation Nest Egg:
Set up in 1994, Operation Nest Egg (ONE) is a tool used to build populations of kiwi quickly after it was noticed that 90% of kiwi chicks die in the wild before reaching 6 months old, mainly due to predation by stoats and cats. If kiwi eggs and chicks can be protected until they are old enough to stand up to stoats and cats, population numbers will increase.

Operation Nest Egg involves monitoring adult kiwi with the use of small transmitters worn on their legs which indicate their movement. When a male is incubating, he will be inactive for an average of 22 hours a day, only going to feed for 2 hours at night. The transmitters indicate how many days the male has been inactive and incubating.

A trained kiwi worker removes an egg from a nest, about halfway through the incubation period when the male leaves to feed. The egg is hatched and raised in captivity, then returned to a predator controlled area when large enough to defend itself against stoats and cats.

Watch [www.youtube.com/watch?v=Tmn3wXcqam4](http://www.youtube.com/watch?v=Tmn3wXcqam4) to see the whole process.

A step by step description of Operation Nest Egg can be found at [www.kiwisforkiwi.org/what-we-do/how-were-saving-kiwi/learn-more-about-operation-nest-egg/](http://www.kiwisforkiwi.org/what-we-do/how-were-saving-kiwi/learn-more-about-operation-nest-egg/)

Chapter 7: Conserving kiwi

Activity 1: Helping kiwi

It is thanks to the hard work of DOC, Ngā Whenua Rāhui, NZ Landcare Trust and many community volunteers that kiwi populations are continuing to be preserved. In this activity, you learn about your nearest kiwi project, join in with LEARNZ to see a project in action and organise fundraising activities to help raise money to support these projects.

Learning intentions

Students are learning to: Understand how people contribute to looking after our environment through hands-on experiences. Experience how kiwi management programmes work. Understand how fundraising can help support kiwi. Develop knowledge of the significance of kiwi for tangata whenua and the role of kaitiakitanga.

Success criteria

Students can: Describe how kiwi are being protected through local community projects. Gain experience of being kaitiaki of kiwi. Share learning through written and oral presentations. Organise and run school fundraising activities to raise money for kiwi.

Maths

Use simple additive strategies with whole numbers and fractions. Communicate and interpret simple additive strategies, using words, diagrams (pictures), and symbols. Create and use simple maps to show position and direction. Investigate probability through simple situations that involve elements of chance.

Social sciences

Understand that people have social, cultural, and economic roles, rights, and responsibilities. Understand how cultural practices reflect and express people’s customs, traditions, and values.

Literacy

Select and use sources of information, processes, and strategies with some confidence to identify, form, and express ideas. Present ideas to audiences and develop use of persuasive language features.

Equipment needed

Computer, camera, notepad, fundraising pack (posters, flyers, money for float etc), calculator.
Chapter 7: Conserving kiwi

Student Learning Experiences
(aimed at Curriculum Level 2)

1: Restoration, Rehabilitation or Reconciliation

Discuss and explore what each these statements mean and how they connect with ‘conservation - the protection of animals, plants and natural resources.’

2: Investigate your nearest kiwi project

Find your closest kiwi project by checking Kiwis for kiwi website [www.kiwisforkiwi.org/what-we-do/who-are-kiwis-for-kiwi/community-efforts/] or Nature Space [www.naturespace.org.nz/search/node/kiwi].

Organise a class visit or a Skype interview with one of the volunteers. Record and share experiences e.g. photos for a school blog, film a news bulletin etc.

3: Understanding Māori world views in conserving kiwi

Māori world views are represented within community groups as people act as kaitiaki (guardians) of kiwi. An example is the hapū of Lake Waikaremoana who were determined not to lose kiwi, their taonga, and so set up the Lake Waikaremoana Hapū Restoration Trust.

Investigate the ways kaitiakitanga (guardianship) and mana whenua (connections) between people and the land are shown in this kiwi conservation project.

Watch [www.sciencelearn.org.nz/videos/700-project-matauranga-bringing-the-kiwi-back] to see how they created inland islands to protect kiwi chicks. Afterwards, create a poster showing the methods used to trap predators and how they kept kiwi chicks in the area.

4: Join in with LEARNZ to see how kiwi raised in captivity make the journey back to the bush

Through LEARNZ, you will follow the team during the whole Operation Nest Egg process, from collecting an egg to transferring a young kiwi back to the wild. Along the way, there are interactive challenges and tasks for children to complete.

Chapter 7: Conserving kiwi

Student Learning Experiences
(aimed at Curriculum Level 2)

5: Organise a school fundraising activity

Kiwi need our support and although we might not be able to work directly with them, we can raise money to help others in saving kiwi.

There are lots of ways to lead fundraising activities at your school. For example, you could get involved in Save Kiwi Month, which is in October every year. Research the following sites for ideas:

- [www.kiwisforkiwi.org/take-action/fundraise/](http://www.kiwisforkiwi.org/take-action/fundraise/)
- [www.houseoffundraising.co.nz/how-it-works/fundraising-tips/](http://www.houseoffundraising.co.nz/how-it-works/fundraising-tips/)

Did you know?

- $30 could buy one trap and trap box
- $50 could fund a kiwi health check
- $75 could train one dog to avoid kiwi
- $100 could protect one kiwi for an entire year
- $350 could buy one transmitter for a kiwi
- $2,000 could fund one year in the life of an Operation Nest Egg chick
- $2,500 could buy one receiver to pick up transponder signals

6: Measure how your input can help

Learning how the money raised supports kiwi will help motivate others to join in with your fundraising.

Calculate what you can do to support kiwi with the money you have fundraised using the table in step 5. Set some future target or goals connected to helping kiwi.

7: Perfect kiwi day diary

Imagine being a kiwi that could freely roam in your school grounds. Write a 200 word piece describing what would be seen in the garden and how to make changes to achieve this.
Chapter 7: Conserving kiwi

Student Learning Experiences

Differentiation for Curriculum Level 1

Hold a school fundraising gala day

Children can help collect items, organise posters/flyers to advertise, collect money and count totals.

Create a kiwi competition

Children can draw, paint, make or use an online programme to create an image of their favourite kiwi. Create a school display with a link to the Kiwis for kiwi website so the school community can see ways they can help.

Differentiation for Curriculum Levels 3-4

Finance Time

Working to protect our kiwi is a costly undertaking and we need to think carefully about HOW and WHERE additional funding should be spent.

Look at the following articles and video clips and discuss what the priorities are for kiwi.

🔗 www.nzherald.co.nz.nz/news/article.cfm?c_id=1&objectid=11534969
🔗 www.nzherald.co.nz.nz/news/article.cfm?c_id=1&objectid=11535360

🔗 www.nzherald.co.nz.nz/news/article.cfm?c_id=1&objectid=11534969
🔗 www.nzherald.co.nz.nz/news/article.cfm?c_id=1&objectid=11535360
Activity 2: Design a kōhanga kiwi

Kōhanga kiwi sites are protected areas where kiwi successfully breed and live. The population grows to a point where it can be split, and some birds are then transferred to the wild or a new site. In this activity, you design a kōhanga kiwi for your local area.

**Learning intentions**

Students are learning to: Understand that kiwi populations are influenced by different management programmes. See the role of people in working to support kiwi. Develop knowledge of the significance of kiwi for tangata whenua.

**Success criteria**

Students can: Calculate how kiwi populations respond to management programmes. Identify different ways we can help to protect kiwi. Give examples of how management programmes work to support kiwi. Explain the significance of kiwi as a taonga.

**Maths**

Use simple additive strategies with whole numbers and fractions. Communicate and interpret simple additive strategies, using words, diagrams (pictures), and symbols. Create and use simple maps to show position and direction. Investigate probability through simple situations that involve elements of chance.

**Social sciences**

Understand that people have social, cultural, and economic roles, rights, and responsibilities. Understand how cultural practices reflect and express people’s customs, traditions, and values. Understand how the status of Māori as tangata whenua is significant for communities in New Zealand.

**Art**

Investigate and develop visual ideas in response to a variety of motivations, observation, and imagination.

**Equipment needed**

Art materials for making kiwi sanctuary model, calculator, camera, stones, paint, printed copies of reports.
Student Learning Experiences
(aimed at Curriculum Level 2)

1: Choose a kiwi (sub)species
Find out which kiwi subspecies is found closest to you and the current population estimate. Our national aim is for each subspecies to increase by 2% each year. Calculate how many new chicks need to be born each year to achieve this.

2: Imagine where to create your kōhanga kiwi
Identify a potential site near you where kiwi could live safely. Create a list of what would need to be done in order to prepare the site for kiwi to live there. How will you protect kiwi from predators? What food source will kiwi need to have? How will you get volunteers to help etc?
Present findings in a creative way, for example, make a small scale sculpture using recycled materials, a diorama or a printed poster.

3: Number crunching kiwi
Now you have your site, it is time to move some kiwi there.
Imagine you stock the kōhanga kiwi with 50 pairs of kiwi. Just 80% of those fifty pairs will successfully breed and lay two eggs. Only 75% of these offspring will be healthy and survive to 6 months old.
How many birds did we breed this year? Is that enough for your subspecies? What happens when you change the numbers? Alter the number of kiwi pairs, the breeding rate, and the survival rate.

4: Calculate how many breeding pairs are needed to increase your local subspecies by 2%
What if more male than female chicks are born, how will this affect population size and future breeding?
What if we change the ratio of breeding success? How many years do we know adult kiwi can successfully breed for?
What size area would you need to hold this many kiwi, knowing that they are territorial and often solitary? Would it be better to have several smaller kōhanga kiwi sites?
5: Māori customs for translocating kiwi

The translocation of kiwi has significance for tangata whenua beyond the management of kiwi populations, and so it is important that there is an opportunity for tikanga (customs) to be followed so that relations between those gifting and receiving kiwi have a strong foundation. Contact your local iwi to find out what these tikanga are.

6: Thinking ahead

Your kōhanga kiwi has been successful and you are ready to move some birds to the wild. Investigate which option would increase kiwi numbers more - several smaller sites (with fewer kiwi) or one large site (with more kiwi)? How can you transport kiwi between sites? Can you mix different subspecies?

Other considerations:
How do kiwi respond to being dropped in a totally new place?
Can we transfer existing pairs of adults?
New habitats need exploring so they can find the best food and shelter.

7: Compare with Kiwis for kiwi strategy for increasing populations

Kiwis for kiwi have analysed expected changes in population size for each kiwi species benefiting from various forms of management over the next five years. www.kiwisforkiwi.org/wp-content/uploads/2017/02/Kiwis-for-kiwi-Investment-Strategy-January-2017.pdf
Chapter 7: Conserving kiwi

Student Learning Experiences

Differentiation for Curriculum Level 1

Create a story about a day in the life of a kiwi who lives in a protected habitat
Choose a subspecies and find out about their daily life. Present the story as a written piece, a storyboard or a drama.

Counting kiwi
Collect some interesting stones from outside and paint kiwi on them. Label them as male or female. Put them in a jar and pull out a set amount. Match up male and female pairs and give each one a chick. Add together how many kiwi there now are.

Differentiation for Curriculum Levels 3-4

Investigate current management of kiwi populations
The report link below shows steps currently being taken to manage the population of each subspecies.


Choose a subspecies and explore factors influencing this population and who is currently involved in working to protect it.
Activity 3: Encouraging kiwi back to our community

In this activity, we connect our learning and use this knowledge to create a unique plan of how to help kiwi in our local community. The ultimate challenge.

Learning intentions

*Students are learning to:* Apply their previous learning about kiwi to develop actions that can help support kiwi in local community. This activity involves developing skills in all key competencies (thinking; relating to others; using language, symbols, and texts; managing self; participating and contributing) through taking meaningful action for the environment.

Success criteria

*Students can:* Think creatively and critically to develop ideas of a plan to help support kiwi locally. Develop an action plan to become involved in caring for the environment. Evaluate this plan and explain how to measure its effectiveness.

Depending on the action course taken, this activity can cover all curriculum areas.

Equipment needed

Copy of inquiry cycle, planning templates, camera, computer.
Chapter 7: Conserving kiwi

Student Learning Experiences
(for Curriculum Levels 1-4)

Discuss the effect having kiwi freely wandering in your local community would have on wellbeing, culture and biodiversity.

• What are the current obstacles that prevent kiwi from living near your school?
• What predators are nearby and what is the best way to target these?
• How can you avoid problems that are associated with targeting predators? E.g. trapping, poisoning, shooting.
• Where is the most suitable local area to focus on making ‘kiwi friendly’?
• How can you protect kiwi from the effects of loss of habitat, dogs and people?
• Who else can help with this project?
• How do you engage members of the local community to help?
• What other organisations can help? DOC? Ngā Whenua Rāhui, local councils? Landcare organisations? Local hapū?

How will you know how effective your plan is?

• How can you fund the costs of the project?
• How can you raise awareness of the project e.g. marketing, media etc?
• How will you organise jobs within your class to maximise individuals’ strengths?
• What methods will be used to ensure that the project would be successful long-term?
• What will be the impact of having kiwi living nearby?
• Why is it important that we try and raise kiwi populations?
• Which species of kiwi would have been the original inhabitants of that area?
• Naming the project - are you conserving, restoring, rehabilitating or reconciling?

Note this activity can be adapted to any native species local to your school if not suitable for kiwi. The learning experiences provided throughout this resource can be applied to help other native species with the same benefits. For example, encouraging native skinks to your school by working to restore a safe environment with food, shelter and lack of pests.
Barb - a point or pointed part projecting backward from a main point, as of a fishhook, arrowhead or feather.

Barbule - a tiny filament projecting from the barb of a feather.

Biodegradable - a substance which is capable of being decomposed by bacteria or other living organisms and thereby avoiding pollution.

Biology - a natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution, distribution and identification.

Breeding - the mating and production of offspring by animals.

Burrow - a hole or tunnel dug by an animal, such as kiwi, to provide a place to live.

Camouflage - coloration or patterns that help an animal to appear to blend with its surroundings.

Captivity - the situation in which a person or animal is kept somewhere and is unable to leave.

Carrying capacity - the number of people, animals, or plants which a region can support without environmental damage.

Clutch - all the eggs produced by birds, amphibians, or reptiles at a single time, particularly those laid in a nest.

Conservation - a careful preservation and protection of something, for example a natural resource to prevent damage or destruction.

DNA - deoxyribonucleic acid, a self-replicating material which is present in nearly all living organisms as the main constituent of chromosomes. It is the carrier of genetic information.

Droppings - the excrement of certain animals, such as rodents, birds, and insects.

Ecosystem - a biological community of interacting organisms and their physical environment.

Evolution - the process by which different kinds of living organism are believed to have developed from earlier forms during the history of the earth.

Genetics - the scientific study of how genes control the characteristics of plants and animals.

Gestation - the carrying of young in the uterus of a female.

Gizzard - the muscular enlargement of the digestive tract of birds that has usually thick muscular walls and a tough horny lining for grinding the food.

Habitat - the place or environment where a plant or animal naturally or normally lives and grows.

Incubation - the process of sitting on eggs so as to hatch by the warmth of the body.

Invertebrates - a group of animals lacking a backbone, including worms, cicadas and beetles.

Keratin - a fibrous protein that forms hair and nails.

Kahu kiwi - a ceremonial cloak used for special occasions and made by Māori using kiwi feathers that are securely woven into flax.

Kōhanga kiwi - sites where kiwi conservation has been so successful, their surplus birds can be used to boost wild kiwi populations elsewhere.

Leaf litter - decomposing but recognizable leaves and other debris forming a layer on top of the soil, especially in forests.

Mainland sanctuary (island) - defined areas that are often isolated by fencing or geographical features. Their aim is to protect and restore habitats on the mainland of New Zealand through intensive management of introduced pests.

Mammal - a warm-blooded vertebrate animal that
has hair or fur, females that secrete milk for the nourishment of the young, and (typically) the birth of live young.

**Management** - the process of dealing with or controlling things or people.

**Monogamous** - the behaviour of having a single mate during a period of time.

**Mustelids** - a family of carnivorous mammals, including the weasel, ferret, and stoat.

**Nocturnal** - the process of being active at night.

**Omnivores** - an animal which feeds on both animal and plant matter.

**Operation Nest Egg (ONE)** - A tool used to quickly building kiwi numbers, particularly for vulnerable kiwi populations in small sites. Kiwi eggs and chicks are removed from their burrows and kept in captivity until big enough to fend for themselves.

**Ovaries** - one of the typically paired essential female reproductive organs that produce eggs and female sex hormones.

**Papatūānuku** - In Māori culture, Papatūānuku is the land. She is a mother earth figure who gives birth to all things, including people.

**Pests** - a plant or animal that is harmful to humans or other animals.

**Plumage** - the feathers of a bird.

**Population** - the total of individuals occupying an area or making up a whole.

**Predator** - one that preys, destroys, or devours.

**Ranginui** - according to Māori culture, Ranginui played a pivotal role in the birth of the sun, moon, planets, stars and constellations.

**Ratites** - a bird with a flat breastbone which are mostly flightless birds (such as an ostrich, rhea, emu, moa, or kiwi) with small or rudimentary wings and no keel on the sternum.

**Resilience** - an ability to recover from or adjust easily to misfortune or change.

**Rodents** - small gnawing mammals (such as a rat or mouse) that has a single pair of incisors with a chisel-shaped edge in both jaws.

**Senses** - a specialized function or mechanism (such as sight, hearing, smell, taste, or touch) by which an animal receives and responds to external or internal stimuli.

**Settlers** - someone who settles in a new region or colony.

**Species** - a class of individuals having common attributes and designated by a common name.

**Subspecies** - a subdivision of a species, usually occurring due to geographical or ecological factors.

**Tāne** - atua of the forests and birds and one of the children of Ranginui and Papatūānuku.

**Tangata whenua** - used to describe the Māori people of a particular locality, or as a whole as the original inhabitants of New Zealand.

**Taonga** - (in Māori culture) an object or natural resource which is highly prized.

**Territory** - an area, often including a nesting site and feeding source, that is occupied and defended by an animal or group of animals.

**Territorial** - the pattern of behavior associated with the defense of a territory.

**Threat** - an expression of intention to inflict injury or damage.

**Threat status level** - of a species indicates whether the group still exists and how likely the group is to become extinct in the near future.

**Trap** - a device for capturing animals and holding or killing them.

**Vibration** - the process of swinging or moving to and fro.

**Whānau** - an extended family or community of related families who live together in the same area.

**Yolk sac** - a membranous sac attached to an embryo formed inside an egg. The yolk contains a source of protein for the developing animal.
This education resource has been produced by Kiwis for kiwi, a New Zealand charity dedicated to protecting kiwi.

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