

Podocarpus laetus (*P. hallii*)

Prumnopitys taxifolia
(*Podocarpus spicatus*)

Podocarpus totara

TREES & SHRUBS

Aristotelia fruticosa

Beilschmiedia tawa

Carmichaelia flagellifera

Carpodetus serratus

Coprosma dumosa (*C. "tayloriae"*)

Coprosma propinqua

Corokia cotoneaster

Elaeocarpus hookerianus

Gaultheria antipoda

Griselinia littoralis

Hebe stricta var. *stricta*

Hoheria sexstylosa

Kunzea sp. (*Leptospermum*
ericoides – see Note 3)

Leptecophylla juniperina
(*Cyathodes juniperina*)

Leptospermum scoparium

Leucopogon fasciculatus
(*Cyathodes fasciculata*)

Leucopogon fraseri (*Cyathodes*
fraseri)

Melicope simplex

Neomyrtus pedunculatus

Nestegis lanceolata
[I have no record of *N. cunninghamii*]

Olearia virgata

Pennantia corymbosa

Raukaua anomalus (*Pseudopanax*
anomalus)

Pseudopanax crassifolius

Pseudowintera colorata

LIANES

Clematis forsteri

Muehlenbeckia australis

Parsonsia capsularis

Rubus cissoides

Rubus schmidelioides

DICOT HERBS

Acaena anserinifolia

Cardamine sp.

Euchiton audax

Geranium potentilloides

Geranium brevicaule

Gonocarpus micranthus

Lagenophora pumila

Myosotis sp. (rare, *M. forsteri*?)

Pimelea prostrata

Viola filicaulis

MONOCOTS

Astelia fragrans

Astelia grandis

Carex breviculmis

Carex dissita

Carex ?erythrovaginata (*Uncinia*
?laxiflora)

Carex horizontalis (*Uncinia rupestris*)

Carex (*Uncinia*) *uncinata*

Carex sp. (*C. solandri* or *C. testacea*?)

Cordyline australis

Austroderia fulvida (*Cortaderia fulvida*)

Dianella nigra

Festuca or *Poa* sp.
[presumably, *Poa cita*]

Hierochloa redolens

Juncus edgarae

Juncus planifolius

Lemna minor

Luzula sp. [*L. picta* var. *picta*?]

Microlaena avenacea

Poa anceps

Flora of the Tapuwae Forest Blocks, Hokianga, Northland

Marley Ford

Introduction

Tapuwae was the customary land (whenua) occupied by the Ngāti Here and Ngāi Tūpoto hapu of Te Rarawa. The approximately 2,000 ha on the north side of the Hokianga Harbour, surrounding the Tapuwae River, was named after an ancestor, Tuwhakararo, who was renowned for his running ability, hence the full name Te Tapuwae o Tuwhakararo: the resounding footsteps of Tuwhakararo.

The bush-clad whenua was used to graze cattle for the benefit of the hapū. Many Ngāi Tūpoto whanau lived on the land, particularly in the summer due to a reliable water supply. In 1911 the Tāi Tokerau Maori Land Board, which had been given authority over all Maori lands in the north at that time, leased the land out for 50 years. The lease changed hands several times and was eventually abandoned in 1959. For

the next 23 years it was run by the Maori Affairs Department under their development scheme, which had poor outcomes for the land and hapu – considerable debt was accumulated despite the buoyant farming climate at the time (Henwood, W, pers. comm.). This was the catalyst for a small group of shareholders to assert rangatiratanga over the whenua and regain control; in 1979 the Tapuwae 1B & 4 Incorporation was set up to govern the block, and in 1982 the land was returned to the hapu. The returned property was in a dismal state requiring the Management Committee to start from the beginning.

Today the focus for this block is to enhance and sustain its people (approximately 1000 shareholders) and the environment, through dry-stock farming, forestry, honey, native nursery and conservation operations. It is committed to kaitiakitanga (guardianship) to protect, restore and enhance the

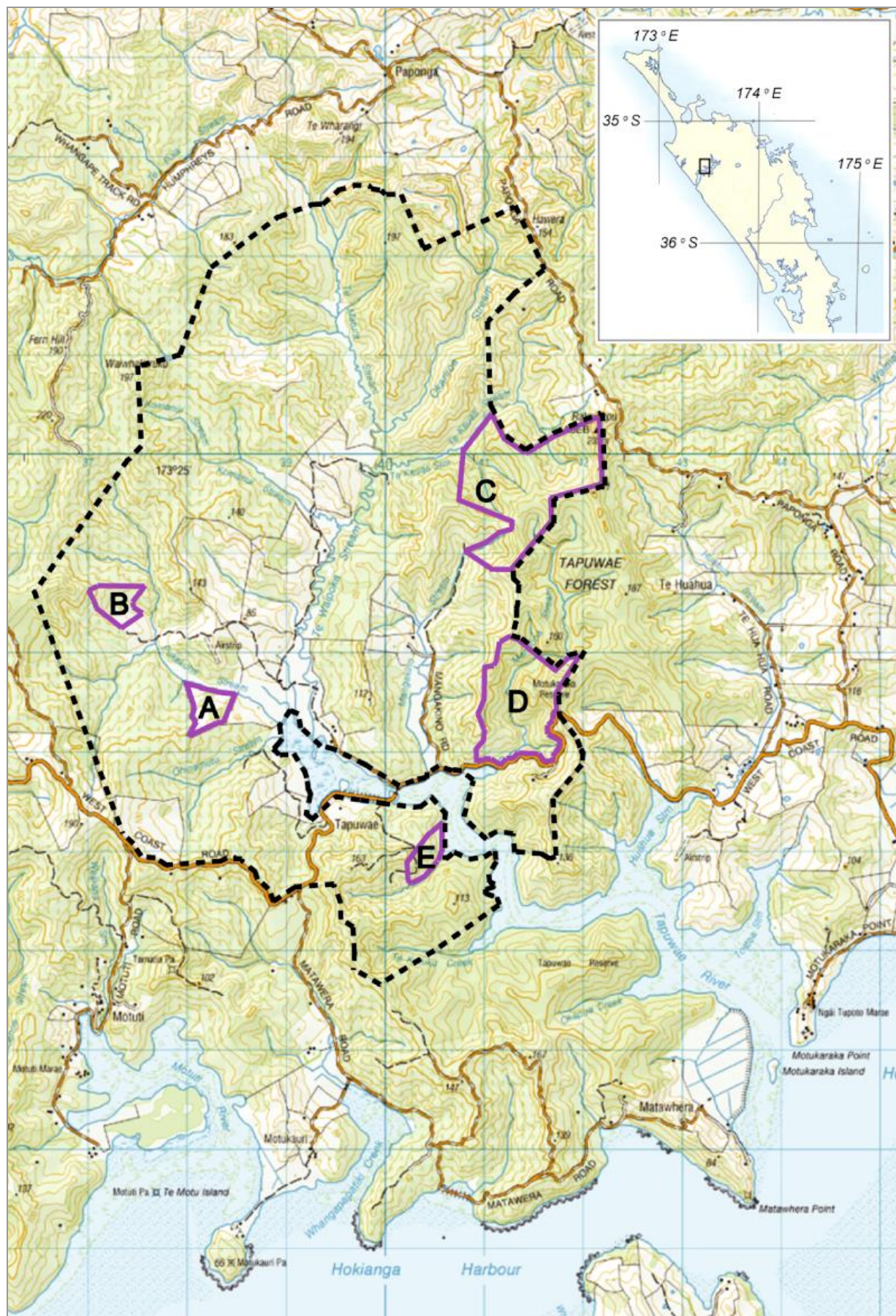


Fig. 1. Te Tapuwae o Tuwhakararo – Tapuwae land outlined with black dashed line. Five survey areas (A – E) outlined in purple (A = Block 1, B = Block 2, C = Mangakino, D = Far Block, E = Starvation Block). Scale = 1 km squares. Inset: Map of Northland. A black box shows the location of Fig.1. Maps produced by Joshua Salter: Fig. 1 from Topo50 map AW27; inset from *New Zealand Atlas*, Government Printer, 1976.

taiao (natural world). This survey of the flora was initiated to identify and document the diversity of species and their status to inform ongoing restoration plans.

The site is composed of dissected hill country forming a catchment that runs down to the Tapuwae River estuary and into Hokianga Harbour (Fig. 1). It is in the Hokianga Ecological District, and has some large remnant stands and areas of regenerating forest, along with large riparian and wetland areas. Of the 2,081 ha that is Tapuwae, 384 ha is of native vegetation. The farm borders the Tapuwae Scenic Reserve (208 ha) (Fig. 1) and Tapuwae Forest and its outliers (1174 ha), both administered by the Department of Conservation. The latter is the second largest forest remnant in the Hokianga Ecological District (Conning et al., 2004), and contains one of the best examples of unmodified old-growth forest remaining in Northland, outside of the large forest tracts such as Waipoua Forest.

The underlying geology of Tapuwae consists of the Mangakahia Complex sandstone and siliceous mudstone (Conning et al., 2004). Motukaraka Scenic Reserve (part of Tapuwae farm, see Fig. 1) is a New Zealand soil site of regional importance as it contains good examples of White Cone soils, an uncommon soil type (Arand et al. 1993). 'Cannonball' concretions, like that of the Koutu boulders, are seen occasionally in the forest remnants of Tapuwae (Fig. 2). They are large spherical concretions, created by cementation of sand and silt by calcite, formed in the Cretaceous micaceous sandstone (Hayward 2014).

Methods

A survey of the flora was carried out at Tapuwae from 21-24 July 2020. The site was traversed on foot, a list of vascular plant species was recorded, vegetation types were mapped, and species and areas suited for revegetation were identified. For surveying purposes, the vegetation was separated into five bush blocks as outlined in Fig. 1 and named Block 1, Block 2, Mangakino, Far Block and Starvation Block. Previous herbarium collections from the area were not included in this work; however, some specimens collected during the survey have been lodged in the Auckland Museum Herbarium.

ECOLOGICAL SURVEY FINDINGS

Overall vegetation

Tapuwae holds a variety of vegetation types. The vegetation from the surrounding reserves have been classed as:

- Tapuwae Forest & Outliers is a broadleaf forest type, the vegetation consisting of nikau (*Rhopalostylis sapida*) – puriri (*Vitex lucens*) –



Fig. 2. 'Cannonball' concretions seen occasionally in forest remnants (21 July 2020). All photos by author unless otherwise stated.



Fig. 3. Block 1 forest margin along cut clay bank of road showing kahikatea and nikau (21 July 2020).



Fig. 4. Weedy forest margin and recent fencing (21 July 2020).



Fig. 5. Block 1 sparse understorey under the canopy of podocarps (21 July 2020).



Fig. 6. Sub-canopy of small leaved coprosma species (21 July 2020).



Fig. 7. Totara and kahikatea forest grading into broadleaf up hillside towards the west (21 July 2020).



Fig. 8. Block 2 margin of broadleaf forest, large puriri with nikau sub-canopy (21 July 2020).

towai (*Pterophylla sylvicola* [as *Weinmannia sylvicola*]) forest (Conning et al., 2004). It also includes old-growth taraire (*Beilschmiedia tarairi*) – towai forest, secondary kanuka (*Kunzea robusta*) / manuka (*Leptospermum scoparium* agg.) – totara (*Podocarpus totara* var. *totara*) forest, and some secondary podocarp forest (kahikatea (*Dacrycarpus dacrydioides*) – totara) (Conning et al., 2004).

- Tapuwae Scenic Reserve consists of kanuka / manuka – tanekaha (*Phyllocladus trichomanoides*) – towai forest and kahikatea–kowhai (*Sophora chathamica*) – puriri forest with frequent kanuka and occasional rewarewa (*Knightia excelsa*) (Conning et al., 2004).
- Kauri forest (*Agathis australis*) is rare in the Hokianga Ecological district, but a few mature forests were seen in the older forest remnants of the Far and Starvation Blocks.

Within Tapuwae ownership there is a mixture of these forest types, explained in detail below.

Block 1 (Fig. 1, A)

Block 1 is a recently fenced-off forest remnant bordering a cut road bank (Figs. 3 & 4). It is a conifer/podocarp forest comprised of a totara and kahikatea canopy with a subcanopy of nikau and ponga (*Cyathea dealbata*). It has an understorey of small-leaved shrubs including twiggy coprosma (*Coprosma rhamnoides*) and a ground cover of akatea (*Metrosideros perforata*) and thread fern (*Icarus filiformis*). Tussocks of Australian sedge (*Carex longibrachiata*) are commonly scattered throughout. Common epiphytes include kahakaha (*Astelia hastata*) and the lichen kohukohu (*Usnea angulata*) on the forest margins. Typical of a grazed forest this remnant has little understorey (Fig. 5) but this will regenerate now that stock is excluded. Trees of interest include a range of small-leaved trees such as poataniwha (*Melicope simplex*), kaikōmako (*Pennantia corymbosa*), tūrepo (*Streblus heterophyllus*) and manakura (*Melicytus micranthus*).

Block 2 (Fig. 1, B)

Block 2 is a good representation of swamp forest grading into steep ridge-top forest. Toward the east of Block 2 is kahikatea-dominated forest, with small-leaved Coprosma species in the subcanopy (Fig. 6) and an understorey of *Carex* sp. and the fern *Deparia petersenii*. Totara forest is seen on the margins with a subcanopy of nikau and tobacco weed (*Solanum mauritianum*). Australian sedge is common with the ground cover basket grass (*Oplismenus hirtellus*) and the exotic creeper *Hydrocotyle bowlesioides*. The podocarp forest grades into a mixed broadleaf forest as it extends up

the hill to the west (Fig. 7). The trees northern rātā (*Metrosideros robusta*), puriri and kahikatea make up the canopy with an understorey of nikau and basket grass covering the ground (Fig. 8). Towards the far west of Block 2 the forest climbs a steep bank dominated by taraire and kohekohe (*Dysoxylum spectabile*) with an understorey of nikau, coprosma and taurepo (*Rhabdothamnus solandri*) and ferns including *Austroblechnum membranaceum*. Astelias are a common epiphyte throughout. Large mature trees seen in this remnant are mostly puriri and rātā.

Mangakino (Fig. 1, C)

The Mangakino forest block has kanuka margins with a ponga understorey grading into more mature totara, kahikatea and puriri forest with a māmāngi (*Coprosma arborea*) subcanopy and nikau understorey (Fig. 9). Common vines include akatea and thread fern along with the epiphyte kahakaha. A more diverse remnant forest (Fig. 10) with a broadleaf canopy, nikau subcanopy and dense thickets of kareao or supplejack (*Ripogonum scandens*) occurs in a gully within this block. A mob of wild pigs (*Sus scrofa*) was seen in this block.

Far Block (Fig. 1, D)

The Far Block also has kanuka margins with a ponga understorey (Fig. 11). Here it grades into a canopy of totara, kahikatea, puriri with an understorey of māmāngi, nikau and mingimingi (*Leucopogon fasciculatus*) seedlings. The epiphyte kahakaha and the vine akatea are again common throughout. Heading towards the mature forest (Fig. 12), emergent rimu (*Dacrydium cupressinum*) are seen above the totara and taraire canopy with a subcanopy of māmāngi and kohekohe. Miniature tree fern (*Diploblechnum fraseri*) is in the understorey and the ground was covered in leaf litter at the time of survey. On the drier ridges large conifers, including kauri, dominate. An alluvial flat is prominent in the valley of this block and a stream runs through with many waterfalls (Fig. 13). The stream edge has towai and rewarewa in the canopy with a variety of shrubs underneath including kanono (*Coprosma autumnalis*), pāte (*Schefflera digitata*), hangehange (*Geniostoma ligustrifolium* var. *ligustrifolium*) and nikau. Native grasses (*Microlaena avenacea*) and ferns are seen on the stream edge (Fig. 14) with a carpet of moss covering the ground and the climber kiekie (*Freycinetia banksia*) scrambling over rockfaces. The Far Block forms part of the Tapuwae Forest and Outliers.

Starvation Block (Fig. 1, E)

The Starvation Block borders mangrove forest (*Avicennia marina*) which grades into saltmarsh consisting of oioi (*Apodasmia similis*) with the occasional mingimingi (*Coprosma propinqua*) and manuka shrub. This saltmarsh in turn grades into a



Fig. 9. Totara forest with māmāngi and tree fern understorey (23 July 2020).



Fig. 10. Treefall in the Mangakino Block showing the broadleaf forest behind (23 July 2020).



Fig. 11. Ponga under kanuka canopy (26 July 2020).

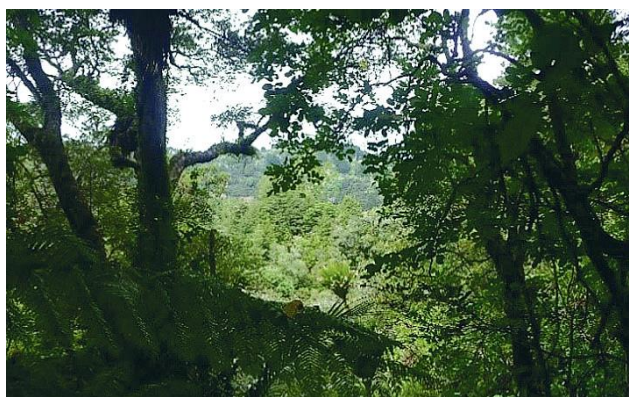


Fig. 12. Far Block mature forest (26 July 2020).



Figs. 13–18: **13.** Far Block waterfall and stream (26 July 2020). **14.** Far Block regenerating forest bordering a stream (26 July 2020). **15.** Starvation Block wetland kahikatea and whekī (*Dicksonia squarrosa*) island (24 July 2020). **16.** Starvation Block a range of species growing under kanuka forest (24 July 2020). **17.** Starvation Block nikau in small gully (24 July 2020). **18.** Starvation Blocks thick understory in ridge top (24 July 2020). **19.** Mature northern rata in the canopy (24 July 2020). **20.** Unnamed hebe species, *Hebe* aff. *stricta* “tetraploid green” (21 July 2020). **21.** Maire taiki (*Mida salicifolia*) - one tree seen under tanekaha forest on a dry ridge (24 July 2020).

wetland of rautahi (*Carex lessoniana*), pukio (*Carex virgata*) and the exotic Mexican devil weed (*Ageratina adenophora*) with kahikatea and whekī (*Dicksonia squarrosa*) ‘islands’ (Fig. 15) and nikau groves. Bordering the wetland ecosystems is regenerating kanuka forest (Fig. 16) with an understory of ponga, nikau, mingimingi (*Leucopogon fasciculatus*) and tanekaha. This grades into a mature forest dominated by kauri,

totara and a mix of broadleaves including towai, taraire and kohekohe with a dense understory.

The gullies also have a broadleaf canopy that includes puriri and kohekohe with nikau in the understory (Fig. 17) and the climber kareao or supplejack (*Ripogonum scandens*) forming thickets (Fig. 18). Large mature trees of northern rātā are seen on the sloping faces of the block (Fig. 19).



Figs. 22–28: **22.** Fan fern (*Schizaea dichotoma*) growing under kauri (24 July 2020). **23.** The tree orchid *Bulbophyllum tuberculatum* (26 July 2020). **24.** The threatened liverwort *Radula marginata* is locally common in a damp, dark gully (22 July 2020). **25.** *Hebe acutiflora* - a rare plant in the Far North (24 July 2020). **26.** Kaikōmako (*Pennantia corymbosa*) - a rare tree in the alluvial forests of the Far North (21 July 2020). **27.** Toro (*Myrsine salicina*) is a rare tree in the lowlands of the Far North. This species often subject to possum browse (24 July 2020). **28.** Foliage of wharangi (*Melicope ternata*) an uncommon plant of the Hokianga (26 July 2020).

Indigenous plant species of interest

In total, 202 native plant species were found during the survey (see Appendix A). The Conservation Status assessment (de Lange et al. 2018a) is a tool used to categorise the threat status of plants. These categories include

Threatened, At Risk-Declining and Data Deficient. Data Deficient means that a species may be either Threatened or At Risk but there is a lack of current information about its distribution and abundance (de Lange et al. 2018a).



Fig. 29. The distinctive bark of kawaka (*Libocedrus plumosa*) (26 July 2020).



Fig. 30. The sedge *Carex subdola* seen in wetland (26 July 2020).

Threat status of Tapuwae plants

- A small population of the unnamed hebe species referred to as *Veronica* aff. *stricta* "tetraploid green" was seen on the cliff edge of Block 2 (Fig. 20). This plant has been assessed as Data Deficient.
- One tree of the At Risk-Declining maire taiki (*Mida salicifolia*) was seen under tanekaha (*Phyllocladus trichomanoides*) forest (Fig. 21).
- The fan fern *Schizaea dichotoma* (At Risk-Naturally Uncommon) was locally common under the kauri (*Agathis australis*) broadleaf forest of the Starvation Block (Fig. 22).
- The small orchid *Bulbophyllum tuberculatum* (At Risk-Naturally Uncommon) was seen on treefall of both the Mangakino and Far blocks (Fig. 23).
- A patch of eelgrass or nana (*Zostera muelleri* subsp. *novazelandica*, At Risk-Naturally Uncommon) was seen on the edge of mangroves by the Starvation Block.
- The liverwort wairua koha (*Radula marginata*) is locally common in damp, dark gullies (Fig. 24), At Risk-Declining (de Lange *et al.* 2020).
- *Hebe acutiflora* (syn. *Veronica rivalis*) is a localised Northland endemic (At Risk – Naturally Uncommon). This record is significant as the exact distribution of this species is still unknown; one plant was seen on the forest margin in the Starvation Block (Fig. 25).

Rare in Hokianga

Plants at Tapuwae that are generally rare in the Hokianga Ecological District include:

- *Coprosma parviflora*, which was identified as a regionally significant plant species in a report on the natural areas of Hokianga Ecological District (Conning *et al.* 2004). This species is a common understorey shrub throughout Tapuwae forests.
- Kaikōmako (*Pennantia corymbosa*), is a rare plant in the Far North. A few individuals were seen on the margins of Tapuwae's lowland forest remnants (Fig. 26).
- Toro (*Myrsine salicina*) is a rare tree in the lowlands of the Far North and is often subject to possum browse. One individual was seen in the forest understorey of the Starvation Block (Fig. 27).
- Wharangi (*Melicope ternata*) was a common understorey tree of the starvation block (Fig. 28)
- A stand of kawaka (*Libocedrus plumosa*) was seen on a ridge of the Mangakino (Fig. 29), (Conning *et al.* 2004).
- *Carex subdola* (Fig. 30) is an uncommon sedge in Northland due to draining of wetland for farming - a few remnant sedge lands were seen in the wetland of the Far Block.



Fig. 31. Large kauri on the forest ridges of Tapuwae, more than 1m in diam. (26 July 2020).

Although kauri is generally rare in the Hokianga Ecological District, two stands were seen at Tapuwae. The first was a small roadside stand consisting of approximately 10 young trees, the second was a larger stand of mature trees scattered throughout the broadleaf-podocarp forest of the Starvation Block. The third forest of kauri was an old mature stand (trees 1m or more diam.) on the hills of Far Block (Fig. 31).

Lichens

Lichens play an important part in nutrient cycles of natural ecosystems and are indicators of forest health. Healthy communities of lichens were seen across the Tapuwae farm indicative of healthy ecosystems. A surprising diversity of cyanobacterial lichens were seen on shaded leaves and branches of totara in the forest of Block 2. Cyanobacterial lichens, also known as cyanolichens, are sources of nitrogen in the natural environment, able to fix more nitrogen in ecosystems than members of the Fabaceae plant family (Henriksson & Simu 1971;

Honegger & Nash 2008; Rousk & Michelsen 2016). Cyanobacterial species in this community include: *Degelia gayana* (Fig. 32), *Erioderma leylandii* (Fig. 33), *Gabura fascicularis* var. *fascicularis* (Fig. 34), *Leptogium denticulatum*, the cyanobacterial form of *Pseudocyphellaria carpoloma* (previously called *P. sericeofulva*) (Fig. 35), *P. hookeri* (Fig. 36) and *Sticta limbata* (Fig. 37).

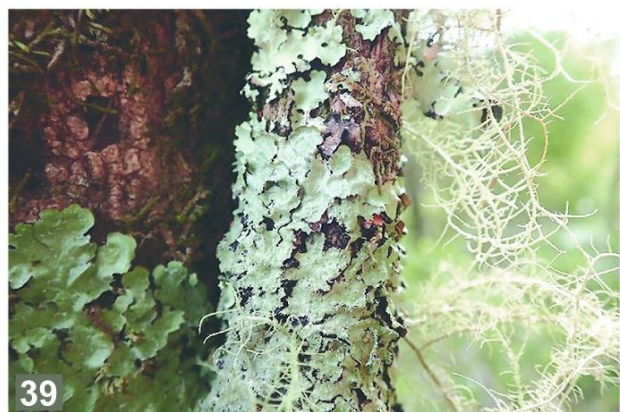
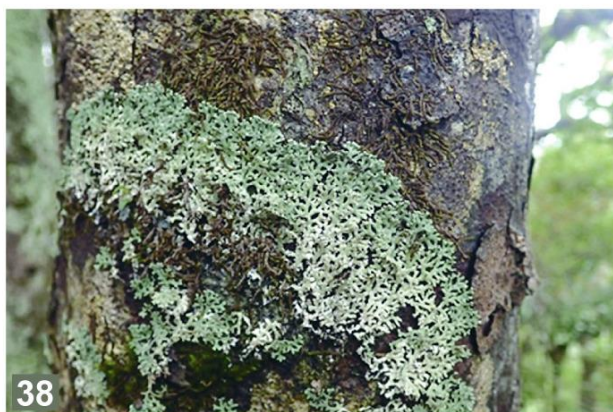
Forest communities of lichens were seen, in the older growth forest of the Far Block on the drier ridges. Some of the lichen species seen during the survey are *Anzia entingiana* (Fig. 38), a rare lichen of shaded forest; *Notoparmelia novae-zelandiae* (Fig. 39) a rare endemic lichen; a fertile specimen of *Hypogymnia subphysodes* (Fig. 40) often seen in farmland areas; and the large macrolichen *Yarrumia coronata*. Other common forest lichen species seen throughout Tapuwae include: *Leioderma soledatum*, *Pannaria fulvescens*, *Pannaria minutiphylla*, *Psoromidium aleuroides* and *Podostictina pickeringii*. An interesting record is the crustose lichen *Megaloblastenia marginiflexa* from the Starvation Block (Fig. 41).

Communities of lichens on the mangroves of Tapuwae river include: *Brigantiaea chrysosticta*, *Collema leucocarpum*, *Menegazzia aucklandica*, *Ochrolechia pallescens* (Fig. 42), *Pannaria allorhiza* (Fig. 43), *Pannaria elixii*, *Ramalina geniculata*, *Ramalina pacifica* (Fig. 44) and *Usnea nidifica* (Fig. 45).

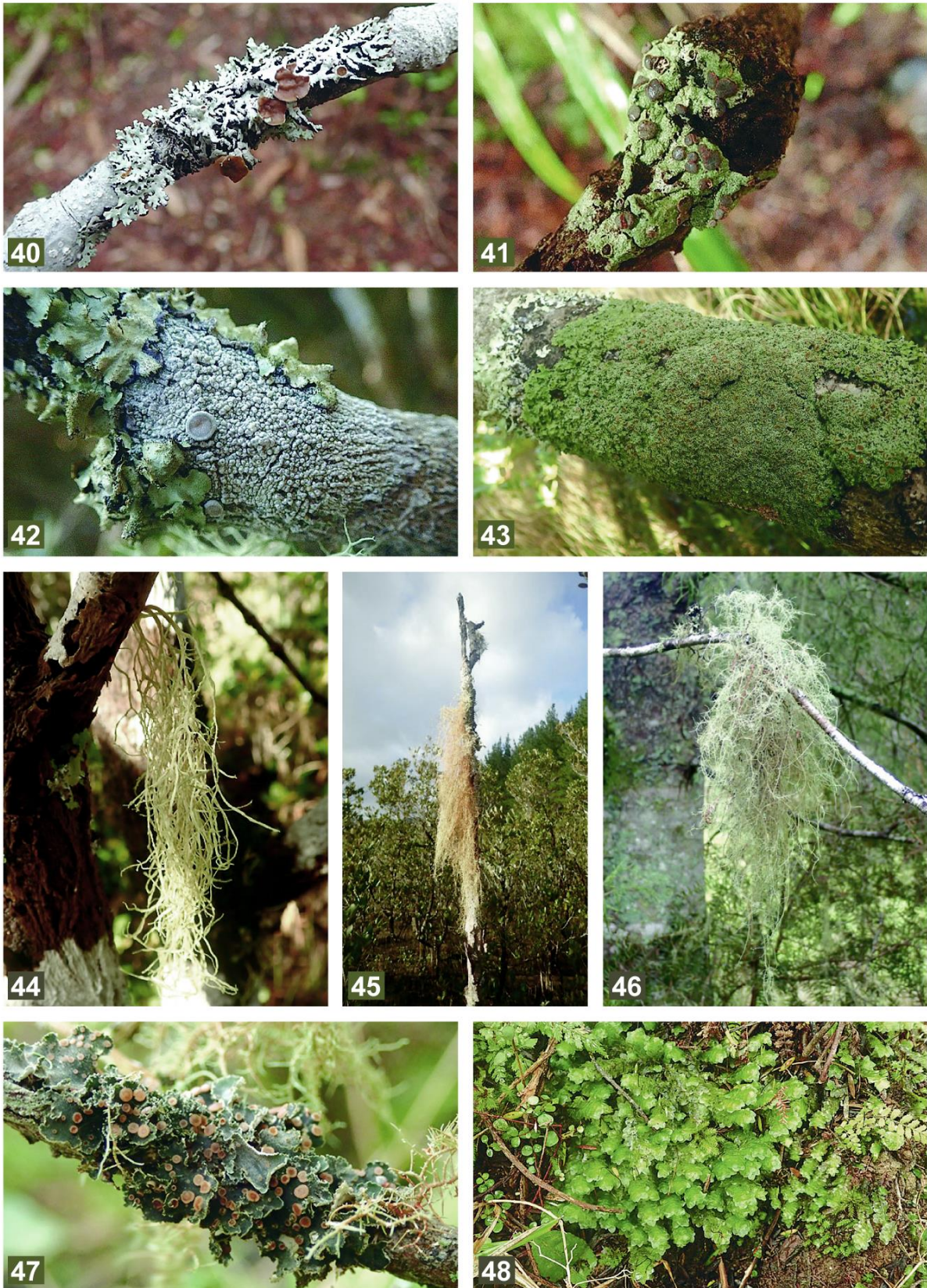
Of the 85 lichen species recorded at Tapuwae (see Appendix D) many species are 'At Risk' (de Lange et al. 2018b). These include:

- *Ramalina pacifica*, a 'Nationally Vulnerable' species (Fig. 44).
- *Teloschistes flavicans* an in-decline species.
- The 'Data Deficient' species *Usnea baileyi* (Fig. 46) and *Hypotrachyna minarum*.
- 12 'Naturally Uncommon' species: *Anzia entingiana* (Fig. 38), *Coccocarpia pellita*, *Dirinaria picta*, *Erioderma leylandii* (Fig. 33), *Gabura fascicularis* (Fig. 34), *Leioderma erythrocarpum* (Fig. 47), *Notoparmelia novae-zelandiae* (Fig. 39), *Parmotrema robustum*, *Pseudocyphellaria hookeri* (Fig. 36), *Pseudocyphellaria intricata*, *Pseudocyphellaria lividofusca* and *Usnea nidifica* (Fig. 45).

Other cryptograms such as the bryophytes (liverworts and mosses – Appendix C) were not studied in great detail during surveys. However, as noted above, the threatened liverwort *Radula*



Figs. 32–39: 32. *Degelia gayana* corticolous on totara in Block 2 (21 July 2020). 33. *Erioderma leylandii* corticolous on totara in Block 2 (21 July 2020). 34. *Gabura fascicularis* var. *fascicularis* corticolous on totara in Block 2 (21 July 2020). 35. Cyanobacterial form of *Pseudocyphellaria carpoloma* corticolous on kahikatea on the margin of Block 2 (21 July 2020). 36. The large foliose microlichen *Pseudocyphellaria hookeri* corticolous in Block 2 (21 July 2020). 37. The small foliose lichen *Sticta limbata* corticolous in Block 2 (21 July 2020). 38. *Anzia entingiana* in the mature forest of the Far Block (26 July 2020). 39. The isidiate New Zealand endemic *Notoparmelia novae-zelandiae* corticolous in the mature forest of the Far Block (26 July 2020).



Figs. 40–48: **40.** Fertile specimen of *Hypogymnia subphysodes* seen on windfall in the mature forest of the Far Block (26 July 2020). **41.** *Megaloblastenia marginiflexa* seen on a decorticate branch in the Starvation Block (24 July 2020). **42.** *Ochrolechia pallescens*, commonly called a crabeye lichen, corticolous on mangroves (24 July 2020). **43.** Large specimen of *Pannaria allorhiza* corticolous on mangroves (24 July 2020). **44.** The lichen *Ramalina pacifica* in mangrove forest (24 July 2020). **45.** The large fruticose lichen *Usnea nidifica* corticolous in mangrove forest (24 July 2020). **46.** The data deficient lichen *Usnea baileyi* corticolous on kahikatea on forest margin of Block 2 (21 July 2020). **47.** *Leioderma erythrocarpum* corticolous on mānuka (21 July 2020). **48.** The large terrestrial moss *Achrophyllum quadrifarium* with capsules (23 July 2020).

marginata was locally common in damp dark stream gullies mainly associated with sandstone (Fig. 24). Also, the large terrestrial moss *Achrophyllum quadrifarum* (Fig. 48), was very common under the regenerating kānuka forest at the Back Block.

Exotic Plant Species

In total, 53 introduced plant species were found during surveys at Tapuwae (Appendix B). No serious infestation of pest plant species was found in the areas of indigenous vegetation. Weeds include Australian sedge (*Carex longibrachiata*), a pasture weed of forest margins and understorey. It forms dense patches preventing the regeneration of native seedlings. Tobacco weed is a common weed of the Hokianga region and is very common in some parts of Tapuwae farm. The weedy groundcover African clubmoss (*Selaginella kraussiana*) was seen smothering native seedlings in the native forest of Blocks 1 and 2. Thick infestations of pampas grass (*Cortaderia selloana*) were seen throughout Tapuwae farm. Gorse (*Ulex europaeus*) was also seen throughout Tapuwae. The two similar-looking weeds Mexican devil weed (*Ageratina adenophora*) and mist flower (*A. riparia*) formed localized infestations. Localized patches of montbretia (*Crocasmia × crocosmiiflora*) were seen in the grazed parts of Far Block wetland. A weed of note was the small creeper *Hydrocotyle bowlesioides* seen on the forest floor of both Blocks 1 and 2 (Fig. 49).

Fauna

During the survey a range of native bird species were seen. They included:

- Mātātā or fernbird (*Bowdleria punctata* subsp. *vealeae*) in the saltmarsh scrub of the Starvation Block which is 'At Risk-Declining' (Robertson et al. 2016).
- Miromiro or tomtit (*Petroica macrocephala* subsp. *toitoi*).
- Tūi or kōkō (*Prosthemadera novaeseelandiae*).
- Kukupa or kereru (*Hemiphaga novaeseelandiae*).
- Tirairaka or piwakawaka or North Island fantail (*Rhipidura fuliginosa* subsp. *placabilis*).
- Riroriro or grey warbler (*Geryone igata*).
- Kahu (*Circus approximans*).
- Ruru or morepork (*Ninox novaeseelandiae* subsp. *novaeseelandiae*).
- Kōtare (*Todiramphus sanctus* subsp. *vagans*).



Fig. 49. The exotic ground cover *Hydrocotyle bowlesioides* (21 July 2020).



Fig. 50. Crushed kauri snail or pūpū-rangi shells (22 July 2020).

The 'At Risk-Declining' species North Island brown kiwi (*Apteryx mantelli*) and banded rail (*Gallirallus philippensis* subsp. *assimilis*) have been recorded at Tapuwae and have been seen in the local area (Conning et al., 2004).

Other fauna seen were:

- Koura or freshwater crayfish (*Paranephrops planifrons*) in the shaded stream of Far Block.
- Crushed kauri snail or pūpū-rangi shells (*Paryphanta busbyi*) throughout Tapuwae suggesting predation by rats or pigs (Fig. 50).



Fig. 51. Glow worms on the overhanging bank beside the stream (22 July 2020).



Fig. 52. Leaf veined slug on the lichen *Notoparmelia testacea* (22 July 2020).

- Glow worms (*Arachnocampa luminosa*) along the stream banks in the Mangakino Block (Fig. 51).
- The native leaf veined slug (*Athoracophorus bitentaculatus*) was seen at Block 2 (Fig. 52).

Pest species include:

- Pigs.
- Goats (*Capra hircus*).
- Eastern rosella (*Platycercus eximius* subsp *eximius*).
- A possum (*Trichosurus vulpecula*) was present at the pine plantation with signs of possum browsing being locally common.

- It is highly likely that rabbits (*Orytolagus cuniculus*), rats (*Rattus* sp.) and feral cats (*Felis catus*) are also present at Tapuwae.

Acknowledgements

I would like to thank Tapuwae Incorporation for providing access to Tapuwae (Wendy Henwood and Warren Gundry), and Wendy Henwood further for her support and background information on Tapuwae. I also would like to thank Melissa Hutchison for her comments/peer review on a report draft and Wendy Henwood again for editing drafts. I also thank Joshua Salter for modifying the maps used in Fig. 1.

References

- Arand, J., Basher, L., Wardle, R., Wardle, K. 1993. Inventory of New Zealand Soil Sites of international, national and regional importance. Part Two-North Island and northern offshore islands. Occasional publication 2, New Zealand Society of Soil Science.
- Conning, L., Holland, W., Miller, N. 2004. *Natural areas of Hokianga Ecological District*. Protected Natural Areas Programme. Department of Conservation, Wellington.
- de Lange, P. J., Rolfe, J. R., Barkla, J. W., Courtney, S. P., Champion, P. D., Perrie, L. R., Beadel, S. M., Ford, K. A., Breitwiser, I., Schonberger, I., Hindsmarsh-Walls, R., Heenan, P. B., Ladley, K. 2018a. Conservation status of New Zealand indigenous vascular plants, 2017. *New Zealand Threat Classification Series* 22. Department of Conservation, Wellington.
- de Lange, P., Blanchon, D., Knight, A., Elix, J., Lucking, R., Frogley, K., Harris, A., Cooper, J., Rolfe, J. 2018b. Conservation status of New Zealand indigenous lichens and lichenicolous fungi. *New Zealand Threat Classification Series* 27. Department of Conservation, Wellington.
- de Lange, P. J., Glenny, D., Braggins, J. E., Renner, M., Von Konrat, M., Engel, J. J., Reeb, C., Rolfe, J. R. 2020. Conservation status of New Zealand hornworts and liverworts, 2014. *New Zealand Threat Classification Series* 31. Department of Conservation, Wellington.
- Hayward, B. H. 2014. Treasured spheres: Protecting New Zealand's heritage of spherical concretions. *Geoscience Society of New Zealand* 12: 24-30.
- Henriksson, E., Simu, B. 1971. Nitrogen fixation by lichens. *Oikos* 22: 119-121.
- Honegger, R., Nash, T. H. 2008. Lichen biology. *Sexual reproduction in lichen-forming ascomycetes*. Cambridge University Press, Cambridge, UK.
- Robertson, H., Baird, K., Dowding, J., Elliott, G., Hitchmough, R., Miskelly, C., McArther, N., O'Donnell, C., Sager, P., Scofield, P., Taylor, G. 2016. Conservation status of New Zealand birds. *New Zealand Threat Classification Series* 19. Department of Conservation, Wellington.
- Rousk, K., Sorensen, P. L., Michelsen, A. 2016. Nitrogen transfer from four nitrogen-fixer associations to plants and soils. *Ecosystems* 19(8), 1491-1504.

APPENDICES A–E: Vascular and non-vascular plants, and lichens and fungi, recorded at Tapuwae.

= taxa also recorded by the author in iNaturalist <https://inaturalist.nz/>

Accession numbers are shown for specimens lodged in the Auckland Museum Herbarium (AK).

A. Indigenous vascular plants

Scientific name	Common Name	Block 1	Block 2	Mangakino	Far Block	Starvation Block
Ferns and Lycopods (60)						
<i>Abrodictyum elongatum</i>	bristle fern			x	x	
<i>Adiantum cunninghamii</i>	common maidenhair			x	x	
<i>Adiantum diaphanum</i> #	small maidenhair		x		x	
<i>Adiantum fulvum</i>	maidenhair			x	x	
<i>Adiantum hispidulum</i>	rosy maidenhair	x	x	x	x	x
<i>Asplenium bulbiferum</i>	pikopiko			x	x	x
<i>Asplenium flaccidum</i>	hanging spleenwort	x	x	x	x	x
<i>Asplenium oblongifolium</i>	huruhuruwhenua			x	x	x
<i>Asplenium polyodon</i>	sickle spleenwort	x	x	x	x	x
<i>Austroblechnum lanceolatum</i>	rereti				x	x
<i>Austroblechnum membranaceum</i>		x	x	x	x	
<i>Cyathea dealbata</i>	ponga	x	x	x	x	x
<i>Cyathea medullaris</i>	mamaku				x	x
<i>Dendroconche scandens</i>	mokimoki	x		x	x	x
<i>Deparia petersenii</i> subsp. <i>congrua</i>		x	x	x	x	
<i>Dicksonia squarrosa</i>	whēkī		x	x	x	x
<i>Diplazium australe</i>		x	x	x	x	
<i>Diploblechnum fraseri</i>	miniature tree fern			x	x	x
<i>Doodia australis</i>	rasp fern	x	x	x		x
<i>Gleichenia microphylla</i>	tangle fern			x		
<i>Histiopteris incisa</i>	mātā		x			
<i>Hiya distans</i> #					x	
<i>Hymenophyllum demissum</i>	irirangi		x	x	x	x
<i>Hymenophyllum dilatatum</i>	matua mauku			x		x
<i>Hymenophyllum flabellatum</i>	filmy fern					x
<i>Hymenophyllum flexuosum</i> # AK383446	filmy fern					x
<i>Hymenophyllum multifidum</i> # AK382164	filmy fern				x	
<i>Hymenophyllum nephrophyllum</i>	kidney fern			x	x	x
<i>Hymenophyllum rarum</i>	filmy fern			x		x
<i>Hymenophyllum sanguinolentum</i>	filmy fern		x		x	x
<i>Hymenophyllum scabrum</i>	filmy fern				x	
<i>Hymenophyllum revolutum</i>	filmy fern	x		x	x	x
<i>Hypolepis lactea</i> #					x	
<i>Icarus filiformis</i>	thread fern	x	x	x	x	x
<i>Lastreopsis glabella</i> #	smooth shield fern		x	x		
<i>Lastreopsis hispida</i>	hairy fern			x	x	x
<i>Lastreopsis velutina</i>				x	x	
<i>Leptopteris hymenophylloides</i>	heruheru				x	
<i>Lindsaea trichomanoides</i> #					x	x

Scientific name	Common Name	Block 1	Block 2	Mangakino	Far Block	Starvation Block
<i>Lomaria discolor</i>	petipeti			x	x	
<i>Loxogramme dictyopteris</i>	lance fern			x	x	x
<i>Lycopodiella cernua</i>				x	x	
<i>Lycopodium deuterodensum</i>	clubmoss				x	
<i>Lycopodium volubile</i>	waewaekoukou			x		
<i>Lygodium articulatum</i>	mangemange			x	x	
<i>Notogrammitis heterophylla</i>	comb fern				x	
<i>Paesia scaberula</i>	ringfern		x	x		
<i>Parablechnum novae-zelandiae</i>	kiokio		x	x	x	x
<i>Phlegmariurus billardiarei</i>	hanging clubmoss	x	x	x	x	x
<i>Pneumatopteris pennigera</i>	piupiu		x	x	x	x
<i>Polyphlebium endlicherianum</i>					x	
<i>Polyphlebium venosum</i>					x	
<i>Pteridium esculentum</i>	rarauhe		x	x		x
<i>Pteris macilenta</i>	sweet fern				x	x
<i>Pteris tremula</i>	shaking brake			x	x	
<i>Pyrrosia elaeagnifolia</i>	leather-leaf fern	x	x	x	x	x
<i>Schizaea dichotoma</i> #	AK383447 fan fern				x	x
<i>Tmesipteris lanceolata</i>	fork fern			x	x	x
<i>Tmesipteris tannensis</i>	fork fern				x	
<i>Zealandia pustulata</i>	kowaowao	x	x	x		x
Gymnosperms (7)						
<i>Agathis australis</i>	kauri				x	x
<i>Dacrycarpus dacrydioides</i>	kahikatea	x	x	x		x
<i>Dacrydium cupressinum</i>	rimu	x	x	x	x	x
<i>Libocedrus plumosa</i> #	kawaka				x	
<i>Pectinopitys ferruginea</i>	miro			x	x	x
<i>Phyllocladus trichomanoides</i>	tanekaha			x	x	x
<i>Podocarpus totara</i>	tōtara	x	x	x	x	x
Dicots (92)						
<i>Alectryon excelsus</i>	tītoki		x	x		
<i>Alseuosmia banksii</i> var. <i>banksii</i> #	AK383444 toropapa					x
<i>Alseuosmia quercifolia</i> #	oak-leaved toropapa			x	x	
<i>Beilschmiedia tarairi</i>	taraire	x		x	x	x
<i>Beilschmiedia tawa</i>	tawa		x	x	x	x
<i>Brachyglottis repanda</i>	rangiora			x		x
<i>Callitriche muelleri</i>	mueller's starwort	x	x	x	x	x
<i>Carmichaelia australis</i>	native broom			x	x	
<i>Carpodetus serratus</i>	putaputawētā	x	x	x	x	x
<i>Centella uniflora</i>	centella	x	x	x		x
<i>Calystegia sepium</i> subsp. <i>roseata</i>	pink bindweed		x			
<i>Clematis paniculata</i>				x	x	x
<i>Coprosma areolata</i>	thin-leaved coprosma	x	x	x	x	x

Scientific name	Common Name	Block 1	Block 2	Mangakino	Far Block	Starvation Block
<i>Coprosma arborea</i>	māmāngi	x	x	x	x	x
<i>Coprosma autumnalis</i> (wrongly called <i>C. grandifolia</i>)	kanono				x	x
<i>Coprosma xcunninghamii</i>	coprosma hybrid				x	x
<i>Coprosma lucida</i>	karamu			x	x	x
<i>Coprosma macrocarpa</i> subsp. <i>minor</i>	karamu		x	x		x
<i>Coprosma parviflora</i>	leafy coprosma	x	x	x		
<i>Coprosma propinqua</i> var. <i>propinqua</i> # AK383445	mingimingi					x
<i>Coprosma rhamnoides</i>	twiggy coprosma	x	x	x	x	x
<i>Coprosma robusta</i>	karamu				x	
<i>Coprosma spathulata</i> subsp. <i>spathulata</i>				x	x	
<i>Coriaria arborea</i>	tutu				x	
<i>Corynocarpus laevigatus</i>	karaka		x	x	x	x
<i>Drosera auriculata</i>	sundew			x		
<i>Dysoxylum spectabile</i>	kohekohe		x	x	x	x
<i>Elatostema rugosum</i>	parataniwha				x	x
<i>Epilobium rotundifolium</i>	round-leaved willowherb		x			
<i>Euchiton japonicus</i>		x			x	x
<i>Fuchsia excorticata</i>	kotukutuku				x	
<i>Geniostoma ligustrifolium</i>	hangehange	x	x	x	x	x
<i>Geranium homeanum</i>			x	x		
<i>Griselinia lucida</i>	puka		x	x	x	
<i>Haloragis erecta</i>	toatoa			x		
<i>Hypericum pusillum</i>	swamp hypericum	x	x	x	x	x
<i>Hebe acutifolia</i> (<i>Veronica rivalis</i>) #						x
<i>Hebe</i> aff. <i>stricta</i> "tetraploid green" (<i>Veronica stricta</i>) #	koromiko				x	
<i>Hedycarya arborea</i>	porokaiwhiri	x		x	x	x
<i>Hoheria populnea</i>	houhere		x	x	x	x
<i>Knightia excelsa</i>	rewarewa	x		x	x	
<i>Kunzea robusta</i>	kānuka	x		x	x	
<i>Laurelia novae-zelandiae</i>	pukatea	x		x		x
<i>Leptecophylla juniperina</i>	mingimingi			x		
<i>Leptospermum scoparium</i> agg.	mānuka	x	x	x		x
<i>Leptostigma setulosum</i>		x	x			
<i>Leucopogon fasciculatus</i>	mingimingi	x	x	x		x
<i>Litsea calicaris</i>	mangeao		x			
<i>Lobelia anceps</i>	punakuru			x	x	x
<i>Melicope xmantellii</i> #	melicope hybrid					x
<i>Melicope simplex</i> #	poataniwha	x	x			
<i>Melicope ternata</i>	wharangi					x
<i>Melicytus macrophyllus</i> #	large leaved māhoe				x	x
<i>Melicytus micranthus</i>	manakura	x	x		x	
<i>Melicytus ramiflorus</i>	māhoe		x	x	x	x
<i>Metrosideros carminea</i>	carmine rātā				x	
<i>Metrosideros diffusa</i>	white rātā	x	x	x	x	x

Scientific name	Common Name	Block 1	Block 2	Mangakino	Far Block	Starvation Block
<i>Metrosideros fulgens</i>	climbing rātā		x	x	x	x
<i>Metrosideros perforata</i>	akatea	x	x	x	x	x
<i>Metrosideros robusta</i> #	northern rātā		x	x	x	x
<i>Mida salicifolia</i> #	maire taiki					x
<i>Muehlenbeckia complexa</i>	pohuehue			x		
<i>Myrsine australis</i>	māpou			x	x	x
<i>Myrsine salicina</i> #	toro					x
<i>Nestegis lanceolata</i>	white maire	x		x	x	x
<i>Nertera depressa</i>	nertera	x		x		
<i>Nertera dichondrifolia</i>	nertera			x	x	x
<i>Olearia furfuracea</i>	akepiro				x	
<i>Olearia rani</i> var. <i>rani</i>	heketara				x	x
<i>Parsonsia heterophylla</i>	kaihua		x		x	
<i>Pennantia corymbosa</i> #	kaikōmako	x				
<i>Persicaria decipiens</i>	tutunawai				x	x
<i>Peperomia urvilleana</i>					x	
<i>Piper excelsum</i>	kawakawa				x	
<i>Pittosporum cornifolium</i>	tawhirikaro				x	
<i>Pittosporum tenuifolium</i> #	kōhūhū				x	x
<i>Pseudopanax arboreus</i> #	whauwhaupaku				x	x
<i>Pseudopanax crassifolius</i>	horoeke				x	
<i>Pterophylla sylvicola</i> (syn. <i>Weinmannia sylvicola</i>)	tōwai	x	x	x	x	x
<i>Ranunculus reflexus</i>	mārūrū			x	x	
<i>Rhabdothamnus solandri</i>	taurepo		x	x		
<i>Rubus australis</i>	tātārāmoa		x	x	x	
<i>Rubus cissoides</i>	tātārāmoa			x		x
<i>Schefflera digitata</i>	patē		x		x	x
<i>Senecio bipinnatisectus</i>	Australian fireweed			x	x	
<i>Senecio elseri</i>	fireweed	x	x	x		x
<i>Senecio minimus</i>	fireweed		x			
<i>Solanum americanum</i>	small-flowered nightshade		x			x
<i>Sophora chathamica</i>	kōwhai		x		x	x
<i>Streblus heterophyllus</i>	tūrepo		x	x	x	x
<i>Veronica plebeia</i>		x	x		x	x
<i>Vitex lucens</i>	puriri	x	x	x	x	x
Monocots (70)						
<i>Acianthus sinclairii</i>	pixie cap			x	x	x
<i>Apodasmia similis</i>	oioi				x	
<i>Astelia hastata</i>	kahakaha	x	x	x	x	x
<i>Astelia solandri</i>	kaiwharawhara	x		x	x	x
<i>Bulbophyllum pygmaeum</i>	pygmy tree orchid			x	x	
<i>Bulbophyllum tuberculatum</i> #	AK381502			x	x	
<i>Carex banksiana</i>	fine-leaved bastard grass			x	x	x
<i>Carex dissita</i>	forest sedge			x		

Scientific name	Common Name	Block 1	Block 2	Mangakino	Far Block	Starvation Block
<i>Carex flagellifera</i>	Glen Murray tussock					X
<i>Carex inversa</i>		X	X			
<i>Carex lessoniana</i>	rautahi		X		X	X
<i>Carex secta</i>	pukio		X			
<i>Carex solandri</i>					X	X
<i>Carex spirostris</i>					X	
<i>Carex subdola</i> #	AK381549				X	
<i>Carex subviridis</i> #	hook sedge					X
<i>Carex uncinata</i>	kamu	X	X	X	X	X
<i>Carex virgata</i>	pūkio			X	X	X
<i>Cordyline australis</i>	cabbage tree, ti kouka			X	X	X
<i>Cordyline banksii</i>	tī ngāhere			X	X	
<i>Cordyline pumilio</i>	tī rauriki			X	X	X
<i>Corybas cheesemanii</i>					X	
<i>Corybas oblongus</i>	spider orchid			X	X	
<i>Cyperus ustulatus</i>	toetoe upoko-tangata		X		X	X
<i>Dendrobium cunninghamii</i>	winikā				X	X
<i>Dianella latissima</i>	tūrutu				X	X
<i>Dianella nigra</i>	tūrutu			X	X	
<i>Drymoanthus adversus</i>			X	X		X
<i>Earina autumnalis</i>	raupeka			X	X	
<i>Earina mucronata</i>	peka-a-waka		X	X	X	X
<i>Eleocharis acuta</i>					X	X
<i>Freycinetia banksii</i>	kiekie		X	X	X	X
<i>Gahnia lacera</i>	bamboo sedge		X	X	X	X
<i>Gahnia pauciflora</i>					X	
<i>Gahnia setifolia</i>	māpere			X	X	X
<i>Gahnia xanthocarpa</i>	giant māpere			X	X	X
<i>Isolepis cernua</i> var. <i>cernua</i>	slender clubrush					X
<i>Isolepis inundata</i>					X	
<i>Isolepis prolifera</i>	bullrush		X			
<i>Isolepis reticularis</i>		X	X	X	X	X
<i>Juncus australis</i>	wīwī		X			
<i>Juncus edgariae</i>	AK383383	X			X	
<i>Juncus kraussii</i> subsp. <i>australiensis</i>	wīwī				X	X
<i>Juncus pallidus</i>	giant wīwī			X	X	X
<i>Juncus planifolius</i>	grass-leaved rush				X	X
<i>Juncus prismatocarpus</i>				X		
<i>Juncus sarophorus</i>		X	X			X
<i>Luzula picta</i> var. <i>picta</i>						X
<i>Machaerina arthropphylla</i>	AK383443			X		
<i>Machaerina juncea</i>	twig rush					X
<i>Machaerina tenax</i>						
<i>Microlaena avenacea</i>	bush rice grass				X	X
<i>Microlaena stipoides</i>	pātiti	X	X	X		X
<i>Microtis unifolia</i>	onion-leaved orchid			X	X	

Scientific name	Common Name	Block 1	Block 2	Mangakino	Far Block	Starvation Block
<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	basket grass	x	x	x	x	x
<i>Phormium tenax</i> #	harakeke					x
<i>Poa anceps</i>					x	
<i>Pterostylis alobula</i> #	greenhood orchid			x	x	x
<i>Pterostylis agathicola</i>	kauri greenhood			x		
<i>Pterostylis brumalis</i>	winter greenhood				x	
<i>Rhopalostylis sapida</i>	nīkau	x	x	x	x	x
<i>Ripogonum scandens</i>	kareao, supplejack		x	x	x	x
<i>Rytidosperma</i> sp.	danthonia			x		
<i>Schoenoplectus tabernaemontani</i>	kuawa				x	
<i>Schoenus maschalinus</i>	dwarf bog rush					x
<i>Schoenus tendo</i>	kauri grass					x
<i>Thelymitra</i> sp.	sun orchid			x		x
<i>Triglochin striata</i>	arrow grass					x
<i>Typha orientalis</i>	raupō				x	x
<i>Zostera muelleri</i> subsp. <i>novozelandica</i> #	nana					x

B. Exotic vascular plants

Scientific name	Common Name	Block 1	Block 2	Mangakino	Far Block	Starvation Block
Ferns and Lycopods (1)						
<i>Selaginella kraussiana</i>	African club moss	x	x	x		
Gymnosperms (2)						
<i>Pinus pinaster</i>	maritime pine			x		
<i>Pinus radiata</i>	radiata pine			x		x
Dicots (40)						
<i>Ageratina adenophora</i>	Mexican devil			x		x
<i>Ageratina riparia</i>	mist flower	x	x	x	x	x
<i>Callitriche stagnalis</i>	pond water-starwort		x			x
<i>Cardamine</i> sp.	bittercress	x	x			
<i>Centaurium erythraea</i>	common centaury				x	
<i>Cerastium glomerata</i>	mouse-eared chickweed	x			x	
<i>Cirsium vulgare</i>	Scotch thistle	x	x	x	x	
<i>Digitalis purpurea</i>	foxglove	x	x	x	x	x
<i>Erigeron sumatrensis</i>	broad-leaved flea-bane		x	x	x	x
<i>Galium aparine</i>	cleavers	x	x			
<i>Gamochaeta simplicicaulis</i>	simple-stem cudweed			x	x	x
<i>Hydrocotyle bowlesioides</i> #		x	x			
<i>Hypericum androsaemum</i>	tutsan			x		
<i>Hypochaeris radicata</i>	catsear					x
<i>Jacobaea vulgaris</i>	ragwort	x			x	
<i>Leucanthemum vulgare</i>	ox-eye daisy			x		
<i>Lotus pedunculatus</i>	lotus	x	x	x	x	x
<i>Lysimachia arvensis</i> subsp. <i>arvensis</i> var. <i>arvensis</i>	scarlet pimpernel	x				

Scientific name	Common Name	Block 1	Block 2	Mangakino	Far Block	Starvation Block
<i>Mentha suaveolens</i>	apple mint					X
<i>Myosotis laxa</i> subsp. <i>caespitosa</i>	water forget-me-not	X	X			
<i>Nasturtium officinale</i>	watercress		X			
<i>Oxalis corniculata</i>	creeping woodsorrel		X			
<i>Phytolacca octandra</i>	inkweed		X			X
<i>Plantago lanceolata</i>	narrow-leaved plantain	X	X			
<i>Prunella vulgaris</i>	selfheal	X	X	X		
<i>Pulicaria dysenterica</i>	fleabane					X
<i>Ranunculus sardous</i>	hairy buttercup		X			
<i>Ranunculus repens</i>	creeping buttercup		X	X		
<i>Rubus fruticosus</i> agg.	blackberry			X		
<i>Rubus rosifolius</i>	roseleaf bramble			X		
<i>Rumex conglomeratus</i>	clustered dock		X			
<i>Scrophularia auriculata</i>	water figwort		X		X	
<i>Sison amomum</i>	stone parsley			X		
<i>Solanum mauritianum</i>	tobacco weed, woolly nightshade	X		X		X
<i>Solanum nigrum</i>	black nightshade		X			
<i>Sonchus asper</i>	prickly sow thistle		X			
<i>Stellaria media</i> subsp. <i>media</i>	chickweed		X			
<i>Ulex europaeus</i>	gorse	X	X	X	X	
<i>Veronica persica</i>	birdseye speedwell		X			
<i>Veronica serpyllifolia</i>	thyme-leaved speedwell			X		
Monocots (19)						
<i>Axonopus fissifolius</i>	carpet grass	X	X			
<i>Carex longibrachiata</i>	Australian sedge	X	X	X	X	X
<i>Carex divulsa</i>	grey sedge		X			
<i>Colocasia esculenta</i> #	taro			X		
<i>Cortaderia selloana</i>	pampas grass	X	X		X	X
<i>Crocasmia</i> × <i>crocosmiiflora</i>	montbretia			X	X	X
<i>Cyperus eragrostis</i>	umbrella sedge	X	X		X	X
<i>Dactylis glomerata</i>	cocksfoot		X			
<i>Glyceria declinata</i>	blue sweet grass				X	
<i>Holcus lanatus</i>	Yorkshire fog	X	X	X	X	X
<i>Juncus articulatus</i>	jointed rush			X		
<i>Juncus effusus</i> var. <i>effusus</i>	soft rush	X	X	X	X	X
<i>Juncus tenuis</i>	track rush	X	X			
<i>Landoltia punctata</i>	purple-backed duckweed		X			
<i>Lolium arundinaceum</i>	tall fescue					X
<i>Paspalum dilatatum</i>	paspalum			X		X
<i>Paspalum distichum</i>	mercier grass	X	X			X
<i>Sporobolus africanus</i>	African ratstail			X		
<i>Zantedeschia aethiopica</i>	arum lily		X			

C. Bryophytes (13)

Mosses (7)

<i>Achrophyllum quadrifarium</i> #	<i>Macromitrium</i> sp.
<i>Cyathophorum bulbosum</i>	<i>Ptychomnion aciculare</i>
<i>Hypnum cupressiforme</i> #	<i>Weymouthia mollis</i>
<i>Leucobryum javense</i>	

Liverworts (6)

<i>Leiomitra lanata</i>	<i>Riccardia crassa</i>
<i>Pallavicinia innovans</i> #	<i>Symphyogyna hymenophyllum</i>
<i>Radula marginata</i>	<i>Trichocolea mollissima</i>

D. Lichens (85)

<i>Anzia entingiana</i> #	AK382293	<i>Leioderma erythrocarpum</i> #	<i>Pseudocyphellaria carpoloma</i> #		
<i>Baeomyces heteromorphus</i>		<i>Leparia finkii</i>	<i>Pseudocyphellaria chloroleuca</i>		
<i>Biatoropsis usnearum</i> #	AK381501	<i>Leptogium coralloideum</i>	AK381497	<i>Pseudocyphellaria crocata</i> agg. #	
<i>Brigantiaea chrysosticta</i> #		<i>Leptogium cyanescens</i>		<i>Pseudocyphellaria dissimilis</i>	
<i>Byssoloma subdiscordans</i>		<i>Leptogium oceanianum</i>	AK381506	<i>Pseudocyphellaria episticta</i>	
<i>Calopadia subcoerulescens</i>	AK383428	<i>Megaloblastenia marginiflexa</i> #		<i>Pseudocyphellaria glabra</i>	
<i>Cladia</i> aff. <i>inflata</i>		<i>Megalospora gompholoma</i> subsp. <i>gompholoma</i>		<i>Pseudocyphellaria hookeri</i> #	
<i>Cladonia darwinii</i>		<i>Menegazzia aucklandica</i>	AK381505	<i>Pseudocyphellaria intricata</i>	
<i>Cladonia floerkeana</i> #		<i>Menegazzia eperforata</i>		<i>Pseudocyphellaria lividofusca</i> #	
<i>Coccocarpia erythroxyli</i> #		<i>Menegazzia neozelandica</i>		<i>Pseudocyphellaria multifida</i>	
<i>Coccocarpia pellita</i>		<i>Notoparmelia erumpens</i>		<i>Pseudocyphellaria rufovirescens</i>	
<i>Coenogonium implexum</i>		<i>Notoparmelia novae-zelandiae</i> #	AK382292	<i>Psoroma asperellum</i> #	
<i>Coenogonium lutescens</i>		<i>Notoparmelia testacea</i>		<i>Psoromidium aleuroides</i> #	
<i>Collema leucocarpum</i> #		<i>Ochrolechia pallescens</i> #	AK383375	<i>Podostictina pickeringii</i>	
<i>Collema subflaccidum</i>		<i>Pannaria allorhiza</i> #		<i>Porina exocha</i>	
<i>Collema subconveniens</i> #		<i>Pannaria aotearoana</i> #		<i>Ramalina celastri</i>	
<i>Chrysothrix xanthina</i> #		<i>Pannaria delicata</i> #		<i>Ramalina geniculata</i> #	AK381504
<i>Crocodia aurata</i> #		<i>Pannaria fulvescens</i> #	AK381499	<i>Ramalina pacifica</i> #	AK381503
<i>Degelia gayana</i> #		<i>Pannaria implexa</i>		<i>Ramalina peruviana</i>	
<i>Dibaeis absoluta</i>		<i>Pannaria leproloma</i> #		<i>Stereocaulon ramulosum</i>	
<i>Dibaeis arcuata</i>		<i>Pannaria minutiphylla</i> #		<i>Sticta fuliginosa</i>	
<i>Dirinaria picta</i>		<i>Pannaria aff. minutiphylla</i>		<i>Sticta limbata</i> #	AK381498, AK383430
<i>Erioderma leylandii</i> #	AK381500	<i>Parmotrema austrocestratum</i>		<i>Stirtoniella kelica</i> #	
<i>Flavoparmelia haywardiana</i>		<i>Parmotrema crinitum</i>		<i>Teloschistes flavicans</i> #	
<i>Gabura fascicularis</i> var. <i>fascicularis</i> #		<i>Parmotrema reticulatum</i>		<i>Usnea angulata</i> #	
<i>Heterodermia japonica</i>		<i>Parmotrema robustum</i>		<i>Usnea baileyi</i> #	AK382260
<i>Heterodermia leucomelos</i>		<i>Peltigera nana</i>		<i>Usnea nidifica</i> #	AK381496
<i>Hypogymnia subphysodes</i> #	AK383429	<i>Phlyctis</i> sp.		<i>Usnea rubicunda</i>	
<i>Hypotrachyna jamesii</i> #	AK383431	<i>Phyllospora</i> sp.		<i>Yarrumia coronata</i> #	
<i>Hypotrachyna minarum</i> #		<i>Physcia poncinsii</i>			
<i>Lecanactis</i> sp.					

E. Fungi (3)

<i>Amanita nothofagi</i> #
<i>Gliphorus graminicolor</i> #
<i>Hygrocybe astatogala</i> #