

Pukemokemoke
 **Bush**
Learning Resource
for Primary School teachers

**Produced by Robin Irving for the David Johnstone
Pukemokemoke Bush Trust
With support from the Perry Foundation**

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Further copies of this booklet may be obtained from the Trust,
C/- Guardian Trust, P.O. Box 1375, Hamilton.



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Foreword

The Pukemokemoke bush reserve is an outstanding 40ha remnant of lowland native forest that was gifted to the nation by David Johnstone on his death in 1990. The reserve is administered by a trust with representation from The David Johnstone parent Trust, University, iwi, and from the friends of Pukemokemoke. A manager appointed by the Trust, currently Alan Leadley, supervises volunteers and the “Friends” in the detailed work of restoring and managing the reserve.

The “Friends of Pukemokemoke” are volunteers who pay a small annual subscription for the privilege of participating in the care and management of the Reserve. They assist in various tasks which enhance and develop the bush reserve (such as building projects, track maintenance, weed control and planting). Members of the local Tauhei marae have a strong and ancient affinity for the bush which is very much part of their history. Two of their Kaumatua, George Hopa and Jim Pene, have worked to preserve and enrich the reserve since its inception and the present richness of the bush owes a lot to their interest and hard work.

The Objectives of the David Johnstone Pukemokemoke Bush Trust are:

- To protect and preserve indigenous flora, fauna, ecological associations and the natural features, landscape, scenic and other intrinsic qualities of the reserve.
- To preserve any historic, archaeological, biological or other scientific features present in the reserve.
- To allow, and where necessary facilitate, controlled public use of the reserve within a level which can be sustained without irreversible harm or damage to the natural resource.
- To manage the reserve in perpetuity as a scenic reserve for the physical, mental and spiritual welfare, recreation, education and enjoyment of the public.

David Johnstone was most concerned for the future of young people and he saw education as a critical part of his bequest both in the parent Trust and in the Bush Trust. To this end the Trust obtained a grant from the Perry Foundation and commissioned Robyn Irving of Lifestyle Plantations to prepare this learning resource for primary school teachers to facilitate curriculum based learning experiences in the reserve. The Trust is grateful to Robyn for the way in which she has collated and prepared the material and for her personal commitment to this task. We believe this resource will greatly facilitate the teaching and learning experience and we encourage teachers and students, with the help of this resource, to value and make use of this outstanding remnant of our natural heritage.

WARWICK SILVESTER

Chair David Johnstone Pukemokemoke Bush Trust.

August 2010



Introduction

The David Johnstone Pukemokemoke Bush Trust members commissioned the development of this resource in response to a desire to develop the outdoor experience and learning opportunities for students visiting Pukemokemoke. It is hoped that by providing a teaching and learning guide specific to this site, teachers will be encouraged to take groups of students out into this very special lowland forest remnant. These experiences will help young people gain an appreciation of the complexities of a forest ecosystem and the diversity of values (ecological, scientific, social, cultural, and historical) that such natural remnants hold.

Pukemokemoke has a depth of history surrounding it. It is a prominent land mass rising above lowland swamps. Ngati Koura and Ngati Wairere people have had both a spiritual and practical association with the hill for centuries. The indigenous people of New Zealand see land as part of their very existence and as part of their identity. They believe the land is bound to the people, the people are part of the land, and the land is their mother, Papatuanuku.

Over the years many people have been associated with Pukemokemoke. During the development of this resource I have had the pleasure of working with a number of people who hold this forest cloaked hill in wonder. Thank you to Alan Leadley, Warwick Silvester, Jock Crawford, George Hopa, Jim Pene and Poppy Lakeman Fraser. Your passion for Pukemokemoke, enthusiasm and desire to nurture this forest for the benefit of people now and in the future is inspirational.

These people and others like them who give their time generously and share their knowledge are the role models for our young people.

This resource is designed to support learning at primary school level but essentially requires committed teachers and educators who are prepared to provide a quality outdoor experience for our young people. Above all have fun!

This resource is not definitive and therefore should not stand alone. It is informed by a number of valuable online references (see the body of the document) as well as resources listed in the references.

This resource was made possible with funds from the Perry Foundation.

ROBYN IRVING
Lifestyle Plantations



Curriculum Links:

Values and Key Competencies:

Learning experiences using the context of Pukemokemoke can encourage students to value and respect innovation, inquiry and curiosity, diversity, and ecological sustainability, and will help foster the key competencies identified in the New Zealand Curriculum (Thinking, Using Language, symbols and texts, Managing self, Relating to others and Participating and contributing).

Learning Areas:

(i) Science (levels 2 & 3)

Nature of Science:

Investigating in science

- Students can carry out investigations using a variety of approaches: observation, classifying and identifying, exploring, data collection and analysis.
- Students can build on prior experiences of forests and the threats to natural ecosystems, working together to share, examine and question.

Communicating in science

- Students can build an awareness and understanding of how different cultures view a local ecosystem.

Participating and contributing

- Students can use their growing science knowledge when considering issues of natural ecosystems, modification and ecological restoration.
- They can explore various aspects of the issues, consider possible alternatives and then develop strategies, make decisions, design, plan and take action.

Living World:

Life processes, Ecology

- Students can experience a local bush reserve where native plants and animals live.
- Students can investigate and observe how living things are suited/ adapted to their particular habitat and how they respond to environmental changes, both natural and human induced. (e.g. explain reasons for the special characteristics of the kawakawa looper caterpillar. Explain differences between the plants that live in the canopy compared to the under-storey. Explain why privet is a successful weed.)
- Students can observe how ecosystems can be affected by human actions (e.g. experience and explore the impact of logging on a forest). Learn how some plants (in particular privet), brought to New Zealand for economic or aesthetic purposes, have become weeds and now threaten the health of our native ecosystems. Learn about the impact of animal pests on Pukemokemoke and how programmes such as Halo are impacting on the pests.

(ii) Social Sciences (levels 2 & 3)

Students can gain an understanding of the cultural and historical significance of Pukemokemoke by:

- Understanding how people make choices to meet their needs and wants (e.g. exploring the different relationships people have had with land and forest over time).



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- Understanding how places influence people and people influence places (e.g. in relation to changing attitudes and values towards natural systems).
- Understanding how the status of Maori as tangata whenua is significant for communities in NZ. (e.g. through learning about how local iwi [Ngati Koura and Ngati Wairere] used and valued and respected the land, plants and animals as a resource).
- Understanding how people view and use places differently (e.g. the different ways that forest remnants are used and managed around the Waikato in the past and now, and how this relates to managing for the future).
- Understand how people participate individually and collectively in response to community challenges (e.g. learning about the different approaches that individuals and groups take to restore Pukemokemoke and how we can collectively and individually contribute).

Success Criteria:

In the initial stages of the learning focus the teacher will discuss the learning intentions with the students and together agree on appropriate success criteria. This could include:

- Creation of a model pa
- Group participation in an action for the bush reserve such as weeding or planting.
- Creative writing
- Development of identification guides
- Contribution to a group poster on Pukemokemoke.

Resource Framework:

This resource has been put together in a way that teachers and students can choose particular *Leaves* to weave a co-constructed programme together. Each *Leaf* has elements of pre-visit, visit and post visit as well as suggested outcomes. The *Leaves* could stand alone but if woven together are more likely to develop a deeper understanding of the interconnectedness of the environment and the role that people play in this.

These *Leaves* are preceded by a *Branch* on which these can be hung. The *Branch* introduces the site, explores the history, develops knowledge of Pukemokemoke and other forest fragments and then develops some understandings around loss of biodiversity and the interconnectedness of people and nature.

This integrated, inquiry approach to knowledge about Pukemokemoke will support students building on existing knowledge and learning and experiencing new things. Students will be encouraged to use these skills and knowledge to help make decisions about action then critically reflect on their achievements. There are opportunities for students to work in groups and individually.



The Branch

This section of the resource covers the over-arching concepts of learning about forest fragments. It provides a scaffold (branch) on which to hang the activities and experiences (leaves).

Introducing the site:

The bush reserve is a small (40 ha) remnant of lowland forest that once covered much of the North Island. It was given to the nation by David Johnstone, former main shareholder of Orini Downs Station, of which it used to be a part. Mr Johnstone wished that young people could see and enjoy the forest that used to be part of his childhood. The Reserve is now administered by the David Johnstone Pukemokemoke Bush Trust.

Activities:

Introduce the study site and ask students if anyone knows anything about it. Who has been there before? What is there? Who looks after it? Use a topography map or satellite image to locate the Pukemokemoke Bush Reserve off the Tauhei – Whitikahu Road. Relate the site to distance from school and other well known sites. How far is the reserve by road from school? Which is the best route? Estimate how long it will take to get there.

Key Concepts:

People make decisions based on their needs and wants.

A *need* is something you *have* to have, something you can't do without. A good example is food. If you don't eat, you won't survive for long. Many people have gone days without eating, but they eventually ate a lot of food. You might not need a whole lot of food, but you do need to eat.

A *want* is something you *would like* to have. It is not absolutely necessary for survival, but it would be a good thing to have. A good example is music. You might argue that music is a *need* because you think you can't do without it. But you don't need music to survive.

Some categories have both needs and wants. For instance, food could be a need or a want, depending on the type of food.

<http://www.socialstudiesforkids.com/articles/economics/wantsandneeds2.htm>

<http://www.lessonplanspage.com/SSOWantsAndNeeds-WithMagazinePics12.htm#>

http://www.learnnc.org/lp/pages/3244_9



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Activities:

Decisions about land use are made on both needs and wants. Consider the Pukemokemoke historical time line provided below and discuss this in relation to the needs and wants that people may have had at particular times in history. Think about the living conditions of the time, how technology or lack of it played a part, the social and economic environment of the time. Compare the possible needs and wants of the early Maori compared to those involved in the flax milling industry in the 1910s. <http://www.teara.govt.nz/en/flax-and-flaxworking/4>

Compare the lifestyle of early farmers to those of today.

History:

1600s: The lands of Tauhei and Whitiakahu became the lands of Ngati Koura and Ngati Wairere Waikai and their sub-tribes.

1600s The whole area around Pukemokemoke hill was swamp land and a rich provider of food and other resources for Maori.

1700s: Wars were commonplace between the Hauraki people and Ngati Wairere where the Piako River was often disputed over eel fishing rights.

1769: With the arrival of Captain Cook, Paramount chief of Ngati Wairere named Wharekoata was the first to introduce potato seeds to Ngati Hako who lived along the banks of the Waihou River.

1860s: During the land wars, Ngati Wairere and Ngati Koura were forced to retreat from their Waikato river pa dwellings to Hukanui and Tauhei and land confiscated.

1870s The NZ Government offered large areas of confiscated land for sale.

1873: After long negotiations led by Te Pirihi Tomonui the Tauhei Block of 1604 acres was returned to the hapu.

1880s: The original wharenuui was built at Tauhei marae and named Maramatutahi.

1880s: With the return of land the Maori enthusiastically farmed the land and grew wheat, maize, potatoes and raised pigs and horses.

1885: The NZ Land Association purchased the Woodlands Estate of about 22,000 acres.

1890: The first flaxmill in the area was erected and operated by Mr S Parlour on what is now the boundary between the Pukemokemoke Reserve and the Tauhei quarry, on the Mangatea Stream.

1908: Fred Seifert owned and operated a flax mill near the same site until a disastrous fire in the autumn of 1908 burnt out hundreds of acres of standing flax and the mill was forced to close.

1900s NZ Land Association was forced to subdivide and sell off smaller blocks.

1913: 'Orini Downs' including the Pukemokemoke hill was purchased by J Lowes.

1918: The demand for rope continued and the Waikato Flax Milling Co Ltd was formed.



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A mill driven by a large water wheel was again sited on the banks of the Mangatea Stream just in front of the eastern face of the quarry.

1920: The land was purchased by R Peacock and W Ellingham who continued developing it for farming.

1923: Botanist Carse (DSIR) recognised the rich diversity of forest types.

1930's: The stream was widened and deepened with the use of a dragline.

1940s: The Roose Shipping Coy, under the control of Mr Caesar Roose, logged the southern slopes of Pukemokemoke, taking out mainly kauri, totara, rimu and kahikatea.

1949: W and Zoe (Shona) Ellingham, F Winstone and W Kendon purchased the land.

1950's: The Tauhei Marae was established on two acres of land near the Pukemokemoke Reserve.

1950's (and thereafter annually) the stream was again dug out. In addition to this, the chemicals from sawmilling operations led to the eels gradually disappearing.

1960: The land passed into the ownership of Zoe Ellingham, W Kendon and H Brookbanks, then Dean Ellingham in 1961.

1969: Vern Miller and T Maxwell took over the farm.

1973: The farm was formed into Orini Downs Ltd. David Johnstone was a major shareholder. This farm included the land now known as the Pukemokemoke Bush Reserve and stocked mainly cattle.

1988-1989: Landcorp planted the pine trees on Pukemokemoke northern slopes.

1988: Waikato Botanical Society made a comprehensive report on the diversity of Pukemokemoke bush – 381 plant species and 10 hybrid plants were counted.

1990: David Johnstone Charitable Trust recognised, on his death, the wish of Mr Johnstone to protect the bush and purchased the interests of the bush reserve land.

1993: The lookout was built at the Tauhei Marae and lifted by helicopter onto the top of the hill.

1995: Waikato District Council placed a conservation covenant under the Reserves Act on the title to protect the bush.

1997: Ownership of the reserve was transferred to the David Johnstone Pukemokemoke Bush Trust.

2003: Tanlaw Corporation Limited purchased, from Waikato District Council, the Tauhei Quarry in 2003 and entered into a joint venture with Perry Aggregates Limited in 2005/06.

2004: Bush declared a Key Ecological Site by Environment Waikato.

August 2009: Project Halo (pest eradication) by Environment Waikato is launched.

April 2010: Learning Resource created.



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There has been a loss of biodiversity:

The biodiversity of the Waikato has decreased as a result of land clearance and only a small percentage of original land cover now remains. There are only remnants of once vast areas of lowland forest left in the Waikato of which the David Johnstone Pukemokemoke Bush Reserve is one.

Hamilton Ecological District Vegetation Types. (Clarkson et al)

http://cber.bio.waikato.ac.nz/PDFs/CBER_58_Hamiltonbasincomposition2007.pdf

“Indigenous vegetation in the Hamilton Ecological District has been severely depleted. A 1995 report (Leathwick et al.) calculated that less than 2% of all indigenous ecosystems remain within the Hamilton ED”

(To see Ecological District boundaries visit http://www.waikatobiodiversity.org.nz/sites/waikatobiodiversity/images/region_map.gif)

“The Pukemokemoke reserve is a small example of lowland forest that once occupied the whole of the Waikato basin. This forest was dominated by large podocarps rimu, kahikatea, matai and totara and by kauri. These were mixed with the common broadleaf species tawa, rewarewa, titoki and pukatea. A rare but interesting association of kauri and beech was found on the hills, but beech is now rare and the last of the hard beech trees at Pukemokemoke died, possibly due to root rot disease, in 2010.

“The understorey was characterised by the presence of shrubs such as mingimingi and prickly mingimingi, and silver fern and wheki tree ferns. In the ground layer sedges, grasses, and ferns such as crown fern and *Doodia media* were common, with occasional kauri grass. This vegetation type is still represented within the Hamilton ED and accessible to the public at Pukemokemoke Reserve, north-east of Gordonton.”

The river flats still support a small amount of modified semi swamp forest with species such as kahikatea and pukatea and there are areas of regenerating scrub and shrublands supporting species such as kanuka, manuka, tanekaha, bracken, akeake, hangehange and kawakawa.

Activities:

Use the Air Zealand Environment trust website to gain an understanding of change over time to New Zealand land cover. <http://airnzenvironmenttrust.org.nz/>

http://www.waikatobiodiversity.org.nz/biodiversity_information/indigenous_ecosystems/wetlands_swamps_and_bogs/

http://www.waikatobiodiversity.org.nz/biodiversity_information/indigenous_ecosystems/native_forest_and_scrub/



Discuss the impact of land clearance on natural biodiversity.

Invite the students to develop some questions that they would like to investigate about native bush, (e.g. What is in a lowland bush? What is its structure? What are the canopy trees? What do they look like? What is their life cycle? What lives in them and around them?).

There is interconnectedness between people and all aspects of the environment.

How we live and the choices we make every day have an effect on the environment. How we travel to school, what we eat and the way we manage our waste all have an impact on the earth – be it direct or indirect. By experiencing a small, managed forest ecosystem students can gain some understanding of how plants and animals rely on one another. This can lead to an awareness of how people fit into the web of life and how different actions can have a positive or negative effect.

Learning about and visiting local natural fragments and places of significance can help develop a connection with the environment and a sense of responsibility towards the wellbeing of these areas. Learning in, about and for local sites students can develop the capacity to plan and carry out further positive outdoor experiences.

Activities:

Introduce the idea of an ecosystem. An ecosystem is a complete community of living organisms and the nonliving materials of their surroundings. Thus, its components include plants, animals, micro-organisms, soil, rocks and minerals, as well as surrounding water sources and the local atmosphere. A healthy ecosystem relies on all components co-existing in balance. If one part of the ecosystem is damaged or removed it influences everything else.

Introduce the idea of a web of life. Food webs are representations of the predator-prey relationships between species within an ecosystem or habitat. Consider webs of life in a forest. Create simple food chains with New Zealand forest species then try to create more complex webs. How could people play a part in this? How could they upset the balance? How might they help it stay connected? Or re-build damaged ecosystems?

Play the game from the DoC site to learn about and reinforce the interconnectedness of the forest ecosystem and webs within it.

<http://www.doc.govt.nz/getting-involved/forteachers/outdoor-and-classroom-activities/forest-ecosystems/teaching-resource/>

Invite students to develop questions that will encourage enquiry into the ecosystems and webs of life at Pukemokemoke, (e.g. What are the common plants and animals at Pukemokemoke? What is their habitat? What do they need to survive?



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What is their life cycle? What might threaten these species? How are all things in the forest ecosystem connected? What might this mean in terms of forest health and management?).

Consider how children use and value bush. How often do we visit the bush? Mr Johnstone wanted children to enjoy the bush that was important to his childhood. What do you think he did in the bush? What sort of things can you do in the bush? Where can you go to enjoy the bush? Who would you like to take with you?

