

New Zealand Curriculum Achievement Objectives

Nature of science
Understanding about science: Understand that scientists' investigations are informed by current scientific theories and aim to collect evidence that will be interpreted through processes of logical argument.
Investigating in science: Develop and carry out more complex investigations, including using models.
Show an understanding of the complexity of scientific inquiry.
Begin to evaluate the suitability of different scientific methods, processes, and communicating in science.
Apply their understanding of science to local and global issues, including visual and numerical literacy.

Possible Learning Activities

What are the Impacts of a History of Gold Mining on the land? The Taieri River up the Maroto to has been diverted and changed throughout the Gold-mining period and beyond. What are the impacts on the land, flora and fauna? What are the impacts on the water? What are the impacts on the water? What are the impacts on the water?



CONSERVATION PLAN

FOR EDUCATION



RAIL TALES CONSERVATION PLAN
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Levels 1 - 8, NCEA L1 - 3

New Zealand Curriculum Achievement Objectives

Level 1 - 2

Nature of science

Understanding about science: Appreciate that scientists ask questions about our world that lead to investigations and that open-mindedness is important because there may be more than one explanation.

Investigating in science: Extend their experiences and personal explanations of the natural world through exploration, play, asking questions, and discussing simple models.

Communicating in science: Build their language and develop their understandings of the many ways the natural world can be represented.

Participating and contributing: Explore and act on issues and questions that link their science learning to their daily living.

Living World

- **Life processes: Recognise that all living things have certain requirements so they can stay alive.**

Ecology:

- **Recognise that living things are suited to their particular habitat.**

Evolution:

- **Recognise that there are lots of different living things in the world and that they can be grouped in different ways.**
- **Explain how we know that some living things from the past are now extinct.**

Possible Learning Intentions:

- Use your 5 senses to identify plants, insects or animals.
- Use the Māori words for the names of places, plants, insects and animals.
- State more than two facts about an animal under the following headings - "About, Found, Eat, At Risk From".
- Name animals that were introduced into New Zealand.
- Draw the animals tracks.
- Identify ways in which we can protect our native species.
- Investigate and collect data about an animal, insect or plant.
- Make statements about Māori belief of an interconnected world.

Explore the outside using your **SENSES**: Explore a local nature area in your school, community or venture out to our Rail Trail or Conservation area.

Use the words: See, Feel, Hear, Smell as headings and note down words and images that you discover. Take a camera, ipad or similar and take photographs, video or just record sounds of nature.

Use **Scratch Jr** and the camera tool to take a photo of an animal or insect you find. Cut out your image using the arrow tool and moving your dots. Draw the animal or insects background habitat and animate your sprite (character). You could use the touch to start tool to make your animal or insect tell you about themselves every time you touch it. Make a sprite for the different parts of your habitat and have them pop up with information every time it is touched.

Make your own **alpine habitat**. Use resources from around your school, to create your own conservation alpine habitat. What does an alpine habitat look like, sound like, feel like, smell like?

What does a Department of Conservation (DOC) worker do?

Find out about how Māori interacted with the land along the trail. www.railtales.nz/maori. How did Māori come to Te Waipounamu? Design and make a working **double-hulled waka**.

DOC has an abundance of resources to support you in this area. Take a look at Learning in Nature [Resource cards](#) or check out their [Nature slideshows](#) to stimulate children's imagination and ideas.

Bird tracking: Complete the bird survey and discover what birds are along the trail. What birds are native and what birds have been introduced? Read [Bringing Back the Birdsong](#) - Connected 2017 Level 2 - Taking Action. Design and make a bird house.

Find out about **predators** in the Maniototo area. Select one predator and make a Scratch Jr. Animation about the behavior of your animal and why they are a pest.

Take a Closer Look: Collect leaves along the Otago Central Rail Trail to take a closer look at later. For each leaf, record where you found it. If you can, place them in a jar of water.

Read: [Take a Closer Look by Margaret Cahill](#) - Connected Level 2. Observe and gather your data before recording your data. Adapt for smaller children.

Make a **seed bank**: Collect seeds along the trail, home or around school. Why is it important to keep seeds? Have students observe, draw and organise their seeds. What seeds are important to keep? [Find out more.](#)

Key Competencies

Thinking:

- ask questions.
- Be curious.
- Interpret information from experiences, data and ideas.

Using Language, Symbols and Text:

- Create presentations and written reports using appropriate scientific language.
- Investigate and gather evidence.
- Draw conclusions from your data.
- Justify your explanations.

Managing Self:

- Make a plan.
- Set achievable goals and outcomes working towards a project deadline.
- Be self-motivated and resourceful.
- Persevere with challenges.
- Be able to make mistakes.

Participating and contributing

- Participate and contribute to conservation projects.
- Be a member of a group.
- Take an environmental action toward sustainability in Aotearoa.

Relating to others:

- Be an active listener.
- Collaborate with others.
- Share ideas effectively, listening and considering others ideas.
- Compromise with positive outcomes in mind.

Lyperobius barbara

Carey-knox-southern-scales, Dec 16, 2020, St Bathans, New Zealand, iNaturalist.org

New Zealand Curriculum Achievement Objectives

Level 3 / 4

Nature of science

Understanding about science: Appreciate that science is a way of explaining the world and that science knowledge changes over time.

Identify ways in which scientists work together and provide evidence to support their ideas.

Investigating in science: Build on prior experiences, working together to share and examine their own and others' knowledge.

Ask questions, find evidence, explore simple models, and carry out appropriate investigations to develop simple explanations.

Communicating in science: Begin to use a range of scientific symbols, conventions, and vocabulary.

Engage with a range of science texts and begin to question the purposes for which these texts are constructed.

Participating and contributing: Use their growing science knowledge when considering issues of concern to them.

Explore various aspects of an issue and make decisions about possible actions.

Living World

Life processes:

- **Recognise that there are life processes common to all living things and that these occur in different ways.**

Ecology:

- **Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced.**

Evolution:

- **Begin to group plants, animals, and other living things into science-based classifications.**
- **Explore how the groups of living things we have in the world have changed over long periods of time and appreciate that some living things in New Zealand are quite different from living things in other areas of the world.**

Possible Learning Intentions:

- Make statements and about how Māori interact with nature and explain the Māori interconnected view of the world.
- Learn the Māori words for our native species of plants, animals and insects.
- Describe how DOC protects our local plants, animals and insects along the trail and in conservation areas.
- Investigate an animal, insect or plant and gather scientific data to make statements about how they contribute to a healthy environment.
- Make statements about how animals have adapted to changes in the environment due to human intervention.
- Collect video or photographic footage to create a documentary on a conservation issue to make change.
- Collect data from Predator Free NZ Trust Map and make statements regarding what is happening in a specific area on the trail.

What is Conservation? Go to our [Conservation Station](#) @ Railtales and discover the different conservation areas along the trail. What are they protecting and why? Create a place mat activity in groups of 3 or 4. Have students use the Conservation Station map and note down everything they find out. Students present their findings back to the class.

Habitats - Discover the different habitats at our Conservation Station. Go to DOCs page on Habitats and discover what the conditions are, what animals and plants are found.

When riding the trail, what do you see? Watch the "What to Spot Along the Otago Central Rail Trail". Students note all the things they see. Find out more about the flora or fauna. When riding the trail, use the Spot worksheet to take notes about the flora and fauna you see on the trail. Collate your data as a group.

What do DOC (Department of Conservation) do? Download the [Papatūānuku Thrives poster](#). Give each of your students a role of being a DOC worker. Put them in charge of one of the statements. Each student finds out what the statement means and creates an "Intro myself" video. They must state who they are. What are they? What is their purpose? Why they do it?

Head out to one of the DOC conservation areas. Complete DOCs criteria to see if DOC has it right.

Create your own School Conservation Area using DOCs conservation criteria to help you select the best spot. [Trees, Seas and Soils](#) - L3 Connected

Collecting moisture levels in soil. Plants need a certain amount of water to survive. Make a **moisture sensor** using Micro:bit and nails. Another great device to use in the field.

How did they get their names? When Polynesians first came to New Zealand, they found plant and animal species that reminded them of the islands, so they gave them similar or the same names. Discover how these names came about. [Te Tapa Ingoa - Connected 2020 Level 3 - Kaitiakitanga](#). Create a glossary of words using Google sheets, Microsoft Excel or other. Alternatively, you could make a Māori name game using Gamefruit, Scratch or other. You could also create your own book of words.

Why are Ngāi Tahu so interested in conservation and protecting our indigenous flora and fauna?

Testing the Waters - Connected 2017 Level 3 - Mahi Tahi, How can we test the waters in Otago and Central Otago. Let's make a water tester.

Predators in the Maniototo - What animals are being targeted in the Maniototo? Use the Predator Free NZ Trust National Map to colour code areas where these pests are being managed and where we have predator free areas. Follow the link and complete the Google Earth activities. Have students write reports on what is found.

Become a skink spotter - Gathering evidence is important to measure and make plans to protect our indigenous flora and fauna. Join the conversation, watch the videos and see if you can spot a skink. Create your own animal spotter using scratch and a computer.

Can you make an animal, bird or insect counter using a Micro:bit? This is a great way to collect data in the field. [Micro:bit counter](#)

Key Concepts and Understandings

- Māori relationship with the land and their interconnected view of the world can have a positive influence and key to our conservation goals.
- Living things interact with each other and the environment.
- Ecosystems work together to form a bubble of life.
- Aotearoa New Zealand has distinctively unique flora and fauna.
- Human actions can have negative and positive impact on the environment.
- Humans can make positive changes to improve outcomes for our environment.
- Introduced flora and fauna threatens many species and ecosystems within Aotearoa and without help, these species will no longer be a part of our planet.

Native Broom (*Carmichaelia petriei*)

Jan 1, 2020, chrisclose,
Middlemarch, New Zealand



New Zealand Curriculum Achievement Objectives

Level 5 / 6

Nature of science

Understanding about science: Understand that scientists' investigations are informed by current scientific theories and aim to collect evidence that will be interpreted through processes of logical argument.

Investigating in science: Develop and carry out more complex investigations, including using models.

Show an increasing awareness of the complexity of working scientifically, including recognition of multiple variables.

Begin to evaluate the suitability of the investigative methods chosen.

Communicating in science: Use a wider range of science vocabulary, symbols, and conventions.

Apply their understandings of science to evaluate both popular and scientific texts (including visual and numerical literacy).

Participating and contributing: Develop an understanding of socio-scientific issues by gathering relevant scientific information in order to draw evidence-based conclusions and to take action where appropriate.

Life processes

- Identify the key structural features and functions involved in the life processes of plants and animals. (L5)
- Describe the organisation of life at the cellular level. (L5)
- Relate key structural features and functions to the life processes of plants, animals, and micro-organisms and investigate environmental factors that affect these processes. (L6)

Ecology

- Investigate the interdependence of living things (including humans) in an ecosystem. (L5)
- Investigate the impact of natural events and human actions on a New Zealand ecosystem. (L6)

Evolution

- Describe the basic processes by which genetic information is passed from one generation to the next. (L5)
- Explore patterns in the inheritance of genetically controlled characteristics. (L6)
- Explain the importance of variation within a changing environment. (L6)

Possible Learning Intentions:

- Make statements about Ngāi Tahu's interest in conservation and why it is so important to tangata whenua.
- Explore ways animals and insects and been impacted by human interaction.
- Gather and interpret data from a range of sources for a research project and make statements supported with evidence.
- Evaluate the quality of your data collected and ask questions regarding to how it was collected and make decisions on its authenticity.
- Recognise the importance of 'fair testing' when carrying out water testing.
- Identify the importance of conservation to tangata whenua.
- Make decisions about taking action from data collected.
- Engage in scientific discussion, thinking through complex concepts, and justifying scientific issues and actions.

Possible Learning Activities

What are the Impacts of a History of Gold Mining on the land. The Taieri River up the Maniototo has been diverted and changed throughout the Gold-mining period and beyond. What are the impacts on the land, flora and fauna? What are the chemicals in the water now?

What about the Water: [WATCH EPISODE FIVE: FRESH WATER.](#)

Water Testing: Go to the [Science Learning Hub](#) to learn how to test water using SOSMART test, testing conductivity, pH level, temperature, water velocity, clarity, and macro-invertebrate sampling. Collect data from testing the water from the Taieri River or a stream along the Otago Central Rail Trail. Interpret your data collected. If you managed to collect data from different areas along the trail, create a Google Earth Project and enter your data. Compare the differences from different parts of the trail. DO: Put together a report to present to local regional council with what you have discovered and what action can be taken.

Ngāi Tahu and Conservation: Why are Ngāi Tahu so interested in conservation. Ngāi Tahu's vision: "Our dream is that our ancestral landscape is protected and our people have living relationships with their whakapapa and traditions through the environment. The goal is that Ngāi Tahu is a principled kaitiaki (steward) of our takiwā (tribal territory)." What does this mean? Take out the words "Living relationship", kaitiaki and takiwā" and create a social media post on Canva or Adobe Express.

Innovation is a part of DOCs goals. Let's use technology to collect data. Use Micro:bit to collect data.

[Max-min Thermometer](#) - measure temperature.

[PIR Movement Alarm](#) - get notified when animals are in your traps or in area of protection.

[Animal Tracker:](#) Make a prototype animal tracker. You could track your cat.

What is Biodiversity: [WATCH EPISODE FOUR - ALL CREATURES GREAT AND SMALL.](#) Find one of our endangered or protected species from a conservation area at [Conservation Station](#). There doesn't seem to be as much content on our Otago endangered species. Research important information about the species such as habitat, predators, and food. Thinking about the short documentary Stuff has created, in a group, create a documentary using video, and information collected.

New Zealand Reptiles: Investigate the status of New Zealand Reptiles. Read and take notes from the [Conservation status of New Zealand reptiles 2021 Report](#). Complete your own investigation on the trail, at school or chosen area. From your data and research you have completed, choose an action that will help make change. Create a [lizard friendly garden](#) in your school.

[Spyfish Aotearoa](#) - Help DOC identify species of fish in water around New Zealand rivers and oceans. DOC will place a baited underwater camera in marine reserves and you're able to contribute and have discussions with people from around the world.



Mountain Stone Weta Hemideina Māori
Chris Close, Jan 3, 2020, Middlemarch,
New Zealand, iNaturalist.org

NCEA Suggested Standards

Level 6, 7, 8

Nature of science

Understanding about science: Understand that scientists have an obligation to connect their new ideas to current and historical scientific knowledge and to present their findings for peer review and debate.

Investigating in science: Develop and carry out investigations that extend their science knowledge, including developing their understanding of the relationship between investigations and scientific theories and models.

Communicating in science: Use accepted science knowledge, vocabulary, symbols, and conventions when evaluating accounts of the natural world and consider the wider implications of the methods of communication and/or representation employed.

Participating and contributing: Use relevant information to develop a coherent understanding of socio-scientific issues that concern them, to identify possible responses at both personal and societal levels.

Living World

L7 - Life processes

- Explore the diverse ways in which animals and plants carry out the life processes.

L7 - Ecology

- Explore ecological distribution patterns and explain possible causes for these patterns.

L7 - Evolution

- Understand that DNA and the environment interact in gene expression.

Ecology and evolution

- Explain how the interaction between ecological factors and natural selection leads to genetic changes within populations.

L8 - Life processes, ecology, and evolution

- Explain how the interaction between ecological factors and natural selection leads to genetic changes within populations.
- Understand the relationship between organisms and their environment.
- Explore the evolutionary processes that have resulted in the diversity of life on Earth and appreciate the place and impact of humans within these processes.
- Understand how humans manipulate the transfer of genetic information from one generation to the next and make informed judgments about the social, ethical, and biological implications relating to this manipulation.

Level 1

Geography 1.3

Demonstrate geographic understanding of the sustainable use of an environment. Internal No. AS91009.

Science 1.10

Investigate life processes and environmental factors that affect them. Internal, AS90949

Biology 1.2 - Report on a biological issue.

RELATING TO THE OTAGO CENTRAL RAIL TRAIL:

Look at how humans are interacting with the spatial dimension of the environment and the consequences of its use. Possible research projects could be: the impact of the Gold Rush and mining, Farming, energy such as Clyde Dam, forestry, tourism, recreation. Put together a plan for sustainable future on and around the Rail Trail.

Discover and research the life processes of an organism found along the trail, in one of the rivers or in a conservation area. For example, the Tiger moth found in the Rock and Pillar Conservation Area.

Innovative resilient land and water use. Agriculture is the leading industry along the trail. Identify ways in which we can use the land and water in a sustainable way, yet it still be profitable for farmers. For example: riparian restoration, denitrification beds and nutrient management strategies. How can we collaborate and bring together scientists, business, iwi, councils and the public.

RELATING TO THE OTAGO CENTRAL RAIL TRAIL:

Science 1.12

Investigate the biological impact of an event on a New Zealand ecosystem. AS 90951.

Investigate the biological impact on a native ecosystem such as introduced animal species, weeds, plants such as wilding pines, the effects of pest control.

The human increases in numbers along the trail or in conservation areas.

Please contact the local DOC offices to discuss any potential investigation as they can provide support, advice and possible comparative data.

Level 2

Ecological Management: Demonstrate a basic ecological understanding of plant species in a specified park area.

Field trip to conservation area. Identify plant species and range, significance to park, ecological niche, issues, threats to plants, park management and practices.

Education for Sustainability 2.1

Undertake a personal action, with reflection, that contributes to a sustainable future. No. AS90810.

Undertake a personal action involving a threat to a sustainability issue along the trail.

The environmental impact of human activity such as Gold Mining, farming, introduction of foreign animals such as rabbits, foreign planting, climate change.

Biology 2.1 - Carry out a practical investigation in a biology context, with supervision. Internal. No. AS91153

Education for Sustainability 2.2 - Explain how human activity in a biophysical environment has consequences for a sustainable future. Internal No. AS90811

The interactions between the physical environment and the biological forms within the conservation areas. Understand how people are interacting with the spatial dimension of the environment and the consequences. Put together a plan for sustainable future on and around the Rail Trail. Farming, energy such as Clyde Dam, forestry, tourism, recreation.

Education for Sustainability 2.3

Demonstrate understanding of how different personal values have implications for a sustainable future. Internal No. AS90813 v2

Adaptions of plants animals and micro-organisms along the trail and in conservation areas. Investigate the interrelationships between two species along the trail or conservation area and use your findings to identify patterns in an ecological community and how an environmental factor might impact a species in the community.

Biology 2.3 - Demonstrate understanding of adaptation of plants or animals to their way of life. Internal. No. AS 91155

Biology 2.6 - Investigate a pattern in an ecological community, with supervision. Internal. No. AS91158

Conduct an investigation involving fair testing and looking for patterns, on plant species on the trail and compare with relative numbers away from the trail. Has human involvement driven species away from the trail?



Science Capabilities:

- Gather and Interpret data
 - Observe and differentiate between observations and inference.
- Use Evidence
 - Gather evidence to support their ideas and explanations.
 - Critique evidence
 - Evaluate the trustworthiness of data
- Interpret representations
 - Present your ideas in a variety of ways, models, graphs, charts, diagrams and written text
- Engage with science
 - Take an interest in science issues, participate in scientific discussion and take action where appropriate

Ice crystals on rocks by Castle Rock
Tomas Sobek, August 16, 2014



NCEA Suggested Standards

NCEA Level 3

[Māori Environmental Practices](#) - Explain kaitiakitanga in relation to the way Māori interact with the natural environment. Unit Standard: 6142

[Māori Environmental Practices](#) - Carry out a local kaitiakitanga activity with direction. Unit Standard: 6143

[Describe rural pest](#) animals, monitoring and control operations in New Zealand. Unit Standard: 29335.

[Prepare and use traps](#) to control rural pest animals - No. 29338. Internal.

[Navigate a transect line](#) in good visibility and poor visibility using a map and GPS for pest control operations. No. 32386.

[Biology 3.1](#) - Carry out a practical investigation in a biological context, with guidance

[Biology 3.2](#) - Integrate biological knowledge to develop an informed response to a socio-scientific issue. Internal AS91602

[Education for Sustainability 3.2](#) - Evaluate measures that may be taken to sustain and/or improve a biophysical environment. Internal. AS 91735

[Biology 3.3](#) - Demonstrate understanding of the responses of plants and animals to their external environment.

Māori used the Maniototo as a place to find food and raw materials. Māori once caught eels in the Taiari Lake (no longer there as mining brought silt and filled up the lake). Our native indigenous species of flora and fauna are at risk and along with this, so will the Māori matauranga and mauri. How can we use Māori methods and matauranga to incorporate into conservation practices? Learn how matauranga (Māori knowledge) is being used in conservation and giving us a respect for things treasured. Incorporate Kaitiakitanga - Taonga - Mauri - Mana - Mana Whenua - Tangata whenua - tapu and noa into a research project and present your findings.

Research how Department of Conservation (DOC) monitors, manages and controls pests, such as rabbits, along the trail and in conservations areas. Relate this to the Animal Welfare Act, hazardous substances and New Organism Act, Otago Regional Council [Pest Management Plan and Biosecurity Strategy](#).

Prepare, set and maintain traps for rural pest animals using correct procedures and permissions.

Use mapping features and navigation tools such as typography mapping, rope, sun, stars, GPS for pest control in conservation areas along the trail.

Investigate and collect data on one of the many streams or rivers along the trail. Make an hypothesis about the health of the stream or river and what impacts this.

What are the social implications of [1080](#) poison used in the Rail Trail area. Links: [Facts](#), [Doc](#)

The Otago Central Rail Trail has biological and social implications that impact the local area. Investigate the positives and negatives of this using a range of opinions and viewpoints as well as scientific and statistical data. Write a report and presentation of ways the trail can be sustainable so that everyone can enjoy this phenomenal area.

Implications of climate change on New Zealand Aotearoa, the Otago Central Rail Trail and the Conservation Areas. How will this effect indigenous Aotearoa including Māori matauranga.

Tropisms: How do plants adapt to conditions along the trail such as phototropism, gravitropism.

Animal behavior: study one of the many animals found along the trail such as the eel migration.

How do organisms detect changes to their environment?

Insect Pheromones: Select an insect from along the trail and research how they release different pheromones to communicate.

Inquiry / project based learning outcomes:

Create a documentary using Google Slides/PowerPoint as backdrop and intersperse with live video footage from your field trip. Use windows movie maker, iMovie or similar.

Write a scientific report or paper.

Create a community conservation event to make positive change for the environment. For example: place down traps for pests.

Write a speech with supporting visual presentation.

Create a book.

Design and make a computer game using scratch, Gamefruit, or other.

Design and make a technology that supports conservation.

Write and record an environmental song.

Design and create a Museum exhibition.

Other links and activities:

- [Microsoft Hacking STEM - "Measure water quality to understand human impact"](#). Excellent activity combining digital technologies with science using Arduino or Micro:bit and Excel. Secondary School Level.
- [Ngai Tahu Claims Settlement Act 1998](#)
- [Doc Conservation Activities with Children](#)
- [Conservation education resources](#)
- [Niwa Climate Change Resources](#)
- [Kiwi Conservation Club](#)
- [Predator Free New Zealand](#)
- [Science Learning Hub / Pokapū Akoranga Pūtaiao - Explore topics](#)
- [Science Learning Hub / Pokapū Akoranga Pūtaiao - Resources with Māori content](#)
- [Forest and Bird Conservation Projects](#)
- [DOC - Science in Conservation Publications](#)
- [Our Land and Water](#)
- [National Library - Topic explorer](#)

Māori Vocabulary:

Matauranga - Knowledge, wisdom and understanding.

Mauri - life force

Papatuanuku - the earth mother

Ranginui - the sky father

Mana - authority

Tapu - sacred and restricted customs

Wairua - spirit

Kaitiakianga - guardians of the land

Taonga - treasures

Aroha - love

Manaaki - look after and care for

McCann Skink

McCann's Skink (*Oligosoma maccanni*), derek_onley, October 2011, near Central Otago, NZ

