

What plants do you know?

A visit to Boundary Stream Mainland Island will be more interesting if you can recognise some of the following plants – tawa, rimu, kahikatea, matai, miro, rewarewa, kamahi, red beech, kowhai, mamaku, kaka beak, mistletoe and neinei.
J.T. Salmon's *Native Trees of New Zealand* is a great place to start.

Introduced mammals

Introduced mammals, both browsers and predators, include deer, pigs, goats, possums, rats, cats, stoats, ferrets, weasels and hedgehogs.



Kaka beak

VEGETATION

Boundary Stream Mainland Island today includes remnants of the ancient forests that escaped burning over the last millennium, together with secondary forests that arose anew after fires ranging from hundreds of years ago to early in the 20th century. By the time Europeans arrived in New Zealand, about 42 percent of Hawke's Bay forests had been destroyed by fire. Captain James Cook, in his journals, recorded the fires he observed as he sailed down the East Coast of the North Island.

The Heretaunga Plains were an expanse of native grasses. Luxuriant forests grew south of Waipawa. To the north, the hillsides around Lake Tutira were covered in bracken fern with native trees in scattered gullies and gorges.

It appears that the lowland forests were destroyed by winds and subsequently burned by lightning strikes. These fires may have started in the mountain ranges, burning eastwards into drier podocarp stands. Maori and European settlement intensified this destruction. Today only 18 percent of Hawke's Bay is still in native forest. Only one percent of Hawke's Bay can be classified as lowland indigenous forest.

Boundary Stream Scenic Reserve now has at least 12 distinct vegetation types and over 220 species of native plants. The distribution of vegetation, which ranges from lowland podocarps to montane forest, is affected by altitude, rainfall, climatic zones and physical features. For instance:

- mountain holly forest (*Olearia ilicifolia*) dominates the crest of the range
- a mix of rewarewa, kamahi, kanuka and beech dominates on drier ridges and terraces
- maire, tawa, tree fern and podocarp forest (kahikatea, totara and matai) dominate within the wetter regions
- an abundance of kowhai adorns numerous cliff faces in spring.

Although much of the bush has been modified by man over the past 200 years, some intact areas of podocarp remain.

Introduced mammals have had a devastating effect on native forests and wildlife throughout New Zealand. However, intensive efforts to reduce their effects by poisoning, trapping, hunting and fencing are ongoing within and around the Boundary Stream reserve. Pest control programmes have reduced possums and goats to the extent that the forest is now showing signs of recovery. Seedlings and trees are no longer browsed as they had been previously.

Kaka beak

- were cultivated widely by Maori, and in the gardens of European colonists from 1834
- Popular with gardeners, extensively cultivated with a number of hybrid varieties commercially available
- grow on sunny, north-facing bluffs and cliffs, along lake or river margins, or on hillsides in scrub communities
 - produce many seeds but poor methods of dispersal limit their spread. Seed can remain dormant within soil for many years before germination
 - are relatively short-lived – between 8-12 years.

Mistletoe

- New Zealand mistletoes:
- are "hemiparasitic", taking water and minerals from their hosts. They can synthesise most of their carbohydrates independently
 - include two groups – the bird-pollinated and insect-pollinated species
 - are all endangered.



Alepis flavida

THREATENED PLANTS

Three species of threatened plant species are found within Boundary Stream Mainland Island – kaka beak, yellow-flowered mistletoe and neinei.

Kaka beak *Clianthus puniceus s.l.* Kowhai ngutukaka

At Boundary Stream Mainland Island:

- original surviving plants found in 1995 – a single plant on the western flanks of Maungaharuru Range and another at the top of Shine Falls. The Shine Falls plant died soon after being found but another was discovered nearby a short time later
- about 100 kaka beak were planted in the reserve, propagated from the original wild parent plant
- Boundary Stream (Shine Falls) kaka beak exhibits a distinctive pink flower, as opposed to the usual scarlet red seen in other wild plants
- southern-most wild specimens in New Zealand. Closest other populations in Te Urewera National Park and on the East Coast between Anaura Bay and Te Araroa
- wild kaka beak populations have been threatened by the combined effects of loss of habitat, browsing by deer, goats and domestic stock plus the need for open sites for plants to grow
- seeds are gathered and propagated for future plantings, cuttings are propagated and branches are bent and staked to the ground so roots are sent out to form new plants.

Yellow-flowered mistletoe *Alepis flavida*

At Boundary Stream, yellow-flowered mistletoe:

- are found only on black beech (*Nothofagus solandri*)
- have increased from three known plants in 1996 to 50 known plants in 2001 after further searches and possibly recovery
- need adequate light for successful establishment
- is bird-pollinated and hermaphroditic – they have female and male reproductive parts within an individual flower
- need birds to find and eat the mistletoe fruits, then deposit seeds on other suitable host trees
- have a slow rate of seedling establishment and high mortality rate in first few months
 - may be six to eight years old before flowering begins
 - contain large quantities of nectar
 - have adapted for bird pollination. "Explosive" flowers open when touched by birds
 - is easily found when in flower by looking high in the canopy of beech trees (or on the ground beneath) during January and February for the bright yellow blossom. On the branches of the beech tree, the mistletoe appears as a large bushy mass of leaves which are larger than the leaves of the host tree.



Neinei (*Dracophyllum latifolium*)

Neinei *Dracophyllum latifolium*

Although neinei are not a threatened species, Boundary Stream's solitary specimen:

- is at the southern limit for this species, which naturally occurs between Mangonui south to North Taranaki and Mahia Peninsula
- can be seen on the Interpretation Nature Walk and is surrounded by a 2m tall fence to protect it from deer, goat and pig browsing. The fence is an extra security measure to complement ground-based hunting
- is highly susceptible, as a species, to browsing by goats.

Dracophyllum:

- is a genus of 35 species, 12 of which form small trees up to 10m.

Adaptation to moa-grazing?

Look out in the Interpretation Nature Walk for pokaka (*Elaeocarpus hookerianus*) and lancewood (*Pseudopanax crassifolium*), growing quite closely to each other. Both have distinct juvenile and mature forms.

During its lengthy juvenile stage, the somewhat tortuous, interlaced branchlets of the pokaka bear leaves of various shapes and sizes. Finally the tree reaches a height of up to 14 metres with leathery leaves. Maori made use of the tough flexible wood for fish hooks.

In its juvenile state, the lancewood looks like a half-closed umbrella, because of the way the rigid leaves surround the top of the tree and bend downwards. The leaves are at least a foot long, very narrow, leathery with distinct marginal teeth.

The lancewood goes through many changes until, after 15 to 20 years, it reaches maturity and looks more like a conventional forest tree.

One popular theory is that the juvenile forms of these plants, and many of the divaricating (many branching) shrubs, are an adaptation to moa-grazing. It is claimed that moa munching native plants over tens of thousands of years caused many to become twiggy shrubs less suited to moa grazing.

Some of the small-leaved divaricate plants, such as ribbonwood and kowhai, change form as they mature, starting life with tough, shrubby divaricate growth and then swapping it to straighter branches and bigger leaves when they reach about 2.5m in height. The very strong branches and small leaves are believed to be defences against browsing moa. It is believed the birds fed by plucking or stripping leaves and clamping and tugging shoots.

The thin, convoluted branches also created a zig-zag pattern that produced a spring-like recoil when tugged. All of these features reduced the moa's ability to remove plant material. The larger leaves and easier-to-snap branches appeared from about 2.5m up the tree, above the reach of most browsing moa.

Another theory, linked to climate, is broadly based around the divaricating habit being an ice age adaption for plant growth in associated cold conditions – the interlaced network of branches and leaves reducing airflow around the inner plant leaf surfaces, creating a microclimate of warmer temperature and higher plant productivity.

Goat control

In the first three years of the Mainland Island project, about 2000 goats were shot in and around the reserve

Why are they growing there?

Look into why particular species are found in specific localities or habitats. Check out the Native Forests section in the Science activities.

Dracophyllum

Is a Dracophyllum a type of dragon?