

Birds

fantail	tui
grey warbler	spotless crane – historical
Indian myna *	record from the raupo wetland
kereru	(Chris Floyd pers. comm.)

Mammals

rabbits – droppings by upper road and beach, also nikau seedlings chewed in forest

predator traps - frequent to catch stoats, hedgehogs and rats (Chris Floyd pers. comm.)

The vegetation and vascular flora of Pine Valley Forest, Dairy Flat

Marley Ford & Nick Goldwater

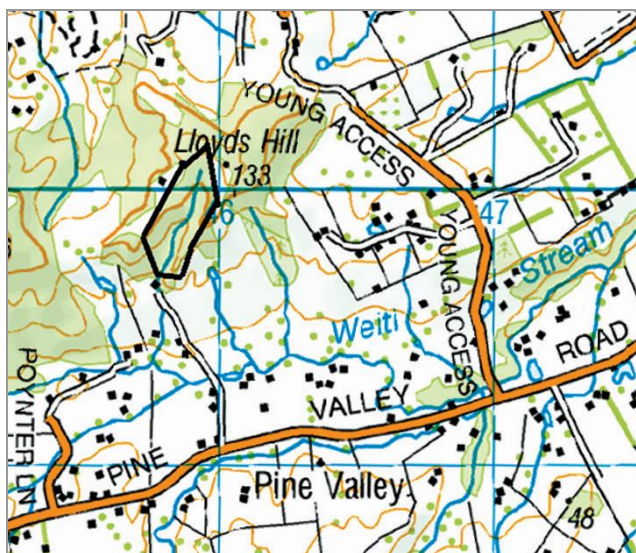


Fig. 1. Location of the study area (delineated by black outline). Topo50 map modified by Joshua Salter. Sourced from www.topomap.co.nz

'Pine Valley Forest' is a six-hectare kauri (*Agathis australis*)-podocarp-broadleaved species forest remnant located on privately owned land near Pine Valley Road, Dairy Flat. The site is characterised by steep forested gullies and spurs and is drained by a permanent stream that at its downstream extent flows through a small wetland at the southern end of the forest (Fig. 1). The forest is in the Rodney Ecological District (Mitchell et al. 1983) and, under the Singers et al. (2017) classification, the ecosystem type of this remnant would be classified as a 'WF11 – kauri, podocarp, broadleaved forest' – a forest type that has 'Endangered' status under the regional IUCN threat classification. This forest is representative of what once covered the northern Auckland Region, but has now been reduced to fragmented relics that persist in rural and urban areas. The preservation and study of this privately owned forest remnant will help the work towards the protection and enhancement of biodiversity within the Auckland



Fig. 2. Mixed conifer forest of kauri and tanekaha on ridge with sparse understorey. All photos except Fig. 9 by M. Ford, 16 Jun 2019.

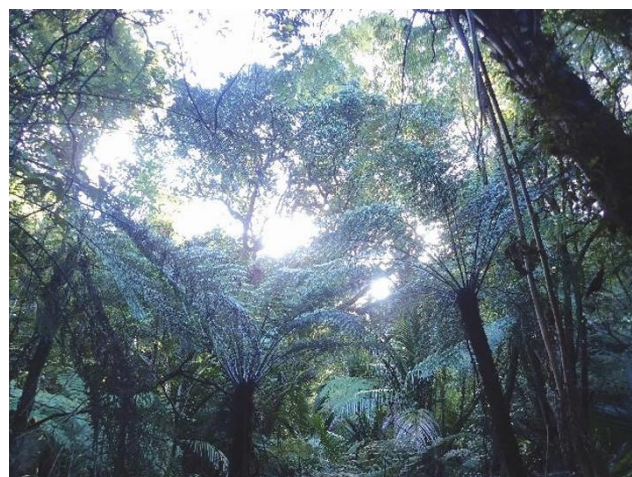


Fig. 3. Gully forest which supports a dense sub-canopy of ponga and nikau under a canopy of pūriri and taraire.

Region. This article is based on a field survey carried out by the authors on the 16th of June 2019. See Appendix for a list of the vascular species observed.

Geology

Pine Valley Forest occurs on the East Coast Bays formation of the Warkworth subgroup (Waitemata Group) (Heron 2014). It is Neogene sedimentary rock consisting of alternating sandstone and mudstone with variable volcanic content (Heron 2014). According to Fieldes' map of New Zealand soils (Fieldes 1968) the Dairy Flat soil type is Northern Yellow-brown earth, an intergrade podzolised soil. The Landcare Research Soil Map Viewer (Manaaki Whenua 2020a) shows the soil as ultic – these are “strongly weathered soils with a well-structured, clay-enriched subsoil horizon that frequently occurs immediately beneath the topsoil” (Manaaki Whenua 2020b). The soils of Pine Valley Forest are acidic and strongly leached, “generally with low levels of calcium and other basic cations” (Manaaki Whenua, 2020b).

Vegetation communities

Two main forest types are present at the site: mixed conifer-kānuka (*Kunzea robusta*) forest (Fig. 2) on the ridges, and gullies dominated by broadleaved tree species (Fig. 3). The mixed conifer forest is largely confined to steep slopes where drier conditions prevail. The dominant species are kauri and tanekaha (*Phyllocladus trichomanoides*) with frequent tall kānuka (c.15 m high) and occasional ponga (*Cyathea dealbata*), horoeka (*Pseudopanax crassifolius*) and hangehange (*Geniostoma ligustrifolium*) in the sub-canopy. The understorey is generally sparse underneath as in Figure 2, with the monocots *Cordyline pumilo* and *Gahnia pauciflora* scattered throughout. Mature pūriri (*Vitex lucens*) and taraire (*Beilschmiedia tarairi*) are frequent on the lower slopes and the gully floor (Fig. 4). The dense sub-canopy commonly consists of ponga and nīkau (*Rhopalostylis sapida*) (Fig. 3) with the vine kareao (*Ripogonum scandens*) common throughout, particularly in shaded, damper areas. Parataniwha (*Elatostema rugosum*) is locally common in the ground tier along the downstream reach of the gully floor.

A small area of gumland-like vegetation occurs on the upper ridges in the northwest part of the remnant. The vegetation here is characterised by species such as *Dracophyllum sinclairii* and the sedges *Schoenus tendo* and *Tetraria capillaris*.

Past browsing pressure from feral goats (*Capra hircus*) and fallow deer (*Dama dama*), together with the depredations of ship rats (*Rattus rattus*) and possums (*Trichosurus vulpecula*), have contributed to a sparse understorey tier throughout much of the

forest (Fig. 2). However, pest control efforts (trapping and baiting) undertaken over the past decade or so, as well as the installation of a stock-proof fence, have resulted in a noticeable recovery in some parts of the forest (Fig. 3). Pest animal densities are now at low enough levels to ensure the ecological viability of this forest. Figure 5 shows regenerating kiokio (*Parablechnum novae-zelandiae*) and ponga and a stand of kahikātoa (*Leptospermum* aff. *scoparium*) (a “Auckland”) in the background.

Flora observations

Orchids included the common *Acianthus sinclairii* scattered throughout the forest understorey while *Pterostylis brumalis* was seen in flower on the drier ridges under kauri and tanekaha. Patches of *P. trullifolia* were beginning to flower and the rosettes of *P. alobula* were seen scattered in the dry kauri leaf litter growing in the moss *Leucobryum javense* (Fig. 6). The small strap fern *Notogrammitis ciliata* (Fig. 7) was a locally common terrestrial fern seen at the base of the conifer forest growing on the steeper terrain. This species is distinguished from the much rarer *Notogrammitis rawlingsii* by the presence of white hairs. Surprisingly, given the inland location, a stunted pōhutukawa (*Metrosideros excelsa*) was seen on a dry ridge amongst podocarps; its occurrence seems to be of natural origin. Other species that occur rarely in this forest include hard beech (*Fuscopora truncata*; at least two mature trees), matai (*Prumnopitys taxifolia*; one semi-mature tree) and common broom (*Carmichaelia australis*; one browsed sapling).

In the litter of a stand of kauri, a few caps of the mushroom *Entoloma canoconicum* were observed (Fig. 8) (see <https://inaturalist.nz/observations/27259097>). This species is a close relative of the blue *Entoloma hochstetteri* – the mushroom illustrated on the New Zealand fifty-dollar note. Other fungi observed in the forest include: the diminutive orange pore fungus (*Favolaschia calocera*, <https://inaturalist.nz/observations/33416000>); the parasol species *Macrolepiota clelandii*, (<https://inaturalist.nz/observations/46050943>); and hare's foot inkcap (*Coprinopsis lagopus*, <https://inaturalist.nz/observations/28762340>, Fig. 9). In contrast to the relatively large number of fungal species observed in the forest remnant over the years, there appears to be a noticeable lack of lichen diversity. This could be explained by: 1. a lack of light in the forest of the relatively south-facing gully, or 2. a young forest without the diversity of a more mature one, or 3. a biased survey by time-limited observers focused on vascular plants.

With the exception of a few prickly hakea (*Hakea sericea*) and the occasional monkey apple (*Syzygium*



Figs. 4–9: 4. Taraire and nīkau canopy with kareao and the depauperate understory due to past browsing. 5. Dense vegetation in open area of forest at ridge top. Kiokio and ponga are common with leafy coprosma species and kahikātoa behind. 6. The orchids *Pterostylis trullifolia*, *P. alobula* and *Acianthus sinclairii* growing in the moss *Leucobryum javense* under kauri. 7. The small strap fern *Notogrammitis ciliata* was locally common on the ground at the base of kauri. 8. The grey cap of the fungus *Entoloma canoconicum* poking through the coniferous leaf litter. 9. The delicate gilled fungus *Coprinopsis lagopus* growing in dappled light. Photo: N. Goldwater. 16 June 2019.

smithii) sapling – all of which have since been removed (by author NG) – the main area of forest is free of environmental pest plant species. Tradescantia (*Tradescantia fluminensis*) was once locally common near the downstream reach of the stream, although this infestation has largely been eliminated. Small patches of tradescantia

persist on the forest edge close to the landowner's house, as do scattered arum lilies (*Zantedeschia aethiopica*).

Threatened Species

Several rare species have been recorded by Maureen Young in forest remnants to the west of Pine Valley

Forest. These include *Notogrammitis rawlingsii* (AK 330138), which is classified as Nationally At Risk – Sparse (de Lange et al. 2018); the Regionally Endangered *Pimelea longifolia* (Stanley et al. 2005) (AK 330137); and the regionally uncommon *Nestegis montana* (AK 330135). None of these species were observed at Pine Valley Forest.

A few plants of *Mida salicifolia* (Nationally At Risk – Declining) were recorded from the site, and this species is often seen in such remnants in the North Auckland area. Two threatened plant species have been planted in the small wetland at the southern end of the remnant: *Astelia grandis* (Regionally Critical) and *Syzygium maire* (Regionally in Gradual Decline). In the past, these species would have been more common in the local area before extensive drainage of lowland wetlands for agricultural purposes (Brake & Peart 2013).

Vertebrate Fauna

A seven-wire fence surrounds the forest to exclude stock and pest animal species such as feral goats and fallow deer. Figures 2 and 4 show the sparse undergrowth vegetation resulting from past grazing. Pine Valley Forest is private land and landowners maintain fences and undertake pest control to work towards the preservation of this forest remnant. There is a network of 15 GoodNature self-resetting traps established in the forest, which has been effective in suppressing rat and possum numbers.

References

- Brake, L., Peart, R. 2013: Treasuring Our Biodiversity: *An EDS Guide to the Protection of New Zealand's Indigenous Habitats and Species*. Environmental Defence Society.
- Stanley, R., de Lange, P., Cameron, E.K. 2005: Auckland Regional Threatened & Uncommon Vascular Plant List. *Auckland Botanical Society Journal* 60(2): 152-157.
- 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.; Breitwieser, I.; Schönberger, I.; Hindmarsh-Walls, R.; Heenan, P.B.; Ladley, K. 2018: Conservation status of New Zealand indigenous vascular plants, 2017. *New Zealand Threat Classification Series* 22: 1–82.
- Fieldes, M. 1968: Soils of New Zealand, Part 1. *New Zealand Soil Bureau Bulletin* 26(2).
- Heron, D. W. 2014: Geology Map of New Zealand 1:250 000: GNS Science Geological Map 1.
- Manaaki Whenua 2020a: *New Zealand Soil Classification*. Soil Map Viewer. <https://soils-maps.landcareresearch.co.nz/>
- Manaaki Whenua 2020b: *Ultic Soils [U]*. Soil Orders. <https://soils.landcareresearch.co.nz/describing-soils/nzsc/soil-order/ultic-soils>
- Mitchell, N. D.; Campbell, G. H.; Cutting, M. L. 1983: Rodney Ecological District. *Survey Report for the Protected Natural Areas Programme, 1984*.
- Singers, N. J.; Osborne, B.; Lovegrove, T.; Jamieson, A.; Boow, J.; Sawyer, J. W. D.; Hill, K.; Andrews, J.; Hill, S.; Webb, C. 2017: *Indigenous terrestrial and wetland ecosystems of Auckland*. Auckland Council, Te Kaunihera o Tāmaki Makaurau.

The toxin cholecalciferol is used periodically to achieve a rapid knock-down of pests at the beginning of bird-breeding season.

During the survey, tūi (*Prosthemadera novaeseelandiae* subsp. *novaeseelandiae*) and Eastern rosella (*Platycercus eximius* subsp. *eximius*) were commonly heard, while pīwakawaka (*Rhipidura fuliginosa* subsp. *placabilis*), silvereye/tauhou (*Zosterops lateralis*), and riroriro (*Gerygone igata*) were present but more subdued. Ruru (*Ninox novaeseelandiae*) are frequently heard at night (owner's observation). A pair of kereru (*Hemiphaga novaeseelandiae*) is resident in this forest and the birds will often investigate when the traps are being serviced (N. Goldwater, pers. obs.). Shining cuckoo (*Chrysococcyx lucidus*) are also regular visitors to the forest in summer. Conspicuous exotic bird species include chaffinch (*Fringilla coelebs*), myna (*Acridotheres tristis*), thrush (*Turdus philomelos*), and eastern rosella.

Copper skinks (*Oligosoma aeneum*) and ornate skinks (*O. ornatum*) have been observed near the southern end of the forest, and plague skinks (*Lampropholis delicata*) frequently occur near the house (N. Goldwater, pers. obs.). Banded kōkopu (*Galaxias fasciatus*) and kōura (*Paranephrops planifrons*) are present in shaded pools in the permanent stream.

Appendix. Pine Valley Forest vascular plants.

Listed are 133 natives and 27 exotics (numbers in brackets: natives + exotics), totalling 160 taxa.

* = Exotic PL = Planted

Ferns and allies 35 (35+0)

Abrodictyum elongatum

Adiantum cunninghamii

Adiantum fulvum

Asplenium bulbiferum

Asplenium flaccidum

Asplenium oblongifolium

Asplenium polyodon

Austroblechnum lanceolatum

Cyathea dealbata

Cyathea medullaris

Dendroconche scandens

Deparia petersenii subsp. *congrua*

Dicksonia squarrosa

Diploblechnum fraseri
Doodia australis
Gleichenia microphylla
Hymenophyllum demissum
Hymenophyllum flabellatum
Hymenophyllum nephrophyllum
Hymenophyllum revolutum
Icarus filiformis
Lindsaea trichomanoides
Lastreopsis glabella
Lastreopsis hispida
Lycopodium volubile
Lygodium articulatum
Notogrammitis ciliata
Parablechnum novae-zelandiae
Pneumatopteris pennigera
Pteridium esculentum
Pteris tremula
Pyrrosia elaeagnifolia
Tmesipteris elongata
Tmesipteris lanceolata
Tmesipteris tannensis

Conifers 8 (6 + 2)

Agathis australis
Dacrycarpus dacrydioides
Dacrydium cupressinum
Pectinopitys ferruginea
Pinus pinaster *
Pinus radiata *
Podocarpus totara var. *totara*
Prumnopitys taxifolia

Dicots 62 (45+ 17)

Alseuosmia macrophylla
Alseuosmia quercifolia
Beilschmiedia tarairi
Beilschmiedia tawa
Carmichaelia australis
Carpodetus serratus
Cirsium vulgare *
Camellia japonica *
Callitriche muelleri
Centella uniflora
Coprosma arborea
Coprosma autumnalis
Coprosma lucida

Coprosma rhamnoides
Coprosma robusta
Dracophyllum sinclairii
Drosera auriculata
Dysoxylum spectabile
Elatostema rugosum
Erigeron sumatrensis *
Fuchsia excorticata PL
Fuscospora truncata
Galium divaricatum *
Geniostoma ligustrifolium var. *ligustrifolium*
Geranium homeanum
Griselinia lucida
Hakea sericea *
Hedycarya arborea
Impatiens sodenii *
Knightia excelsa
Kunzea robusta
Lepidium didymium *
Leptospermum aff. *scoparium* (a)
 "Auckland" AK 284541 (de Lange et al. 2018)
Leucopogon fasciculatus
Meliccytus macrophyllus
Meliccytus ramiflorus ssp. *ramiflorus*
Metrosideros diffusa
Metrosideros excelsa
Metrosideros fulgens
Metrosideros perforata
Mida salicifolia
Myrsine australis
Myrsine salicina
Nertera dichondrifolia
Nestegis lanceolata
Oenanthe pimpinelloides *
Olearia furfuracea
Olearia rani var. *rani*
Oxalis incarnata *
Plantago lanceolata *
Plectranthus ecklonii *
Pseudopanax crassifolius
Prunella vulgaris *
Ranunculus repens *
Rubus australis
Rubus cissoides
Schefflera digitata
Solanum mauritianum *

Streblus heterophyllus
Syzygium maire PL
Ulex europaeus *
Veronica persica *
Veronica serpyllifolia *
Vitex lucens

Monocots 37 (29+ 8)

Acianthus sinclairii
Astelia grandis PL
Astelia hastata
Astelia trinervia
Carex banksiana
Carex dissita
Carex divulsa *
Carex lambertiana
Carex lessoniana
Carex ochrosaccus
Carex uncinata
Cordyline australis
Cordyline pumilio
Cyperus eragrostis *
Dactylis glomerata *

Digitalis purpurea *
Earina mucronata
Freycinetia banksii
Gahnia pauciflora
Gahnia xanthocarpa
Holcus lanatus *
Isolepis reticularis
Juncus effusus var. *effusus* *
Juncus planifolius
Lemna disperma
Microlaena stipoides
Oplismenus hirtellus subsp. *imbecillis*
Phormium tenax
Pterostylis brumalis
Pterostylis trullifolia
Rhopalostylis sapida
Ripogonum scandens
Schoenus maschalinus
Schoenus tendo
Tetraria capillaris
Tradescantia fluminensis *
Zantedeschia aethiopica *

Recolonisation of plants following fires on two of Auckland's volcanic cones

Ben Goodwin

In late 2019, fires occurred on three of Auckland's volcanic cones (maunga). The first two affected Maungawhau (Mount Eden) and Maungarei (Mount Wellington) on Guy Fawkes night (5 November), and were caused by fireworks. The third, and largest, occurred some weeks later (11 December) on the Māngere cone, and appears to have been caused by arson. I visited the sites at Māngere and Maungarei on seven occasions each, during 2019–2020, to observe the recolonisation of plants within the burnt areas. I also made a single, brief trip to each site in March 2021, to determine slightly longer-term changes. Unfortunately, the fire on Maungawhau (Mount Eden) occurred within the crater, which is not publicly accessible for cultural reasons.

Auckland's volcanic cones have a long history of fires. Naturalists and commentators from the mid-

nineteenth century describe landscapes and plants (e.g. *Pteridium esculentum*, *Coriaria arborea* and 'brushwood') typical of areas modified by fire. Pioneer missionary John Gare Butler ascended Maungarei in 1820 with Ngati Paoa chief Te Hinaki and noted: "...the grass and fern growing upon burnt earth and calcined cinders..." (Butler 1927: p. 97). Ernst Dieffenbach, in 1841, noted that the crater of Maungakiekie was "...overgrown inside with brushwood..." (Dieffenbach 1843: p. 459). William Colenso, in 1842 commented on the landscape in the vicinity of Penrose and Otahuhu: "the eye wanders over a succession of low volcanic hills bearing nothing but the monotonous brown fern, with here and there a shrub of *Coriaria*..." (Colenso 1846: p. 117). John Logan Campbell, regarding Ōhinerangi (Mount Hobson) in the 1840s, describes his ascent to the summit: "It was pretty stiff scrambling over the