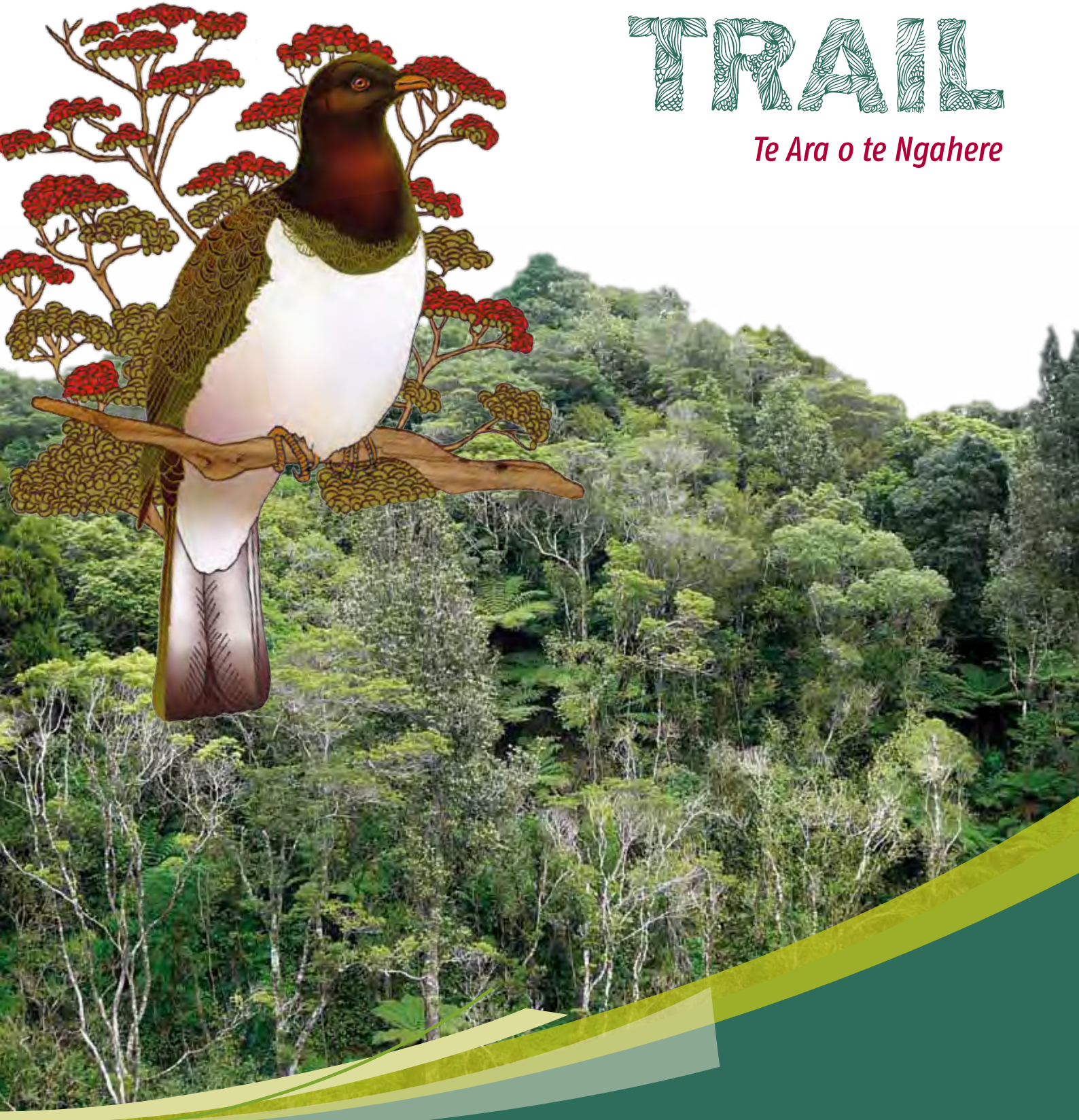
Otari-Wilton's Bush

NATURE TRAIL

Te Ara o te Ngahere



THE BOTANIC GARDENS OF WELLINGTON
Otari-Wilton's Bush

Absolutely POSITIVELY Wellington
Me Heke ki Pōneke
Wellington City Council

He Mihi/Greeting

E ngā tāngata o ngā kura huri noa i te motu
Kia ora koutou katoa
Nau mai, haere mai ki Te Marae o Tāne.

Welcome to the Marae of Tāne at Otari-Wilton's Bush.
Greetings to all schools, students, teachers, parents and other visitors.

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Te Ara o te Ngahere

PART ONE – Information for Teachers

General information about Otari-Wilton's Bush

Otari-Wilton's Bush, a Wellington City Council Reserve

The Otari-Wilton's Bush area owes its start to Job Wilton who, against the general trend in the 1860s, protected a significant area of native bush here. Following the Wilton family's 40-year care of the area, the Wellington City Council formed it as a reserve in 1906. From 1926, when the gardens were opened under the guidance of Sir Leonard Cockayne, it was known as the Otari Plant Museum. The reserve has gradually been extended until today it covers approximately 101 hectares, including the 7.7 hectares of Wilton's Bush originally protected by Job Wilton. Nowadays Otari-Wilton's Bush is part of Wellington City's Outer Green Belt and is managed by Wellington City Council.

Forest areas

Otari-Wilton's Bush contains a natural forest ecosystem with both original and regenerating bush, sweeping right down to the valley floor. The mature forest is an example of what was once a common type of forest in Wellington. By visiting Otari you can get a sense of Wellington when it was fully clothed in original forest.

Conservation and ecosystem restoration

Otari-Wilton's Bush is the only botanic garden in New Zealand dedicated solely to growing native New Zealand plants. These plants represent most ecosystems throughout the country.

Staff work closely with the local community in ecosystem restoration through the Kaiwharawhara Valley; and with the Department of Conservation in the propagation, growing and restoration of endangered and critically endangered plant species in the Wellington region.

Native plants at Otari-Wilton's Bush

New Zealand has about 2,400 species of vascular flora – plants that have tissues for conducting water, minerals and photosynthetic products. They include ferns, club mosses, flowering plants and conifers. Of these, Otari grows about 1,200 species originating from all over New Zealand - from the Sub-Antarctic Islands in the south to the Kermadec Islands in the north. Eighty percent of New Zealand's flora is endemic, meaning that they are found nowhere else in the world.

Here at Otari you'll find taxonomic (groups of species) collections and other collections that represent New Zealand's bio-regions, such as the eastern South Island dry lands, alpine regions, and the 38˚ garden which is made up of plants that grow naturally north of latitude 38˚. The Nature Trail/Te Ara o te Ngahere introduces you to many of the different native plants at Otari particularly those of the original podocarp-broadleaf forest.

Māori links with Otari-Wilton's Bush

Māori have had a strong association with Otari for centuries, having used the area as a source of food. They often walked the West Coast Trail here, from Makara through the Kaiwharawhara Valley to reach the rich seafood resources at the harbour.

A trail wound through the forest from Thorndon, crossing the Kaiwharawhara Stream near the existing lower picnic site at Otari. It headed up the spur that is now Chartwell and continued on to Makara. This section of the Kaiwharawhara Stream was known then as Te Mahanga. The track linked Taranaki Whānui settlements at Makara and Kaiwharawhara.

Traditional occupation rights over the Otari area are claimed by Te Atiawa/Taranaki Whānui, which includes the Ngāti Tama iwi. For a period before the Treaty of Waitangi, a Ngāti Tama chieftain, Te Kaeaea, lived at the Kaiwharawhara Pā at the mouth of the Kaiwharawhara Stream.

Land was set aside for the Ngāti Tama and Te Atiawa/Taranaki Whānui as part of the 'McCleverty Award' in the 1840s. McCleverty, who was employed by the Government to settle an impasse between Māori and Pākehā in this area, designated further Native Reserve land as compensation to Māori for the loss of cultivations on the land allocated to European settlers. These are now included in Otari-Wilton's Bush.

Primeval forest

While you're exploring Otari, especially the Nature Trail/Te Are o te Ngahere, you'll encounter primeval forest and landforms that are fairly typical of those that greeted the new arrivals to this area – firstly Māori and then Europeans. The area is breathtaking and reignites our awareness of the original pristine environment of Aotearoa/New Zealand.

Information for Teachers

Introduction to this resource

The Otari-Wilton's Bush Nature Trail/Te Ara o te Ngahere resource supports a self-guided walk at the Otari-Wilton's Bush Reserve where you can view the unique vegetation of New Zealand.

The Otari plant collections give you access to the diverse range of New Zealand plants. There are many life forms to be discovered here and it is an ideal place to open your students' eyes and ears to amazingly vibrant forest life and plants. The bush here is a lot like a tropical forest, yet it is thriving in a temperate region. The indigenous biodiversity here holds many life forms for you to explore and to inspire action-research programmes at your school.

Inter-connectedness – Whanaungatanga

This resource is intended to stimulate awareness and recognition of the fragile nature of our environment and the consequences of human activities. It aims to trigger actions at a grass-roots level by encouraging your school community to understand the interconnectedness of all things and to recognise the importance of healthy ecosystems in our everyday lives. In so doing, you and your students will be encouraged to 'act locally' and help to protect the environment.

Plants – the building blocks of life

The resource focuses on plants as the fundamental building blocks of all life. No plants – no life! It's as simple as that. We rely on plants for food, fibre, medicines and construction materials and, if we go back in our planet's history, plants were essential in forming oil and gas deposits. Every life-path that you choose to trace back in time has its origins in plants.

Purpose of this resource

This resource supports teachers to plan pre, on-site and post-visit activities. It is designed to align with your school's curriculum and is connected to the learning area of science in *The New Zealand Curriculum*, 2007. The Nature Trail/Te Ara o te Ngahere experience can however be readily adapted to suit most aspects of your school's curriculum by integrating any of the learning areas.

Think globally, act locally

In an era dominated by environmental concerns and the prospect of climate change, it is wise to 'think globally, act locally' and protect our natural heritage so that our children and their children will know the original forest areas of New Zealand. With the understanding/mātauranga and tools to make a difference in the environment, our younger generations can continue the work of today's conservationists.

Compiling your copy of the resource

We suggest that you print this document as two-sided pages, compile them in a 30-leaf, A4 clear-file and then select the pages you want to reproduce for your students, teachers and adult supervisors. Photocopy as needed.

What to bring to Otari-Wilton's Bush

We suggest bringing along first-aid kits, sunscreen, whistle, magnifying glasses, compasses, tape measures, cameras, clipboards, pens, pencils, drinking cups or drink bottles, binoculars, ball and frisbees. If you intend to picnic, pack things like precooked sausages, bread, tomato sauce, plates, forks, chilli bin, brush and a cloth to clean the barbecues, container to collect water from the taps, paper napkins, oil or butter. Check with the Otari Curator that the free barbecues are working and available.

It's often cooler at Otari-Wilton's Bush than elsewhere in the city, so ensure that children are warmly dressed and ready for possible rain. Footwear needs to be suitable for walking on a bush trail – walking shoes or lace-ups, not jandals.

Work with students to compile your own list of essential things to take on the day. Consider the nature of the terrain when deciding what to bring. For example, a push chair would be difficult to manoeuvre in some parts of the trail.

Reconnoitre

Ideally, as a teacher leading your trip to Otari-Wilton's Bush, you would visit the site before your trip, walk the Nature Trail/Te Ara o te Ngahere, get your bearings and learn the big stories here. The Curator at Otari is happy to discuss your visit with you. (tel 04 475 3245).

Location

Otari-Wilton's Bush is located at 160 Wilton Road, Wilton, Wellington. It's sign-posted from Churchill Drive and from the Karori Tunnel.

Bus services and parking

Take the Number 14 Wilton bus from Lambton Quay to Otari-Wilton's Bush. The bus stops nearby, on Gloucester Street. It's part of the 'silver route' from Kilbirnie via the city. School bus parking is available in the car park at Wilton Road. Car parking is also available.

Tracks

There's an extensive track network at Otari, but it's recommended that schools restrict their trips to the planted collections areas, the Circular Walk and the Nature Trail/Te Ara o te Ngahere. The blue, yellow and red forest trails are bush tracks, which can be physically demanding and are unsuitable for large groups.

Booking your visit to Otari-Wilton's Bush

Contact the Treehouse at the Botanic Garden to book your visit to Otari-Wilton's Bush. This will avoid doubling up with other large groups.

Tel: 04 499 1400 **Fax:** 04 499 1903
Email: treehouse@wcc.govt.nz

Sites for group gatherings

You have a choice of venues for morning tea, lunch or afternoon tea. These sites are also suitable for sketching, note-taking and listening to speakers. Five suggestions:

1. Information Centre – Te Marae o Tāne

Open to the public from 8am to 4pm daily, the Information Centre provides detailed interpretation of Otari-Wilton's Bush. No seats or desks are supplied, but a whiteboard is available on request. Here you'll find a sheltered veranda, a drinking fountain, toilets and benches where you can sit and get organised for your walk. The deck at the Centre can be used for up to 100 students. The interior can be used for classes of up to 50 by prior arrangement. You may find other groups booked, so please check before you go in. There is no shade on the deck so sun protection will be needed.

2. Kauri Lawn

You'll find the small Kauri Lawn near the Information Centre and the toilets. There is no shade here either, so sun protection will be needed.

3. Cockayne Lawn

The Cockayne Lawn is across the Canopy Walkway and about 100 metres from the toilets at the Centre. Sun protection will be needed. Keep off the rock gardens to protect the rare and endangered plants.

4. Troup Picnic Area

The most popular picnic site, the Troup Picnic Area, is located in the stream valley, about 10 minutes downhill from the Information Centre/Te Marae o Tāne. You'll need sun protection there and keep out of the stream.

Facilities include:

- barbecues (check at the Treehouse or with the Curator)
- picnic shelter
- safe drinking water at the taps
- a few benches under a shelter and some seats scattered around the area
- toilet
- rubbish bins
- a big flat grassed field for games.

5. Solander Picnic Area

The Solander Picnic Area is easy to reach and only a short distance from the northern entrance of Otari, just off Churchill Drive. Facilities include bus parking nearby and a flat grassed area. There are no toilets, rubbish tins or shade, so you'll need sun protection.

An easier walk

If you prefer a flat, short walk or have students with restricted mobility, visit only Posts 1 to 4 and Posts 9 to 12 on the Nature Trail/Te Ara o te Ngahere (Posts 5 to 8 are steep).

Possible ways to organise your groups

There are many ways to organise your school group. The sites comfortably accommodate up to nine children and an adult. As the teacher, you'd ideally remain free of a group to allow you to keep an overview of proceedings and to be available to groups by cell phone.

Some suggestions:

1. You could divide your class into groups of three or four students, each with an adult. Groups could start at the same time, each at a different site. (There are 20 sites.)
2. Alternatively, send each group to start at Site One at intervals of five minutes. Tell each group to move clockwise on the Nature Trail/Te Ara, stopping for four to five minutes at each of the sites. The trail takes about an hour-and-a-half to complete.
3. We suggest that you initially walk the Nature Trail/Te Ara, unencumbered by bags, clipboards or pens. After a meal break, direct students to particular sites so that they can gather information to share with the rest of the class. They could then also sketch and take photos.

Caring for possessions

We recommend that you leave one adult at the Information Centre/Te Marae o Tāne to care for your bags and other possessions.

Adult supervision and cell phones

The required ratio of adults to children varies according to the age of the children. While this particular track is relatively easy, heading into the bush always involves risk. Ensure that each adult supervisor has a cell phone and that one person has all of the supervisors' cell phone numbers.

Health and safety risk register for school trips

Location	Risk Item	Mitigation
Car park	Falling from bus	Exit managed by teachers, bus driver and parents
	Car park traffic	Monitor traffic and keep students in groups at all times. Move quickly out of the car park to the assembly area inside the Waharoa (carved gateway) area.
	Road traffic	Ensure students remain inside the car park at all times and do not move to the road. Meet at the Waharoa and map entrance way.
Otari – bush and garden areas	Getting lost	Ensure close monitoring with parent/teacher at the rear of the group. Regularly count number of students and check names against list. Explain to students the importance of staying in groups on the Trail/Te Ara. Explain to the students that if they are lost, stop and wait for someone to come and get them. They can shout out for help.
	Poisonous plants, prickles or stinging plants	Tell students that at no time are they to eat plant parts, berries or seeds as many plants are poisonous. If they do – immediately visit a GP or hospital.
	Trip hazards – material on tracks	Material will be removed by Otari staff if possible. Remind students to take care.
Hīnau – platform (Post 6)	Space	There is limited space on the Hīnau viewing platform. When full, students must remain on the path.
	Trip hazard – steps	Remind students there are steps downhill and back up the other side. They are not to push their way either up or down steps. Allow students time to negotiate the steps.
	Bridge at stream	Cross in single file as there is a handrail on one side only.
Circular Walk/Troup Picnic Area	Kaiwharawhara Stream	We recommend that children keep out of the water at all times.

Location	Risk Item	Mitigation
Steps	Trip hazard – large steps/steep path	Remind students to take care on the steps, both up and downhill. They are not to push their way up or down steps. Allow students time to negotiate the steps.
Troup Picnic Area	BBQs	Keep students off the BBQ surfaces and cooking plates. Plates may be hot.
General	Insects – bites, stings, scratches	Remind students of natural hazards. Have antihistamines on hand. Have a simple first-aid kit available. If necessary, seek medical advice.
	Plants – scratches, spikes	Remind students of natural hazards. Have a simple first-aid kit available.
	Machinery – operating or stationary	Keep students away from all machinery at all times.
	Sun	Ensure students wear hats, covering clothing and sunscreen. Beware of overcast days and the burning effects of sun on those days.
	Rain	Tracks can become slippery and streams can rise quickly. If it rains before you leave for Otari, it is recommended that you defer the trip.
	Strong winds	If strong winds are forecast, it is recommended that you defer your trip. If strong winds rise while you're at Otari, it is recommended that you bring the students together and defer any further activities.
	Slip hazards – timber decks and walkways may be slippery when wet, or icy when frosty	Keep to grip tread parts, walk carefully and slowly. Do NOT run – walk at all times.
At departure	Getting lost	Close monitoring with parent or teacher at the rear of the group. Count number of students against list of names. Remind students about the importance of staying in groups.

Planning based on your school's curriculum

Integrated planning

This resource is designed to trigger imaginative planning within your school community. Use the biodiversity of the forest and other life at Otari as your inspiration. Base the design of your integrated programme on your school's vision, principles, values, key competencies and other components of your customised curriculum. While this resource is focused on *The New Zealand Curriculum* science learning area, it offers scope for the integration of e.g., art, English language, te reo Māori me ōna tikanga (Māori language and culture) and the social sciences.

Curriculum level

The descriptions of each site are aimed at a year 7-8 level (approx. 11-12 years). You'll need to interpret the material to suit the learning levels and needs of your particular students.

Pre-trip, on-site and post-trip activities

The pre-trip, on-site and post-trip activities included here provide starter ideas to be developed according to the learning needs and ages of your students. Your time on site will be enhanced if you undertake relevant pre- and post- activities.

Observation

Encourage children to observe, to look, to see, to touch without damaging, to feel, to listen, to smell and to discuss ideas and collect information in a variety of ways. Encourage students to look up, look down, over here, over there. Guide them to develop an awareness of their surroundings.

New Zealand's first 'ecologist', Leonard Cockayne, recommended that we "look to the plants themselves" to learn about the ecology of this land. Encourage students to notice connections between plants and other things in the vicinity and to be aware of the big stories such as Ecology, Evolution, Tama nui te Rā/The Sun, Plants and Mauri/The essence of life itself.

Student experts

Encourage students to become experts in particular facets of the bush before their trip. Support them to choose a topic of interest – one that inspires them. Each pairing or group of children could then be acknowledged for their expertise on a particular topic. They could become the 'go to' people for that specific part of the ecological story. Students can gather more information once they are on-site. Ultimately, you could develop a class-based presentation to demonstrate how each element of the bush is connected to the whole.

Possible topics for investigation

Each site at Otari-Wilton's Bush presents opportunities for students to specialise and develop expertise on particular topics. Some possible topics to choose from are: Ferns, Epiphytes, Kauri, Rimu, Kawakawa, Kāhikatea, Dr Leonard Cockayne, Karaka, The northern rātā-rimu story, Evolution, Lancewoods/Horoeka, Vines, Light-seeking plants, Tama nui te rā/The sun, Job Wilton, Wai/Water and moisture in the bush, Streams, Rewarewa, Waharoa (carved gateway), Ngaio, Kānuka, Hīnau, Tree ferns, Maps, Ecology, Whanaungatanga/Biodiversity, interconnectedness, Ake ake tonu/Sustainability and continuity, Mauri/Life-force, The colour green in our bush, Native birds (tūī and kererū), and Managing pests.

Taking notes and drawing

If students concentrate purely on the bush during their walk, they can take notes and draw afterwards, either at their picnic site or on a return visit to a particular site. Take photographs to display and examine back at school, as part of your information-gathering and investigation process.

Rules

A visit to Otari is an ideal context for practising such key competencies as 'managing self', 'relating to others', and 'participating and contributing'. Discuss what they will look like and sound like at Otari.

There are a few rules for students to understand. Abiding by them will make your trip more enjoyable and ensure minimum impact on the special protected environment at Otari-Wilton's Bush.

Discuss the rules and interpret them with your class. Ask your students to express the Otari-Wilton's Bush rules in language that makes sense to them. The rules should ring true for them. For example:

1. Use the rubbish bins.
2. Take care of the native plants.
3. Walk on the tracks, not on the gardens and rockeries.
4. Take only photographs and leave only footprints.
5. Care for Te Marae o Tāne.

Links to *The New Zealand Curriculum* science learning area

Whakataukī

Mā te whakaaro nui e hanga te whare; mā te mātauranga e whakaū. – Big ideas create the house; knowledge maintains it.

What is science?

Science is a way of investigating, understanding and explaining our natural, physical world and the wider universe.

Where to start planning?

The science learning area statement (p. 28 *TNZC*) describes the essential nature of the science learning area. "This, rather than the achievement objectives, should be the starting point for developing learning programmes suited to students' needs and interests. Schools can then select achievement objectives to fit those programmes."

Strands

The big picture science content is encompassed by strands: 1. The Nature of Science (understanding, investigating, communicating, participating and contributing); 2. The Living World (life processes, ecology and evolution); and 3. Planet Earth and Beyond (interacting cycles).

1. The Nature of Science

The Nature of Science is the unifying strand. Through it, students learn what science is and how scientists work.

- They develop the skills, attitudes and values to build a foundation for understanding the world.
- They come to appreciate that while scientific knowledge is durable, it is also constantly re-evaluated in the light of new evidence.
- They learn how scientists carry out investigations, and they come to see science as a socially valuable knowledge system.
- They learn how science ideas are communicated and to make links between scientific knowledge and everyday decisions and actions.
- These goals are pursued through the major contexts in which scientific knowledge has developed and continues to develop.

2. The Living World

The Living World strand is about living things and how they interact with each other and the environment. Students develop an understanding of the diversity of life and life processes, of where and how life has evolved, of evolution as the link between life processes and ecology, and of the impact of humans on all forms of life. As a result, they are able to make more informed decisions about significant biological issues.

The emphasis is on the biology of New Zealand's unique fauna and flora and distinctive ecosystems.

3. Planet Earth and Beyond

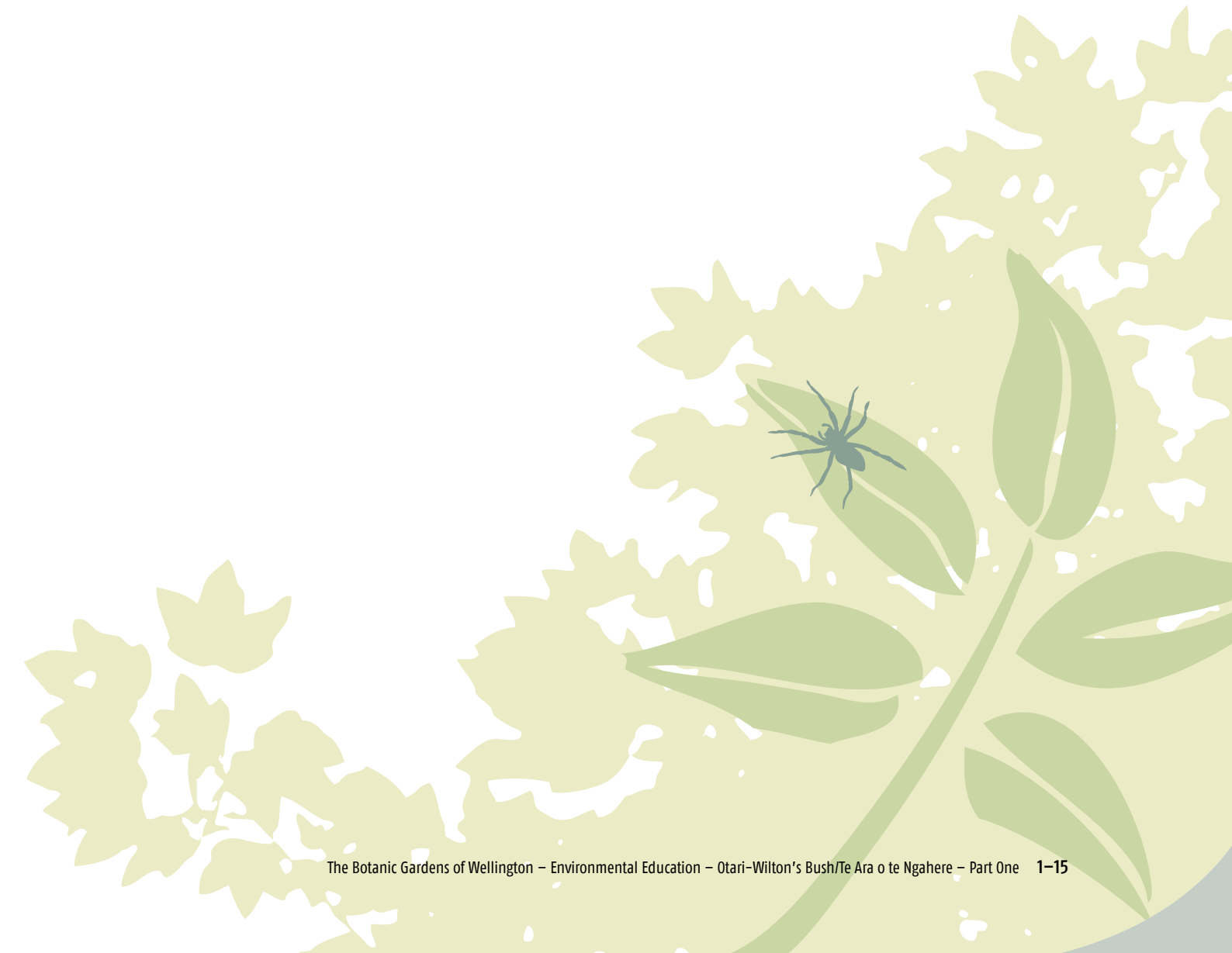
The Planet Earth and Beyond strand is about the interconnecting systems and processes of Earth, other parts of the solar system and the universe beyond.

- Students learn about the Earth's subsystems:
  - geosphere (land)
  - hydrosphere (water)
  - atmosphere (air)
  - biosphere (life).

The four subsystems are interdependent and all are important.

- Students come to appreciate that humans can affect the interdependence of these subsystems in both positive and negative ways.
- Students also learn that Earth provides all the resources required to sustain life except energy from the Sun and that, as humans, we act as guardians of these finite resources.
- This means knowing and understanding the numerous interactions of Earth's four systems with the solar system.
- With this knowledge, students can confront the issues facing our planet and make informed decisions about the protection and wise use of Earth's resources.

(adapted from *The New Zealand Curriculum*, 2007)



Pre-trip starter activities

To the teacher

Before you head to Otari-Wilton's Bush, prepare your students to ensure rich on-site experiences. Paint a picture of Otari for your students. Stimulate their thinking about the primeval forest environment. Make the trip purposeful and have your students primed up to notice living things. Provide a range of resources, both visual and verbal, to assist their exploration of New Zealand's native forest and its inhabitants. Focus on the understanding and investigating aspects of The Nature of Science strand. Select from the following starter activities.

1. Be an expert

Become an expert in a particular facet of the bush before your trip. Select a topic in which you'd like to develop expertise, such as a particular favourite plant or a big environmental story. You would then become the 'go to' person for that aspect of the bush.

2. Mural

You could start a mural. Add to it continuously as you discover new information. Include the layers of the bush as shown on the diagram you'll see at Site 14. Build up a picture of the ecology of your area and/or Otari. Research the features of native plants and place them where they belong in the bush mural. Use words and pictures to depict the diversity of life in the New Zealand bush. Include ecological interactions as you discover them. You'll have a lot more to add after your trip to Otari-Wilton's Bush.

3. Choose a topic based on the Nature Trail/Te Ara

1. Waharoa
2. Te Marae o Tāne
3. Karaka
4. Rewarewa and Tawa
5. Rimu/Northern Rātā story
6. Lancewood/Horoeka
7. Dr Leonard Cockayne
8. Harakeke/Flax
9. Kānuka
10. Epiphytes
11. Wai/Water in the bush
12. Rimu
13. Rangiora
14. Wilton's Bush
15. Nīkau Palm
16. Northern Rātā
17. Kawakawa
18. Ferns
19. Kauri
20. Conifers

4. Review your school grounds or a local reserve

Do a site analysis and identify the native trees and other plants in your school grounds or at a local reserve. Mark on a map all the natives and exotics that you, your teachers and the community know. Count the numbers of particular species. Consult local experts in your area to assist you to find out more. Discuss what you could do as a class to contribute to the restoration of bush in your area.

5. Study an individual tree or other plant

Study a native specimen in your locality, such as rimu, hīnau, ngaio, kōwhai, nīkau, tawa, rewarewa, northern rātā, kahikatea, kauri etc. Record what your tree is doing in a particular season. Note the animal life around your tree. Measure your tree. Compare it with the same species at Otari.

6. Rimu and Northern Rātā

To get a sense of a time scale, work out how many generations of people are represented by one ancient rimu tree. (There are examples of both 400-year old and 800-year old rimu at Otari.) In the life of the tree, when did Europeans arrive in Aotearoa? When did Māori arrive? Make a timeline showing what was happening in history as the rimu was growing. Estimate how many children would have to stand on each other's shoulders to reach the top of a mature rimu (20–30m). Prepare a presentation that includes information about how the rātā depended on the rimu all those years ago when it was 'young'.

7. Nīkau palm

Draw the nīkau in colour, in black and white or as a logo. Research how New Zealand artists have depicted nīkau, including the metal structures outside the Wellington Library.

8. Ferns

Check out the relationship between ferns and the prehistoric dinosaurs of New Zealand. (Ferns are an ancient order of plants.) Find out about the most common ferns in New Zealand. Read the school journal article on ferns (See page 4–4 of this booklet). Classify the various ferns you can identify.

9. Sketching

Practise drawing native trees from real life. Sketch trees near your classroom. Practise the techniques of observational drawing such as cross-hatching. Draw big versions of native trees for a class mural. Focus on one aspect at a time and identify specifically what you are aiming to record – the trunk, the leaves, and/or the overall shape and colour.

10. Photographs

Practise taking photos of native plants in your area as research data. Get images of, e.g., the leaf, the whole tree, the tree in context and other living things on the tree.

11. Reading and viewing

Read and discuss relevant school journal stories and other reference books (See the list on page 4–4). View YouTube to find out what other environmentally-aware schools are doing in their areas.

12. Ecology

Research the ecological features of a native plant, such as karaka, matai, nīkau and northern rātā. Use the internet and books. Consult experts where you can. Find out where your plant naturally belongs, e.g., the habitat of nīkau is often in wet valleys and other places where the seeds have been distributed by birds. Find out which animals and plants depend on your chosen plant. What does it need in order to survive?

13. Layer upon layer

Gather information about plants and their specific level in the bush – e.g., emergent trees, canopy, epiphytes, sub canopy, ground floor.

14. Te reo Māori me ōna tikanga

Create lettering for your class mural, using Māori terminology. Remember to include macrons.

Research kupu Māori me ōna tikanga (Māori words and their cultural base). Find out the pronunciation and meaning of Te Marae o Tāne, Waharoa, Tāne Māhuta, kauri, kareao, matai, rātā, nīkau and other aspects of the bush. Find out the characteristics of the taonga trees (kahikatea, tōtara, rimu, rimu-rātā, kauri) and how they have contributed to Māori tikanga, culture and literature.

15. New Zealand is green

How many greens are there in the New Zealand bush? What colour is green? Try mixing paint colours to make the greens of the forest. Prepare a tally of all the greens you can see in your school grounds (based on a green paint chart) and present your recordings to the class. Practise matching the chart colours with the greens of the natural environment. Prepare a chart to gather more information at Otari. Note the colour of trees such as the rimu, the rātā, the rewarewa and the tawa. Demonstrate the range of greens you've discovered by matching them with the named colours on a paint chart.

16. Leaves

Identify the parts of a leaf. Identify various types of leaves. What are the different shapes? Work out groupings of similar leaf types. What do the leaves of our native plants look like? How are they similar or different to exotics?

17. Wellington City Council team and volunteers

Find out about the team of City Council workers and volunteers working at Otari to ensure the sustainability of the forest and garden, to restore natural ecosystems and to protect the streams. Research the role of modern volunteers in the ecosystem of Wellington and the Kaiwharawhara catchment. The internet is a great source of information (See page 4–4).

18. Pests

City Council staff and volunteers are tracking and trapping possums, weasels, stoats, ferrets and hedgehogs. These pests are a problem because they eat seeds, seedlings, new growth on trees, fledglings and birds. Investigate the impact of pest animals, including cats and dogs, on the bush.

19. Wilton family

Research the Wilton family. Record their conservation story. Establish where the Wiltons fenced their bush area and mark it on a map. Information is available from the Otari-Wilton's Bush Trust for a gold coin donation.

20. Birds

Which New Zealand plants do our native birds find delectable? Which exotic plants do they like? How can you attract native birds to your school grounds? The Otari-Wilton's Bush environment attracts many native birds. It's popular with flocks of kererū, tūī and other native birds. They gather here to sup on the native fruit and flowers. Find out about their appearance and habits.

You're likely to see tūī at Otari. They are honeyeaters and have a special brush-like tongue adapted for feeding on the nectar of flowers. Their tongues are split into four tiny hair-like extensions at the end to help the birds mop up the liquid nectar in such flowers as kōwhai and rewarewa.

Other native birds at Otari are North Island fantail/tīrairaka or pīwakawaka, morepork/rūrū, kererū, kingfisher/kōtare, paradise shelduck, waxeye/tauhou and shining cuckoo/pīpīwharauroa. If you keep quiet enough you may hear and see these native birds call and swoop through the forest.

Forest clearance threatens the survival of native birds, as there are fewer areas to search for food, mates and nesting sites. Fruit-eaters, such as kererū, and nectar-eaters, such as tūī and bellbird/korimako, must fly further afield to find food.

Research the kind of native plants that either belong in your area or would grow well and attract native birds. For instance, tūī and korimako require the nectar-producing plants.

21. English language

What words do you associate with Otari and the bush? Collect words that resonate for you. Answer the question, 'If the bush could talk, what would it say?' Think of questions and special words that relate to the bush/te ngahere. Write them on large, coloured sheets of paper and add them to your class mural. Use these as prompts in your investigation.

22. Conservation

Explore the statement 'Auē/Alas. How long it takes to grow, yet how quickly it can be destroyed!' What is the history of the New Zealand bush? How much native bush is left? What can we do to ensure protection and regeneration of the bush? Explore and answer Cockayne's question 'Will our descendants prize this unique heritage from the dim past and preserve these sanctuaries intact?'

23. Maps

On a map of New Zealand, mark in where the forests are today and how extensive they were 1,000 years ago. Secondly, look at a map of Otari-Wilton's Bush to get your bearings. Trace your Nature Trail/Te Ara route from the Information Centre to the Canopy Walkway, the Cockayne Lawn, the Wilton's Bush viewing platform, the northern rātā, the Fernery, the Kauri Lawn and back to the Information Centre/ Te Marae o Tāne.

24. The light story

Observe how plants reach for the light and describe the process clearly enough for your class to understand. Grow bean seeds and study 'phototropism'. Draw a diagram to show how plants' light-seeking tendencies work. Find out about light-seeking climbing vines in the bush.

Study the process of 'photosynthesis'. Notice all the different shades of green you can pick out in plants. Find out about 'chlorophyll'.

25. Evolution

Find out how plants evolved in New Zealand with only birds living here and no predator mammals. What do moa have to do with the way many of our native plants grow? Find out about your region in prehistoric times. Research Gondwanaland, moa, dinosaurs and primitive plants in New Zealand.

26. Wellington's green belts and Town Belt

Otari-Wilton's Bush is part of Wellington's three green belts. Find out about them. Where does Otari-Wilton's Bush fit into the green belts? Find out about the Wellington Town Belt.

27. Presentation

Work towards a presentation for your class, another class or for parents. Prepare a powerpoint or an illustrated talk. Gather data to tell a multi-dimensional story about (a) the environment at Otari and/or (b) your particular environment. Include song, scientific data, illustrations and so on.

Otari-Wilton's Bush
NATURE TRAIL
Te Ara o te Ngahere

PART TWO
Introduction to Sites on the Nature Trail/Te Ara o te Ngahere

To the teacher

Simple activities are built into these notes for each of the sites on the Nature Trail/Te Ara. Encourage students to 'read' the bush as if it were the internet or the whare wānanga o Tāne/ the place of learning of Tāne. There are many living things to notice. The bush is a living learning resource which is constantly changing - the closer you look, the more you notice.

He tirohanga matawhānui me he tirohanga matawhāiti/distant and close-up views

Encourage students to look at the overview of the bush and then to zoom in and look at the detail, to be aware of the broad views in the distance and to look closely at the nearby living things.

Gathering information

After a walk and meal break, we recommend that students return to specific sites to gather more information, to take photographs or to sketch. Good places for sketching are the Canopy Walkway and Cockayne Lawn area. Some of the closer posts are 1–4 and 9–12.

Recording information

Once your students have completed the Nature Trail/Te Ara and had morning tea, lunch or afternoon tea, ask them to review what they have learnt and observed, and then record it in their booklets (pages 23–24).

They could note a few key points about each of the sites and include a sketch as a trigger for more detailed work later.

Otari-Wilton's Bush is an ecological site teeming with life. How many species can you find in this picture?

Sites 1–20 on the Nature Trail/ Te Ara o te Ngahere

1 Entrance – Waharoa/carved gateway and map

Assemble in the area near the Waharoa and the map shelter at the car park on Wilton Road.

On this trip, you're going to step back in time to an ancient world. Otari-Wilton's Bush was originally covered with dense forest. Moa roamed the area. There are now about 100 hectares of forest here, made up of original bush, and forest that is growing back. This type of forest is found only in New Zealand. Not only that, but Otari is the only public botanical garden in New Zealand solely dedicated to native plants.

Waharoa/gateway

The Waharoa here was carved by Bryce Manukonga of Te Atiawa and Mahanga a Taiiri, tribal groups in Taranaki. The gateway represents the karanga, the call of women to welcome you to the marae of the bush.

The map

The map under the shelter shows you how widespread Otari-Wilton's Bush is. The bush covers the slopes formed by the Kaiwharawhara Stream and nestles at the bottom of the deep sheltered valley. You can see the forest, including Wilton's Bush, the special botanical gardens, and the Nature Trail/Te Ara o te Ngahere on the map.

Mamaku

There are half a dozen young mamaku here framing the entrance way to Otari. You can pick them out by their distinctive trunks with diamond or hexagonal patterns. Tree ferns are some of the oldest plants in the world and belong to the time of the dinosaurs.

To do

Look at the map to find some of the main features, such as the forest reserve which is coloured green with swirly patterns; the original Wilton's Bush, which is below the forest reserve and coloured dark green; and the Nature Trail/ Te Ara. The trail is marked, meandering through native forest areas and gardens.

What's next?

There's a massive number of things living and growing here, so keep your eyes and ears open. On the way to the Information Centre/Te Marae o Tāne, look out for the young rimu on the right of the pathway. It's labelled. See how its foliage droops down as if it is weeping. Later during your trip, you'll meet a 400-year-old rimu.

When you reach the Information Centre/ Te Marae o Tāne, put your bags down and have a seat.

2 Te Marae o Tāne/Information Centre

Te Marae o Tāne is named for Tāne, the god of the forest. At Otari, the marae encompasses the bush area. Before 1840, Māori regularly walked through this area, hunting birds in the forest. The name Otari is thought to mean 'the place of bird snares'.

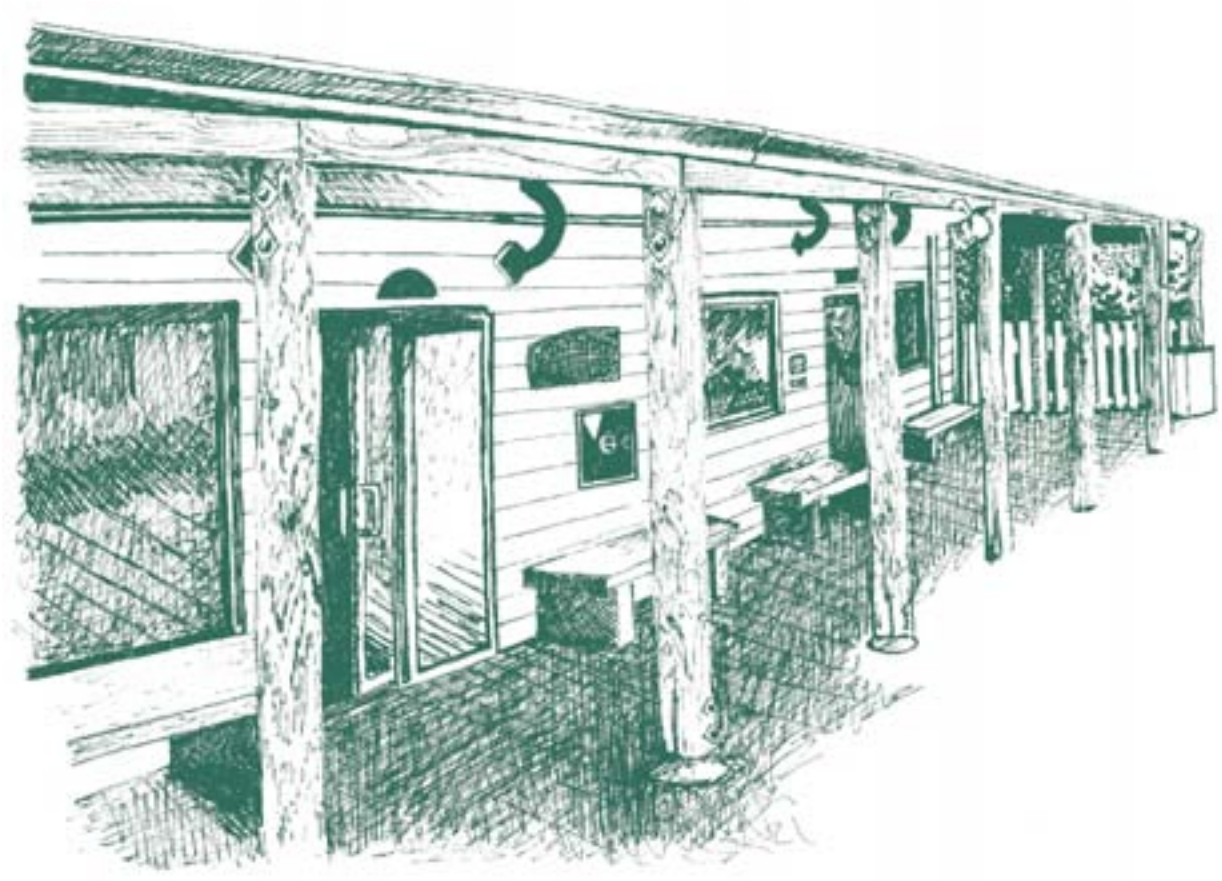
New Zealand has about 2,400 native species of plants such as conifers (trees with cones), ferns and flowering plants. You can find many of them here in the natural ecosystem of this forest. All the different species live together here, some competing and others depending on each other.

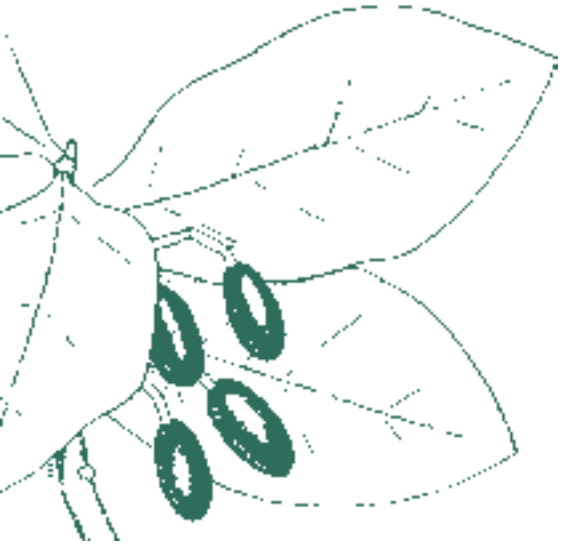
To do

Read and take photos of the two information panels: 'From foraging to farming' and 'Time to protect' so that you can view them later.

What's next?

Your adult supervisor will lead the way, following the numbered trail markers (Posts 1-12). You have 20 sites to see. Stay within calling distance of your supervisor. The trail is steep and narrow in some places and has many steps, so play it safe and stick together. At the end of the trail, return here to Te Marae o Tāne/ The Information Centre.





3 Post 1 – Canopy Walkway, Karaka

Karaka

Seek out the karaka trees, which you'll find at the orange-coloured start sign for the Canopy Walkway. They are big beautiful trees with large glossy leaves. The Nature Trail Post 1 is on the fence to your right.

The karaka tree grows to a height of 15 metres and its trunk can reach one metre in diameter. It produces flowers from August to November and the fruit takes a year or so to ripen. If you're here in summer or autumn, you'll see the trees weighed down with their large fruit. They start out as a vivid green and later turn a bright orange. They're poisonous until cooked and specially prepared. The pulp of the fruit is edible but the nut (the kernel) contains poison.

Karaka groves

Many karaka trees were planted by Māori in groves which they visited to collect the fruit. Records of plants show that karaka were originally brought from the Pacific Islands to the north of the North Island. There are many Māori oral traditions – songs and chants – describing how they were brought to different parts of Aotearoa, including Taranaki. They are an important food for Māori and people in the past travelled long distances to collect the berries. The hardy karaka tends to take over other plants and fast becomes dominant in a bush area. Wellington City Council staff here are culling it in places because infestations can cause havoc in the bush.

Karaka and Kererū

At certain times of the year, the smell of the karaka berries is very strong, attracting birds to them. Waxeyes/tauhou eat the orange flesh of the seed. Kererū eat the pulpy berries, digest the pulp and excrete the one hard seed. The kererū is the only bird with a bill big enough to wrap around the berries and swallow them whole. The moa used to share that job with the kererū.

To do

Look over the side of the Canopy Walkway to the left. Locate the multiple trunk of the big karaka. What stage are the berries and flowers at?

What's next?

Set off along the zigzag Canopy Walkway footbridge, which soars 18 metres above the forest floor and crosses over a deep gully. On the way to Post 2 you'll see a panel named 'The lie of the land' with a map showing the Wellington Peninsula. Find Otari on the map and take a photo of the display panel. The Nature Trail Post 2 is on the right by the first seat.

4 Post 2 – Canopy Walkway, Tawa and Rewarewa

You'll come to a seat opposite a view of the forest floor and see a panel called 'Learning to survive'. Post 2 is on the right fence to the right of the seat, heading up the Canopy Walkway.

Tawa

The trees here are mostly tawa, which means 'purple' in te reo Māori. You can see tawa close-up, beside the 'Learning to survive' information panel. It has big dark purple-blue berries shaped like olives. It was important to Māori both as a food source and as a medicine. The kererū like the fleshy fruit of tawa and they help to spread the tree by eating the ripe fruit and passing the seeds back into the environment.

Tropical rainforest

New Zealand's climate is neither very hot nor very cold, yet much of our forest has a tropical feel about it. Many of our plants look as if they belong in a jungle. Look over the Canopy Walkway to see layers of plants growing over and around each other. Vines like supplejack and kohia/New Zealand passionfruit are common in the forest.

Rewarewa

The rewarewa tree is behind the seat. In spring its flowers are deep red and unusual because they grow straight from the hard, woody branches. The relatives of the rewarewa, the protea family, live in South Africa and South America. According to scientific theories, the lands of New Zealand, Australia and Africa were at one time connected as Gondwanaland. That could explain why many of our plants, such as the rewarewa, have close relations overseas.

Possums and rats

Possums and rats were until recently a major threat to bird populations here and could be so again, except for the vigilance of Wellington City Council staff and volunteers who keep putting out poison. Possums and rats climb trees, feed on eggs and young birds, eat seeds and seedlings and destroy new forest growth.

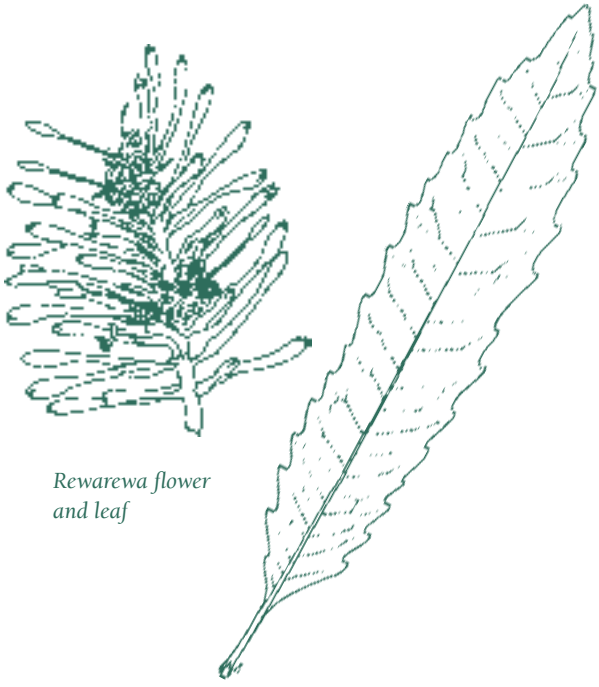
Possums have been drastically reduced in this forest. Killing off the rats and possums in this and other areas in New Zealand has made a huge difference to the regrowth of the forests and brought the birds back.

To do

Listen to the stream here. Later you'll walk beside it when you descend into the bush. Check out tawa berries on the 'Learning to survive' panel.

What's next?

Continue on the Canopy Walkway and enjoy the magnificent views over the valley and forest. You'll find Post 3 on the fence on the right side of the walkway, to the left of the information panel 'Dining out on the town'.



Rewarewa flower and leaf

5 Post 3 – Canopy Walkway, Valley view, Rimu and Northern Rātā

Rimu and rātā

The rimu-rātā combo is a unique pairing of trees. You can see the rimu, with a rātā towering above it, really well from here. In the middle distance you can pick out several massive, billowy, rimu crowns with the smaller, umbrella-like rātā crowns standing above them. They look like two trees growing as one.

The rimu is a different green from the other trees. The other trees are silvery. The rimu and the northern rātā together make a dark olive green shape because their little leaflets and leaves don't reflect as much sunlight as the other trees.

Kōwhai

The kōwhai to your left here often has kererū feeding on its leaves, completely defoliating it (stripping it of leaves). The kōwhai grows back again, recovering from its kererū attack! Tūī, waxeyes/tauhou, the bellbird/korimako and other nectar-feeding birds pollinate the kōwhai flowers when they are searching for the nectar deep within the flowers. They do the same for rewarewa.

Vines

You can see a tall rewarewa almost totally covered with vines – the native passion vine and supplejack. In spring you can see the slender, curved, sensitive tendrils that the native passion vine uses for climbing.

Kahikatea

Kahikatea is an emergent tree, the tallest native tree in New Zealand. You can see one opposite the 'Dining on the town' panel. It usually has a very slender trunk and often dwells in swamps. Kahikatea was used by Māori as an important food source, to make spears for bird hunting and was highly prized for its soot from burnt branches as a pigment for tā moko/traditional tattooing.

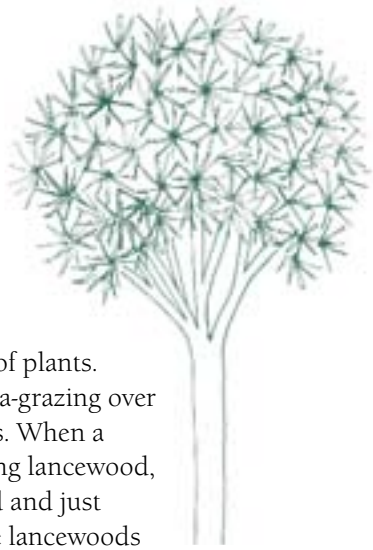
To do

Find the map on the 'Dining out on the town' display panel. It shows the forest cover of New Zealand before human occupation and the forest cover today. What does the map tell you about the changes that have occurred?

What's next?

On the way to Post 4, look at the top of the tree fern over the side of the Canopy Walkway. At Post 4 you'll see another Waharoa and lancewoods/horoeka. You'll find the Nature Trail Post 4 just beyond the Canopy Walkway, on the left, on the same side as the Waharoa information panel.

6 Post 4 – Waharoa (gateway), Lancewood/Horoeka



Waharoa/carved gateway

Go through the hand-carved Waharoa and look back at it. In the middle, you can see Tāne Māhuta, the guardian of the forest, representing respect for nature. On the left are the kararehe, the insects and other animals of the forest. On the right you can see ngā manu, the birds of the forest, and the dotted pattern is rongoā, the seeds or medicines of the forest. Ngā hau e whā are the swirly wavy patterns on the sides of the Waharoa. They are the four winds of the forest and represent all of the iwi/ tribal groupings.

Lancewood/Horoeka

You can recognise one species of lancewood or horoeka here by its long, thick, hard leaves with large teeth. The young tree can resemble a collapsed or broken umbrella.

At this site we can see three stages in the life of the common lancewood. This tree looks very different in its adult stage compared with its younger stage. When two botanists on Cook's first voyage collected these two stages of the lancewood, they described them as different species. Why do they look so different? Botanists still argue about these ideas. Some botanists, like Otari's botanical advisor, Dr John Dawson, are tending towards the 'moa' explanation.

It seems likely that the young, hard form of lancewood would not appeal to moa as food. One theory is that years ago, the moa lived here and liked to eat lots of plants. The plants adapted to moa-grazing over tens of thousands of years. When a moa came across the young lancewood, it would think it was dead and just pass on. The very juvenile lancewoods are completely brown. We'd think they were dead, so presumably the moa would too. Another suggestion is that the tough, very long and narrow leaves look like swords and would have been difficult for moa to swallow. Imagine how difficult it would be to swallow a sword! In effect, it's like a security system for the lancewood.

In its adult form the tree starts branching from the top of the trunk and grows green adult leaves. It can grow up to about 13 metres. You can see the tall adult lancewood to the right of the seat. It would probably look more appetising than the young plants but, to eat the leaves, the moa would have to reach up like a giraffe to get at them. Not many moa could easily reach that height, so it's likely that they wouldn't bother. There'd be plenty of other tucker down below.

7 Cockayne Lawn, Ngaio and Forest lookout

Ngaio

Walk onto the Cockayne Lawn where you can see the tall rounded ngaio tree. The ngaio has rough rugged bark and brilliant white flowers in spring. The ngaio has male and female parts in the same flower – a stamen and a pistil – one producing pollen and the other an ovule. The ngaio has poisonous oil glands as a defence mechanism. Hold a ngaio leaf up to the light and you can see the oil glands. Because early British settlers didn't know much about New Zealand's plants, some of their sheep and cattle died from eating ngaio.

Dr Leonard Cockayne

Leonard Cockayne was born in England in 1855. During his childhood he developed a keen interest in plants. He moved to New Zealand and studied Darwin's ideas about evolution and applied them to New Zealand plants. In the 1920s he came up with the idea of making an 'open air plant museum' here at Otari. He created a five-hectare garden containing a wide variety of plants from all the different habitats around the country.

Plant collections

There are approximately 1,200 species in the plant collections here, all raised from cuttings or seeds from all over New Zealand. The City Council staff and volunteers look after them. This is New Zealand's most extensive collection of native plants and they are all recorded on a computer data base.

Forest lookout

You can see both original and regenerating forest from this lookout. The rimu trees to the left have been there for hundreds of years. One of them is 800 years old. Job Wilton's farm was over to the right and, in the area he fenced off, you can pick out the rātā growing, especially when it flowers and is covered in lots of red blooms. Directly in the middle you can see 100 years of regrowth of native trees. It's amazing what we can do if we want to replace the forest.

To do

Take photos of the ngaio, lancewood/horoeka, the Waharoa and the forest lookout. You'll be able to compare this Waharoa with the one at the entrance to Otari-Wilton's Bush.

What's next?

As you make your way down the path, pick out the lancewoods/horoeka with their browny colouring and yellow brush-stroke markings.

8 Goliath Harakeke/Flax

There are two main species of New Zealand flax – harakeke and whaririki or mountain flax. The Goliath harakeke is the biggest in New Zealand. It can grow up to three metres high. Māori grow harakeke plants especially for weaving and they used to make ropes with them.

The harakeke form clumps as you can see and their leaves fan out like sets of swords or whānau/families.

To do

Stand beside the Goliath harakeke. How much taller than you are they? How would you describe the colour? What does Goliath mean?

What's next?

Walk downhill to the kānuka, a short distance from here. You'll find Post 5 to the left of the steps, where the path makes a steep downwards turn.

9 Post 5 – Kānuka

In many places in New Zealand when the land is cleared, either by man or by natural processes, the plants soon start to recolonise – to spring up in the area. Colonisers are tough and adaptable plants like this kānuka. It's a plant that can cope with the wind and sun in exposed places. These shrubs will eventually provide shelter for other forest trees to grow.

To do

Estimate how tall these kānuka are now, compared with your own height. Can you see what makes them such tough plants?

What's next?

Next you'll plunge into original bush and make your way through trees tangled with vines and supporting epiphytes. Notice the hound's tongue fern carpeting both sides of the steps. At Post 6, you'll see layers of many different plants growing on a hīnau tree. Post 6 is on the small platform beside the hīnau.

10 Post 6 – Hīnau with epiphytes

Hīnau

The tree with many plants growing on it is called a hīnau. It can grow up to 25 metres tall, in the roof of the forest. When the flowers are pollinated, they turn into purplish fruit which kererū love to eat. Many different plants are living together here in a small space on the hīnau.

Epiphytes

The hīnau has many epiphytes or perching plants nestled in its forks and along its branches. Epiphytes are plants that live and grow on trees. They use their host tree as a ladder to reach the light. Epiphytes aren't parasites. Parasites pull the nutrients out of a tree that they grow on and can eventually kill it, whereas epiphytes live together with the tree.

You might be wondering how the epiphytes got onto the hīnau. There are two possible ways – either a bird ate its seed and pooped it out on the tree or the wind blew the seed up into the tree. It would depend on the type of epiphyte.

Epiphytes have no contact with the ground. They create their own compost heap and get the nutrients they need by collecting up dead leaves and other plant waste. As their leaves and roots die off, the leaf mould collects beneath them and wind-blown dust adds to the pile.

You could think of this tree as an 'apartment building' or a 'garden in a tree'. The epiphytes that live on the 'apartment building' include different types of rātā, orchids, mosses and lichen, lots of types of climbing ferns, astelia/kōwharawhara, kahakaha, hound's-tongue fern and the broad-leaved puka, which is the thick vine with long-lined marks on it.

The widow maker story

One of the epiphytes on this hīnau was given the name 'widowmaker' when the early European settlers were cutting down the trees. These kahakaha or *Collospermum* nest epiphytes would occasionally fall on a bushman, killing him and thus making his wife a widow.

To do

Lie down on your back and look up into the canopy to get a better look at the hīnau and epiphytes.

What's next?

Next you'll walk alongside a streamlet as it makes its way to join the Kaiwharawhara Stream at the bottom of the valley. It's a chilly but sheltered pocket of bush housing lush New Zealand ferns. You'll see Post 7 to your right at the streamlet. Continue down the steps.

11 Post 7 – Stream and Tree ferns

Water power

Moisture is an important part of our bush. Plants, such as our ferns, thrive in damp areas. It rains here for about 125 days of the year. That's about one rainy day in every three, which suits many of the plants here just fine.

Tree ferns

There are six species of tree fern in the New Zealand forest and you can find three of them here. You can recognise kātote by its old fronds that hang down like a skirt. It's growing on the banks above the stream. The ponga with its silver undersides is behind the Post 7 sign. And the tallest tree fern of all, the mamaku, is labelled on the side of the track. The bulges at the base provide support so that it doesn't fall over, despite its massive height.

To do

Look up to the sky and the light, to see where mamaku and other ferns are reaching. Get a feeling for the moisture in the air, the water flowing downhill and the dampness of the ground. Notice the effects of the water on the rock face. Otari has very steep hill slopes and you can see that the stream has gradually gouged out the rock, as the water has poured down the hill. What else is growing here and enjoying the cool, damp conditions?

What's next?

Make your way uphill to see a rimu tree that was a youngster in the 17th century. That was over 400 years ago! Look out for epiphytes as you walk up to the rimu and head to the seat at its base. You'll see a labelled rimu on the way. It's a good one to hug. Post 8 is right beside the 400 year old rimu.

12 Post 8 – The 400-year old Rimu

Rimu from the seat below

This is a rimu and it's big! Every 10 years, the trunk grows 25 millimetres in diameter. It's about one metre now, so it's around 400 years old. The circumference (the distance around the trunk) of this tree is quite extensive. It would take three or four children holding hands to wrap their arms right around it. It will reach up to 60 metres high and is known as an emergent tree, which means it sticks out of the top of the layers of trees.

Before European settlers came to New Zealand and started cutting down trees, the rimu trees commonly lived for many hundreds of years throughout New Zealand's lowland and lower mountain forests. There's one here at Otari that is thought to be 800 years old.

You can see a reddish-coloured northern rātā vine on the side of the rimu. It has thickened up to the size of an adult's leg, widened and spread itself against the rimu. The northern rātā started its life on this mature rimu tree. The wind blew a rātā seed into a branch of the rimu many years ago and, over a very long period of time, the root came down and wrapped itself around the rimu tree. It has stayed up there, wedged in the bark or on a branch – far from the soil on the ground.

Nest epiphytes

If you look up, you'll see that the rimu is home to more perching epiphytes. They are fed by the build-up of humus, a massive black bundle of soil, fallen leaves and bark which holds lots of water.

Walk up the steps past the rimu and look back down at it from further up the steps.

Rimu from the steps above

You can see the rātā roots going around the rimu. The roots gradually grow down the rimu tree as if they are wrapping their arms around the tree. They are finding their way to the bottom of the tree. Eventually, the rātā will take over the rimu, which will die and rot away, leaving a hollow space at the base. The rātā does not actually kill the tree or feed (parasitise) off it.

You can also see a puka vine with its long ridges, growing down the rimu.

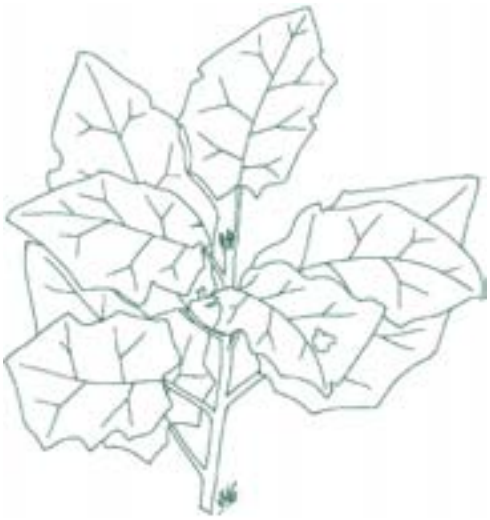
To do

To get a sense of scale, work out how many generations this one 400-year-old rimu tree represents. When did Europeans arrive in Aotearoa? When did Māori arrive? What else has happened in the 400-year-life of this rimu?

What's next?

Make your way up to Post 9, which will be on your left near rangiora shrubs.

13 Post 9 – Rangiora



Rangiora is a tree daisy. Look for its distinctive large, broad leaves – the largest of all the tree daisies.

To do

Once at Post 9, catch your breath and wait for everyone to catch up. Admire the rangiora at Post 9. People call it bushman's toilet paper. It's also been used as writing paper or track markers. Why do you think it has such large leaves?

What's next?

Once everyone has reached the Post, head uphill and turn left onto the bridge leading to the Wilton's Bush Viewing Platform. You'll see the big Nature Trail sign on the right.

14 Wilton's Bush Viewing Platform

Here at the Viewing Platform you are standing within the original protected Wilton's Bush. Job Wilton was unusual for his time because he protected this bush area.

Job Wilton arrived in Wellington at the time that the Treaty of Waitangi was being signed (1840). The land here was in the care of Taranaki Māori. Before their kaitiakitanga (guardianship), the Wellington area was inhabited by Ngāi Tara, Ngāti Ira and others. Job bought land here in 1860 and began farming. At the same time he fenced off a bush area the size of seven rugby fields.

Job married Ellen and they had 11 children who grew up on the family farm here. Job and Ellen taught their children to love the bush and to look after it well. The family made sure the fencing was secure and they patrolled the place in the evenings to see that the picnickers' fires were out. Fire would have been disastrous.

To do

Look at the panel 'The podocarp forest'. A podocarp forest is made up of a family of many of the evergreen conifers that evolved long before flowering plants. The panel shows the five layers of plants in the forest. They are: the emergent layer, the canopy layer, the sub-canopy layer, the shrub layer and the forest-floor layer.

What's next?

Walk back along to the end of the bridge walkway. Turn left and you'll see the main green sign for the Nature Trail. Look out for the nīkau palm with rings around its trunk. It will be on your left on your way to the rātā tree at Post 10.

15 Nīkau Palm

This tropical beauty is native to New Zealand and is our only palm. Palms usually live in warm climates, but this one copes with the cold and is common in our coastal forests. The trunk has no branches and it grows up to 10 metres tall. The base of the trunk is wider – a bit like an elephant's foot. It's smooth, green and ringed with scars where the leaves have fallen off.

The nīkau has a crown of enormous leaves and, when you are here during summer, you'll see masses of small pink flowers hanging from the trunk at the base of the leaves. These become red berries, which can take a year to ripen. The kererū feasts on the nīkau and so spreads the single large seed from each berry.

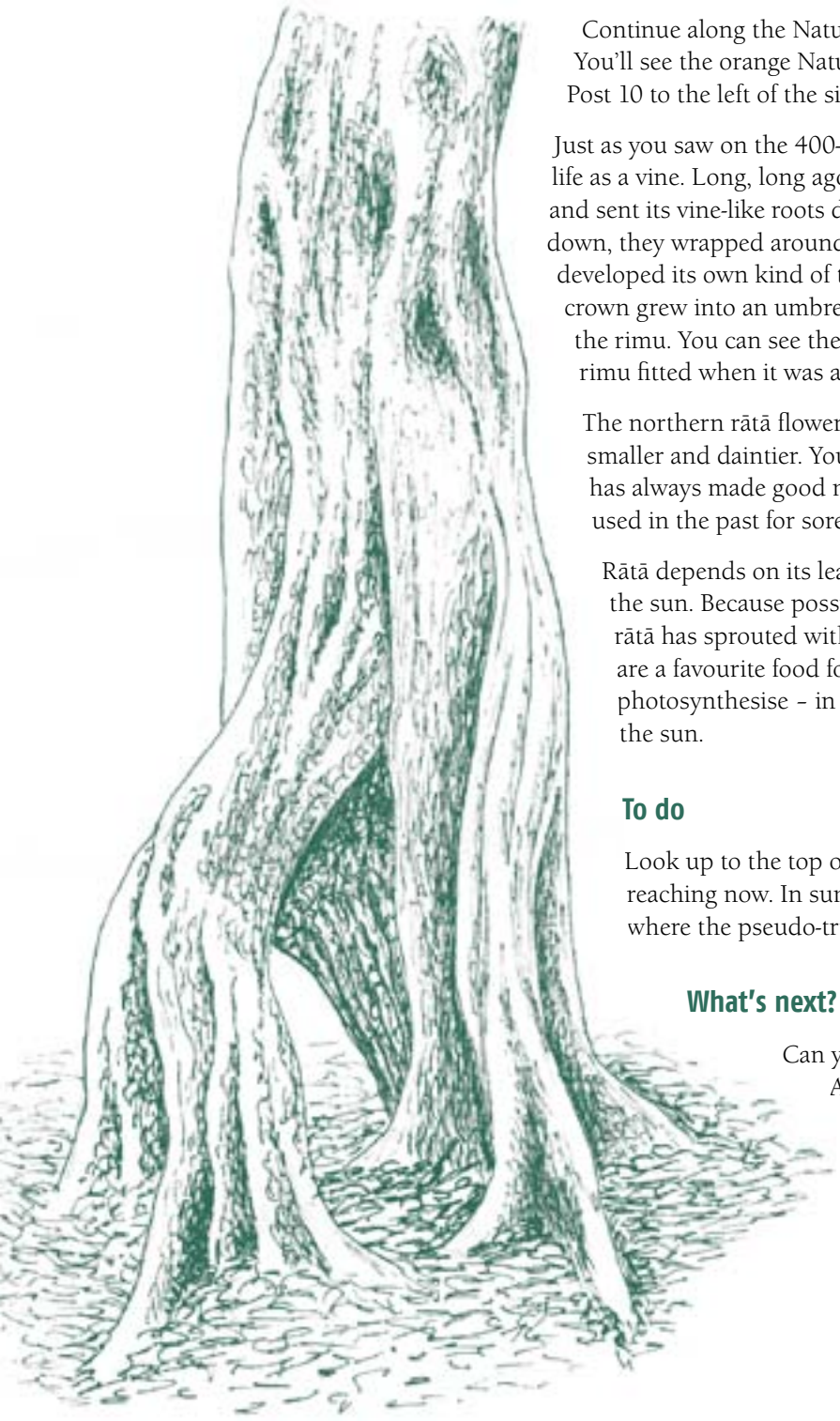
To do

The nīkau is fun to sketch or paint. Return later with your sketching materials or take a photo now to use for drawing later. Can you think of any reasons for the shape of the leaves?

What's next?

You'll find the ancient northern rātā just around the corner to your left.

16 Post 10 – Northern Rātā



Continue along the Nature Trail until you reach the northern rātā. You'll see the orange Nature Trail sign on your left and you'll find Post 10 to the left of the sign-posted northern rātā.

Just as you saw on the 400-year-old rimu at Post 7, the rātā started life as a vine. Long, long ago, a rātā seed landed in an ancient rimu and sent its vine-like roots down the tree. As they worked their way down, they wrapped around the rimu trunk. Eventually the rātā vine developed its own kind of trunk, a 'pseudo' or fake trunk and its crown grew into an umbrella-like shape, reaching for the light above the rimu. You can see the gap at the foot of the rātā tree where the rimu fitted when it was alive.

The northern rātā flowers are like those of the pōhutukawa, but smaller and daintier. You see them at Christmas time. The rātā tree has always made good medicine and the flower nectar has been used in the past for sore throats. Today rātā honey is very popular.

Rātā depends on its leaves to make its food with the energy of the sun. Because possums have been killed off in this area, the rātā has sprouted with luscious new growth. The rātā leaves are a favourite food for possums. Without its leaves it can't photosynthesise – in other words, it can't make food from the sun.

To do

Look up to the top of the rātā to the sky to see how far it is reaching now. In summer, look for the flowers. Can you see where the pseudo-trunk started from?

What's next?

Can you see a large kawakawa near this rātā? At Post 11 you'll see some more kawakawa. There are also large-leaved Whau in this area.

17 Post 11 – Kawakawa

You'll often find kawakawa growing in clearings and at the edges of forest areas like this. The heart-shaped leaves usually have masses of holes caused by small native looper caterpillars. The caterpillars feed at night but sometimes you can find them in the late afternoon on an overcast day.

The leaves of the kawakawa plant have long been used as medicine. Traditional Māori practitioners still use them today for preparing rongoā/medicine. Kawakawa beer is also growing in popularity.

To do

Look at the holes on the kawakawa leaves. Hunt for caterpillars. What layer of the canopy do kawakawa live in? Notice their interesting stems. Think about how you'd draw the whole plant. Take a photo to use as a guide for sketching later.

What's next?

Next, just around the corner, you'll find an alcove sheltering lush New Zealand ferns. There's no numbered post in the Fernery. (You'll find Post 12 later at the Information Centre.) Follow the big green signs to find the Fernery Viewing Platform. Stop at the Fernery information panel on the boardwalk.

Kawakawa leaves

18 Fernery Boardwalk

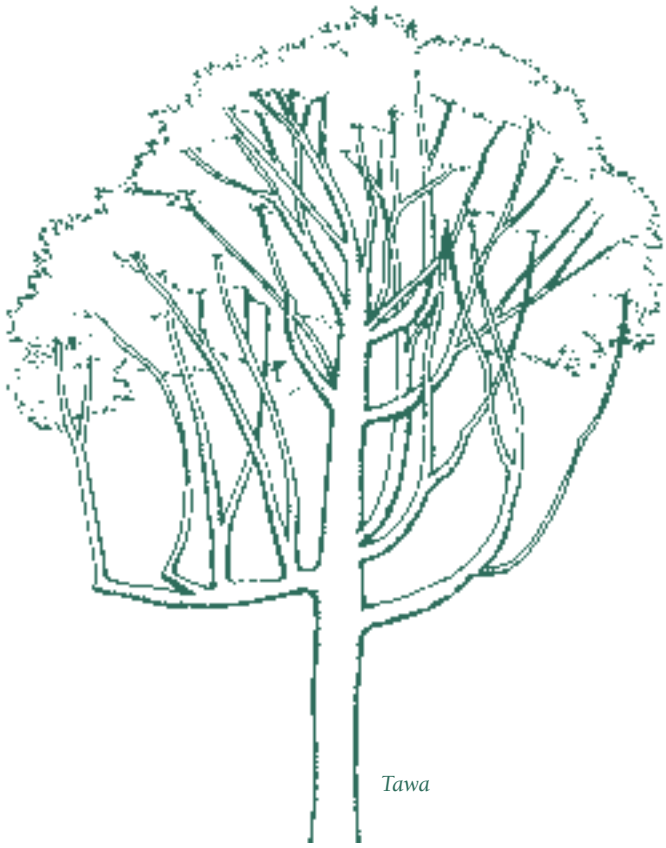
New Zealand ferns

This fernery was created in 1968 after the Wahine storm – a cyclone that sank a ferry at the entrance to Wellington Harbour with loss of life. The super strong wind damaged many very old trees here, making an opening in the forest canopy and creating a perfect setting for a fernery.

This area is now home to ferns from all around New Zealand. There are 12,000 fern species worldwide and 150-200 species in New Zealand. Sixty of the New Zealand species of fern live in this area of Otari-Wilton's Bush.

Tawa

The tree with strange-looking branches is a tawa. It looks like a candelabra (a fancy candlestick).



Tawa

Climbing ferns

You can usually see a species of climbing fern here on the tawa that changes its looks depending on where it is living in the forest. This fern – *Blechnum filiforme* – crawls along the forest floor looking for a tree trunk. Then it changes its appearance as it climbs the trunk. As it reaches further into the light, it transforms once again. So you can see three versions of the same fern in this one small area.

Ponga/kaponga or silver fern

You can pick out the ponga opposite the information panel by the silver-white undersides of its fronds. It's regarded by many as a symbol of New Zealand. It's probably the slowest growing New Zealand fern and prefers shade and drier slopes. It can reach up to 10 metres. The All Blacks and other sports teams wear this fern symbol on their jerseys.

To do

Take photos of each fern for your reference later. Take special note of the patterns on the trunks and the way the old fronds hang down.

What's next?

Walk along the boardwalk towards the Wilton's Bush Viewing Platform, then go left, down into the Fernery. Make your way to the green seat in the Fernery near the 'hen and chickens' ferns.

19 The Fernery and Kauri Lawn

Mamaku/Black tree fern

The mamaku is the tallest tree fern in New Zealand and is one of the tallest tree ferns in the world. You can locate the mamaku fern here in the Fernery by its height – it's the tall black one and can reach up to 20 metres. There is one behind the green seat. Its trunk and stems are black and it has lacy bright green fronds. It grows quickly up to the light and prefers to live in moist gullies. Notice how it has angled itself at the base to reach the light.

King Fern/Para

The king fern/para is the largest ground fern in New Zealand. It grows naturally in dense, shady moist forest in the northern half of the North Island. You can find it here behind the green seat. The starchy root of this fern was a food source for Māori. It was cooked and then pounded to make flour. You can see a type of fruit called sporangia underneath its glossy leaves. Sporangia contain spores that are spread by the wind.

Hen and chickens fern/Mouku

Another special fern here is the 'hen and chickens' or mouku. The tiny little ferns you can see are called the chickens. These tiny bulbils grow on the mature leaves, the 'hens'.

The fern has a second means of reproduction – sporangia. Look under the leaves to see if you can find the sporangia.

Walk out of the Fernery on the track to the right of the green seat onto the Kauri Lawn.

Kauri Lawn

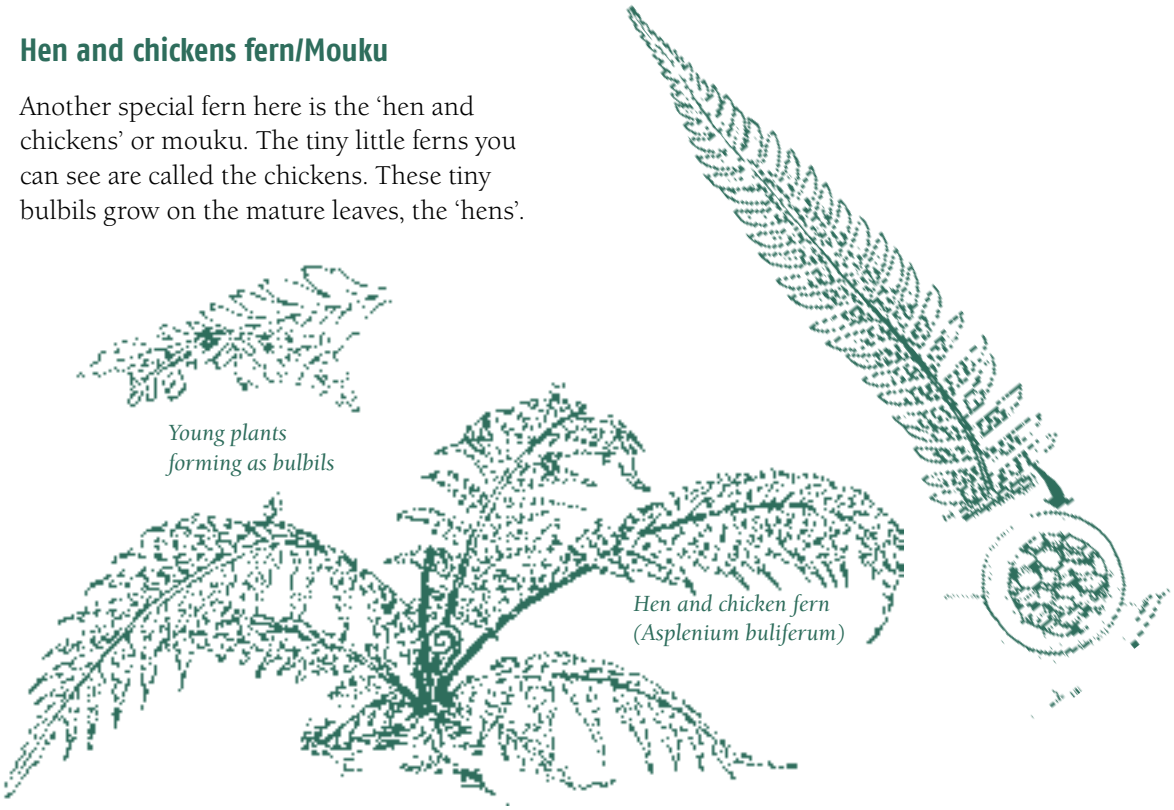
In fine weather, this is a good spot to sit down and chat, to watch for birds and to take in the surrounding kauri, tree ferns and other native plants.

To do

Rest and relax on the lawn. See if you can find the very young rimu and the young kauri.

What's next?

At Post 12, you'll see the cone trees, the conifers of the New Zealand forest.



Hen and chicken fern (Asplenium buliferum)

20 Post 12 – Native conifers (cone trees) – Kauri

Head along the path leading to the Information Centre/Te Marae o Tāne. You'll see a grove of native conifers, which were mostly planted about 80 years ago. They include rimu, kahikatea, tōtara and kauri. Conifers produce separate male and female cones on the same tree. They don't have flowers. Conifers are very old trees in evolutionary terms.

Kauri

The kauri is one of the world's largest trees. It's the biggest of the few native New Zealand conifers. It has a trunk that can grow to a massive 11 metres in diameter and it can reach up to 60 metres in height. The largest surviving kauri is Tāne Māhuta in Northland's Waipoua Forest. Kauri are not natural dwellers at Otari – thay have been planted here.

Juvenile kauri

The kauri trees in this conifer grove are still young, but they've been reproducing for some years. They have pollen cones like little fingers and perfectly round seed cones that are like small, green tennis balls. When the seeds are ready to spread, they burst out of the cones with some force – like little shot guns.

The young kauri behind the information panel was planted in 1933 and it will take a few hundred years before it grows into a giant. It can live for many centuries. Some have been estimated to be 2,000 years old.

You'll find the Post 12 sign on the fence opposite the Information Centre/Te Marae o Tāne.

To do

Look for signs of seeds or cones on the ground. Depending on the season, the kauri will be at a different stage of development. Look for green cones on the trees in summer.

What's next?

Reassemble at Te Marae/the Information Centre. After some refreshments, fill in your booklet with notes and sketches from each of the sites you visited on the Nature Trail/ Te Ara o te Ngahere.

Reflect on what you have learnt during your tour. Capture the information you've gleaned by reading, listening, watching, smelling and viewing.

Otari-Wilton's Bush
NATURE TRAIL
Te Ara o te Ngahere

PART THREE
Students' Resources

- Teacher Notes
- *Otari-Wilton's Bush Nature Trail/Te Ara o te Ngahere – My trip*
- *Otari-Wilton's Bush Nature Trail/Te Ara o te Ngahere – Map*

Teacher Notes

There are two booklets in Part Three, Students' Resources:

1. Otari Wilton's Bush Nature Trail/Te Ara o te Ngahere – My trip
2. Otari Wilton's Bush Nature Trail/Te Ara o te Ngahere – Map

They are designed for students to use during their trip to Otari. Print out enough copies of the map for the group leaders.

We suggest that you give out *My trip* booklets after the initial walk. That way, students will be able to focus on their experience in the surrounding forest and only later record their observations.

Did you know?

1. Otari-Wilton's Bush contains the biggest and oldest original forest in Wellington City.
2. Job Wilton fenced off seven hectares of native forest in 1860.
3. Parts of the forest have regenerated in this area. Most of the forest you see at Otari-Wilton's Bush has been regenerating for more than 100 years.
4. Otari-Wilton's Bush has the largest collection of New Zealand plants in the world – over 1,200 different species.
5. Nearly half of New Zealand's 'at risk' species are growing here.
6. Nowadays, because of the vigilance of staff and volunteers here, you'll only occasionally find a possum.
7. You can plant native trees in your area. See the Planting Natives brochure at **Wellington.govt.nz/services/prksgrdnsserv/pdfs/planting-natives.pdf**
8. We now have over 50 environmental community groups in Wellington City. You can contact one of them for either information or assistance on the City Council website: **Wellington.govt.nz/services/resbelt/volunteers/groups.html**

Fold here

Otari-Wilton's Bush

NATURE TRAIL

Te Ara o te Ngahere

My trip

Name _____

School _____

Date _____

THE BOTANIC GARDENS OF WELLINGTON
Otari-Wilton's Bush

Absolutely POSITIVELY Wellington
Me Heke ki Pōneke
Wellington City Council

Site number: _____ *Topic:* _____

My observation:

Site number: _____ *Topic:* _____

My observation:

Site number: _____ *Topic:* _____

My observation:

Site number: _____ *Topic:* _____

My observation:

Otari-Wilton's Bush Nature Trail
Te Ara o te Ngahere

1. Entrance - Waharoa (carved gateway) and map
2. Information Centre/Te Marae o Tāne
3. Post 1 Canopy Walkway – Karaka
4. Post 2 Canopy Walkway – Rewarewa and Tawa
5. Post 3 Canopy Walkway – Rimu and Northern Rātā
6. Post 4 Waharoa and Lancewood/Horoeka
7. Cockayne Lawn - Ngaio, Dr Leonard Cockayne and forest lookout
8. Goliath Harakeke/Flax
9. Post 5 Kānuka
10. Post 6 Hīnau with epiphytes
11. Post 7 Stream and tree ferns
12. Post 8 400-year-old Rimu
13. Post 9 Rangiora
14. Wilton's Bush Viewing Platform
15. Nīkau Palm
16. Post 10 Northern Rātā
17. Post 11 Kawakawa
18. Fernery Boardwalk
19. The Fernery and Kauri Lawn
20. Post 12 Native conifers (cone trees)

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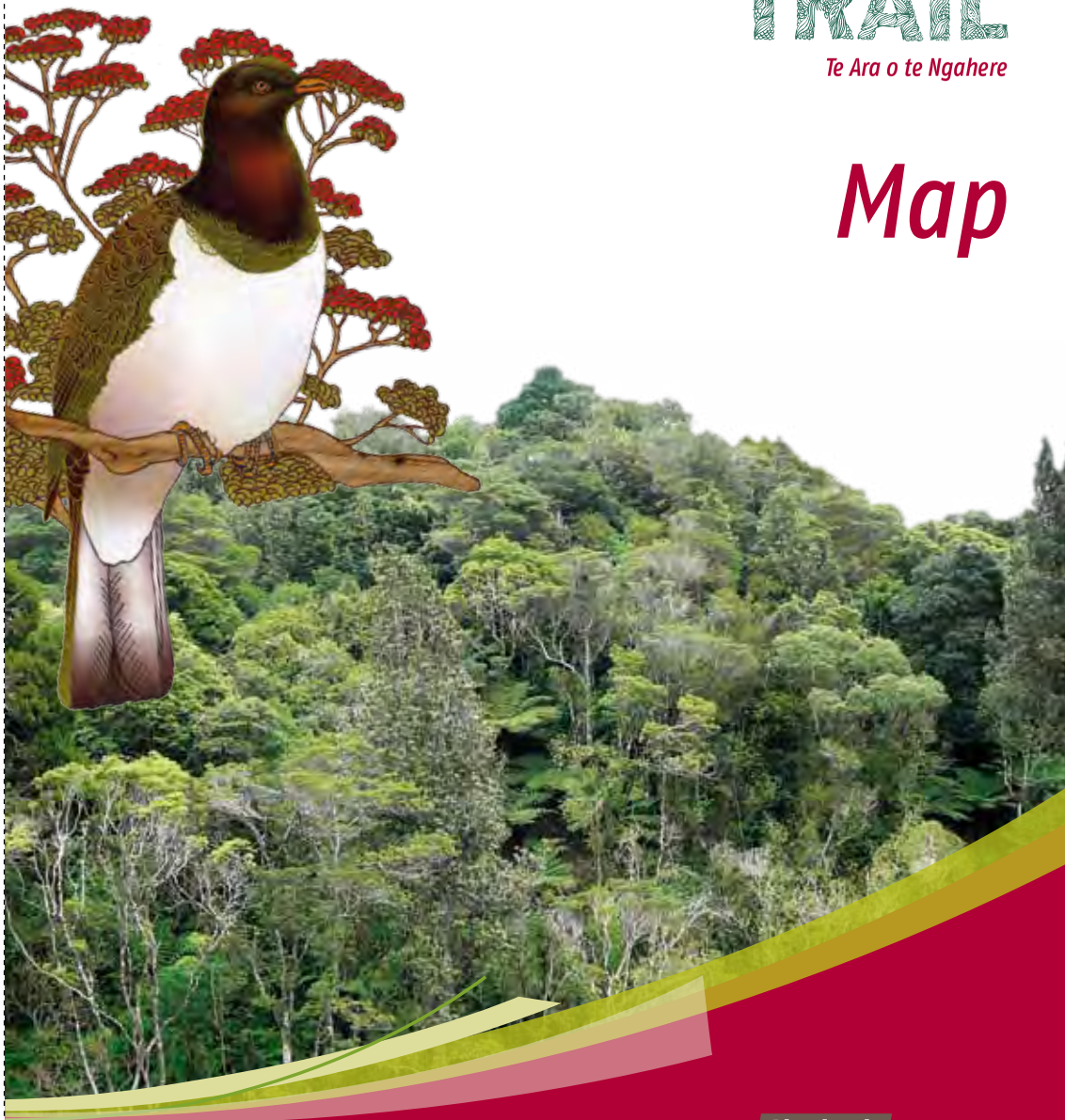
Otari-Wilton's Bush

NATURE TRAIL

Te Ara o te Ngahere

Map



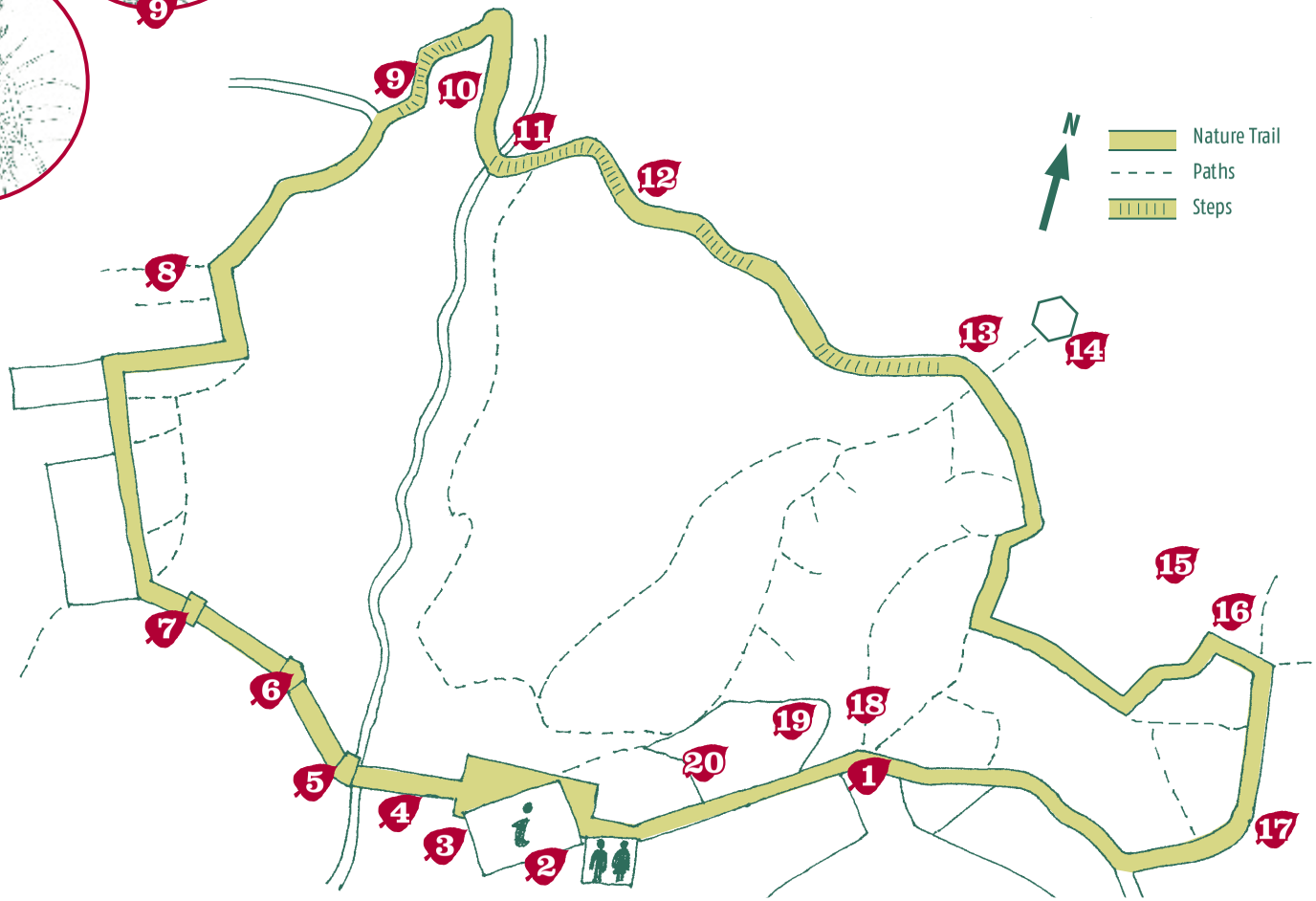
THE BOTANIC GARDENS OF WELLINGTON
Otari-Wilton's Bush

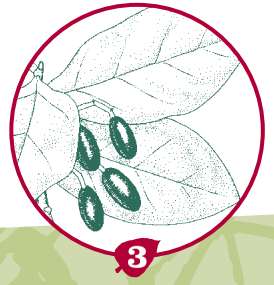
Absolutely POSITIVELY Wellington
Me Heke Ki Pōneke
Wellington City Council

Otari-Wilton's Bush

NATURE TRAIL

Te Ara o te Ngahere





Otari-Wilton's Bush
NATURE TRAIL
Te Ara o te Ngahere

PART FOUR – Post-trip Activities

To the teacher

For post-trip activities, focus on students participating and contributing, sharing their findings, discussing what actions to take and then taking action. Encourage your students to further develop their expertise in particular facets of the bush. Encourage the notion of the students as the 'go to' people for their chosen aspect of the bush. Bind the groups of experts and the topics together with a class-based presentation. Encourage students to describe the ways in which all things are connected - how each organism depends on its neighbour. Caption photos and display them. Continue to develop a mural on the classroom wall, capturing the ecology of the New Zealand bush. Offer the following ideas as starters for activities:

Descriptive writing

Write descriptively about the scene at Otari. You could include the vines, the Wilton story, the colours, the sound of the wind and the birds, the smells and the feelings of being there.

The possum-control debate

Check out YouTube for a story about the success of possum control. Regular possum control has been used once every four years to suppress possums in the Otira Forest in the South Island. Ecologist, Dr Gerry McSweeney, highlights the success of a programme started in the 1960s to protect New Zealand's forests. Discuss the pros and cons of using 1080 to kill possums.

(Teachers should handle this issue sensitively and realistically, based on their understanding of their own class)

Northern Rātā – a strangler or not?

The northern rātā has been described as a strangler. Research ideas on this topic. Present the case for and against the rātā being regarded as a strangler. What can be done nowadays to protect the rimu and the rātā?

The importance of biodiversity

Explore the importance of biodiversity and the contribution that plants such as rimu and rātā make to it. Look at the importance of the shade they provide, the food for birds, the home for insects, how one couldn't grow without the other (hint: the rimu probably has to be 200 years old before the rātā seed will be captured in it.)

Report

Prepare to communicate with your audience. Write a report about your trip and the special topic you've chosen. Add in photos, images and text. Publish to share the information you've gathered.

Our nature trail

Make a nature trail in your school grounds. Read the school journal about the Enviro-school, Hukanui, to find out how they did it. Think about your trip to the Otari Nature Trail/Te Ara o te Ngahere and identify the key relevant points. What would you include in your school's nature trail?

Being the difference

We all have a role in bringing the bush back to life. All people do. Everything we do has a consequence. So what action will you take? Discuss what you've learnt. What has your experience motivated you to do? What difference can you make? Think about the links or the contacts you can make. What action are you going to take, as a class/ as an individual? Sometimes it can be as simple as letting nature take its course (ake ake tonu). Start thinking about how your class could apply ideas about conservation at school and at home.

Ask, 'What shall we do now?' and 'How can we make a difference in our area?' Put a plan in place to actually make the difference to the environment in your area.

Actions for students

Google for information	Look for more information about your local native plants. What grows in your area?
Tell the stories	Talk about plants and animals to your friends and family – make sure they know as much as you do about how important it is to have lots of plants and animals in our lives
Explore your environment	Be curious – take the time to stop and look at what is growing on plants, how they are growing and what is growing alongside. Which insects are nearby and what birds are around about? Ask questions and seek answers!
Ask an expert	To learn more, contact, e.g., people at Otari-Wilton's Bush, DoC, the zoo, the Regional Council or your library.
Support our birds	Plant native trees for fruit and nectar to support native birds, lizards and insects and encourage their travel around the city. Find out which plants are best for them.
Provide insects	Create micro environments for insects and lizards in the forgotten corners of your garden and school.
Save and spread seedlings	Save those seedlings that pop up in the wrong place – carefully lift them, pot and 'grow them on' – to be planted at your home or school, or by your local community restoration group.
Make compost	Don't throw that food or plant away – turn it into compost. It can be as easy or complicated as you like. It's all good for improving the health of soil communities.
Spread seeds	Got some native plant seeds? When they are either ripe or dry, gather them up, put them in a bag and label them, saying where they have come from. Give them to your school or a community restoration group. Remember to leave enough on or around the tree for your own seedlings to grow. Remember to leave them alone in native reserves as they are needed there and it is illegal to take them!
Join an environmental organisation	Join an organisation such as the Junior Forest and Bird – the Kiwi Conservation Club (www.forestandbird.org.nz). Your family could look into joining the NZ Plant Conservation Network (www.NZPCN.org.nz), Greenpeace or WWF.
Enjoy your environment and appreciate your efforts	Sit outside and look at the trees, listen to the birds and the cicadas, look out for the lizards and insects. Think how lucky you are and appreciate all the things that you and others have done to make this a better world by protecting the environment.

Resources

Books

John Dawson & Rob Lucas, *Nature Guide to the New Zealand Forest.* A Godwit book, published by Random House, Auckland, 2000.

Janet Hunt & Rob Lucas, *From Weta to Kauri – A Guide to the New Zealand Forest*, Random House, Auckland, 2004.

Ministry of Education, *Plant Life Histories*, Building science concepts series, Book 26, Learning Media, Wellington, 2001.

Ministry of Education, *Making better sense of the living world, levels 1-4*, 2001.

(Information on Darwinian Evolution, p20; The Modern Theory of Evolution, p.21; Biodiversity, p.21; Parts of a flower and pollination, p.82.)

National Library

You can order books for your classroom from the National Library. There is an online request form. They offer a very good selection on native trees, conservation and ecology.
www.schools.natlib.govt.nz
www.natlib.govt.nz/students

School journals

McGuinness, Jan, *Eating pikopiko*, Article, reading age 9-10 years, Part 02, No. 2, 1990.

Buchler, Marie, *Grow your own ferns*, Article, Part CN, No. 3, 2002.

Alchin, Rupert, *The world of ferns.* Article, Part CN, No. 3, 2002.

Robinson, Melodie, *Black fern*, Article, Reading age 11-13 years, Part 04, No. 1, 2003.

Anderson, K.E., *Seeds*, Connected 1, 1999.

Find journals at Learning Media's catalogue of the school journals:
www.journalsurf.learningmedia.co.nz

Websites

For a historical outline of Otari in the *Otari-Wilton's Bush Management Plan:* 2.2.1 see:
www.wellington.govt.nz/plans/policies/otari

www.kennett.co.nz/otariwiltonsbush

www.bushmansfriend.co.nz

www.hikingnewzealand.com/new-zealand-natural-history

www.wellington.govt.nz/services/heritage/trails

www.teara.govt.nz/TheBush/UsesOfTheBush

www.tiritirimatangi.org.nz

www.landcareresearch.co.nz

www.doc.govt.nz

www.forest-bird.org.nz

www.nzpcn.org.nz

Student activities resource

Ministry of Education, *Making better sense of the living world, levels 1-4*, Learning Media, Wellington, 2001.

1. What are plants? (p.30)
2. What makes a tree a tree? (p.31)
3. Wanted poster (p.31)
4. Sorting leaves (p.33)
5. Changing trees (p.33)
6. Imitating winter (p.34)
7. All kinds of birds (p.47)
8. All about beaks (p.48)
9. Home sweet home (birds) (p.52)
10. Observing plants (p.54)
11. Colourful flowers (p.55)
12. Wandering water (p.56)
13. Meandering plants (p.57)
14. Roving roots (p.57)
15. Designer label (p.58)
16. Water supporter (p.63)
17. Sprouting vegetables (p.83)
18. More of the same (p.84)
19. A contract with a plant (p.119)
20. Focus on flowers (p.85)
21. All about pollination (p.86)
22. Seed search (p.87)
23. Plant survival game (p.89)
24. Mosses and ferns (p.106)
25. Where do mosses and ferns grow? (p.108)
26. Growing ferns (p.109)