

# 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 Ara 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 (tūi 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, tūi 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 tūi 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/tūairaka or piwakawaka, morepork/rūrū, kererū, kingfisher/kōtare, paradise shelduck, waxeye/tauhou and shining cuckoo/pīpīwharau. 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 tūi 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, tūi 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.

