

WANGANUI PLANT LIST NO. 86

INDIGENOUS HIGHER PLANTS OF MCPHERSON BUSH¹, SUTHERLAND BUSH², LAIRD BUSH³ AND NGARURU⁴ AND NAMUNAMU⁵ LAKES, LOWER

TURAKINA VALLEY

- ¹ Grid ref: N138 848857; alt. c. 200 ft
² Grid ref: N138 875900; alt. c. 300 ft
⁴ Grid ref: N138 955920;)
⁵ Grid ref: N138 967925;) alt. 500 - 1000 ft

AP Druce, Botany Division, DSIR

April 1978 (based on visits 1976 and 1979) revised Jan 1979, June 1979,
May 1980, April 1981, Aug 1982, June 1984, Oct 1988. Jan 1990¹

NB: It is not clear whether Druce visited 'Sutherlands No. 2', and his list for the two lakes does not specify which species were in which lake. In the case of the lakes, all Druce records have been placed under L Ngaruru, pending new surveys of each lake)

Wanganui Botanical Group (R Springer)

April 1995 (Sutherlands No. 1), 1 Dec 1996 (Sutherlands No. 2).

Peter White (RFBPS)

Nov. 1998 (McPherson's, Sutherland's No. 2, Laird's)

Wanganui Botanical Group (Colin Ogle)

4 Oct 2004; 4 June 2005

Errors corrected and nomenclature last revised 8 June 2005

Druce's list was typed by DoC Wanganui in July 1995 and extra columns were created to recognise two parts of Sutherlands Bush and to separate the data for the two lakes.

unc/u = uncommon; p=planted; p+ = planted + naturally occurring

(M) - McPherson Bush (Jan 1990)

(S1) - Sutherland Bush (Turakina Valley Rd) - Druce's distributions had all been listed under "S1" during typing in July 1995.

(S2) - Sutherland Bush (Mangahoe Rd)

(L) - Laird Bush

(Ng) - Ngaruru Lake) – Druce combined the 2 lakes under "N" in his list. (Nm) - Namunamu Lake) during typing in July 1995, we listed them all in column "Ng", pending re-survey.

! new record for list 4 June 2005

¹ Druce's plant list states "plants present in all areas unless otherwise indicated". In typing Druce's list, we have taken this literally and marked each species as present in M,S1, L and Ng, except where Druce stated the species was present in a smaller range of sites. C C Ogle, June 1999.

Formal Name	Common Name	Locations					
		M	S1	S2	L	Ng	Nm
<u>GYMNOSPERM TREES</u>							
Agathis australis (planted only)	kauri	3					
Dacrycarpus dacrydioides	kahikatea	x	x	x	p+	x	
Dacrydium cupressinum	rimu	u	x	x	x	x	
Podocarpus totara s.s.	totara	x	x	x	p+	x	
Prumnopitys ferruginea (unc)	miro	u	u	u	x		
Prumnopitys taxifolia	matai	x	x	x		x	
<u>MONOCOT TREES AND SHRUBS</u>							
Cordyline australis	ti kouka, cabbage tree	x	x	x	p+	x	
Cordyline banksii	ti ngahere	u				u	
Cordyline australis x C. banksii (unc) ²							
Rhopalostylis sapida	nikau	u		u		u	
<u>DICOT TREES & SHRUBS</u>							
Alectryon excelsus var. excelsus	titoki	x	x	x	x	x	
Aristotelia serrata	makomako, wineberry		u	u			
Beilschmiedia tawa	tawa	x	x	x			
Brachyglottis repanda s.s.	rangiora	x	x	x	x	x	
Carmichaelia australis	native broom		x			x	
Carpodetus serratus	putaputaweta	x	x	x			
Coprosma areolata		x	x	x			
Coprosma crassifolia			u		u		
Coprosma grandifolia	raurekau	x	x	x	x		
Coprosma lucida	shining karamu	x	x	x			
Coprosma rhamnoides esp. rhamnoides		x	x	x	x	x	
Coprosma rigida			u	u	u		
Coprosma robusta	karamu	x	x	x	x	x	
Coprosma rotundifolia	round-leaved Coprosma	x	x	x	x	x	
Coprosma tenuicaulis						u	
Coriaria arborea ³	tutu						
Corynocarpus laevigatus	karaka	x	x				
Elaeocarpus dentatus (incl. E.d var. obovatus)	hinau	x	x	x	x	x	
Elaeocarpus hookerianus	pokaka		u		u		
Fuchsia excorticata	kotukutuku, tree fuchsia		u	1	u	u	
Geniostoma rupestre var. ligustrifolium	hangehange	x	x	x	x	x	
Griselinia lucida	broadleaf		u			u	
Hebe stricta var. stricta	koromiko	x	x	x		x	
Hedycarya arborea	pigeonwood	x	x	x	x	x	
Helichrysum aggregatum var. aggregatum	a shrub daisy u					u	
Hoheria populnea var. lanceolata	houhere, lacebark	x	x	x	x	x	

² In general area (lower Turakina V.), but not seen in bush reserves or around lakes.

³ In general area (lower Turakina V.), but not seen in bush reserves or around lakes.

Formal Name	Common Name	Locations					
		M	S1	S2	L	Ng	Nm
<i>Knightsia excelsa</i>	rewarewa	x	x	x	x	x	
<i>Kunzea ericoides</i> var.	kanuka	x	x	x	x	x	
<i>Laurelia novae-zelandiae</i>	pukatea	l	x	u?		x	
<i>Leptospermum scoparium</i> var.	manuka	x	x	x	x	x	
<i>Leucopogon fasciculatus</i>	mingimingi		x	x		x	
<i>Lophomyrtus bullata</i>	ramarama	u	u	u	u	u	
<i>Lophomyrtus bullata</i> x <i>L. obcordata</i> (unc)		x	x		x	x	
<i>Lophomyrtus obcordata</i>	rohutu	u	u	u	u	u	
<i>Macropiper excelsum</i> var. <i>excelsum</i>	kawakawa	u	u	u	x	u	
<i>Melicope simplex</i>	poataniwha		x	x	x		
<i>Melicytus micranthus</i>	small-leaved mahoe	x	x	x	x	x	
<i>Melicytus micranthus</i> x <i>M. ramiflorus</i> (incl. <i>M. m.</i> var. <i>longiusculus</i> ?)			u	u			
<i>Melicytus ramiflorus</i> ssp. <i>ramiflorus</i>	mahoe	x	x	x	x	x	
<i>Metrosideros robusta</i>	northern rata		l!			u	
<i>Myoporum laetum</i> var. <i>laetum</i> (unc)	ngaio					x	
<i>Myrsine australis</i>	mapou	x	x	x	x	x	
<i>Myrsine salicina</i>	toro	u	u				
<i>Neomyrtus pedunculata</i> (unc)			x			x	
<i>Nestegis cunninghamii</i>	black maire	u	u	u	x	u	
<i>Nestegis lanceolata</i>	white maire	x	x	x	x	x	
<i>Nothofagus fusca</i> (planted only)	red beech	l					
<i>Nothofagus menziesii</i> (one, planted only)	silver beech	l!					
<i>Olearia rani</i> var. <i>colorata</i> (unc)	heketara	x	x		x	x	
<i>Olearia virgata</i> var. <i>virgata</i>	a shrub daisy		x			x	
<i>Pennantia corymbosa</i>	kaikomako	x	x	x	x	x	
<i>Pittosporum cornifolium</i>	perching pittosporum	u	u			u	
<i>Pittosporum eugenoides</i>	tarata, lemonwood	o	o			x	
<i>Pittosporum tenuifolium</i> ssp. <i>tenuifolium</i>	kohuhu	x	x	x	x	x	
<i>Pseudopanax arboreus</i> var. <i>arboreus</i> (unc)	five-finger	x	x	x	x		
<i>Pseudopanax crassifolius</i>	horoeka, lancewood	u	x	x	x	x	
<i>Raukawa anomalus</i>		x	x	x	x	x	
<i>Rhabdothamnus solandri</i> (unc)	taurepo	x	x	x	x		
<i>Schefflera digitata</i> (unc)	pate	u	x	u	u	x	
<i>Solanum aviculare</i> var. <i>aviculare</i>	poroporo	x	x	x		x	
<i>Sophora microphylla</i>	kowhai	x	x	x	x		
<i>Streblus heterophyllus</i>	turepo, small-leaved milktree	x	x	x	x	x	
<i>Urtica ferox</i>	shrub nettle, ongaonga	u!	u				
<i>Weinmannia racemosa</i> var. <i>racemosa</i>	kamahi	u	u				
MONOCOT LIANES							
<i>Freycinetia banksii</i> (unc)						u	
<i>Ripogonum scandens</i>		x	x	x	x	x	
DICOT LIANES							

Formal Name	Common Name	Locations					
		M	S1	S2	L	Ng	Nm
Calystegia tuguriorum		x	x				
Clematis foetida		x	x		x	x	
Clematis forsteri			x	x			
Clematis paniculata		x	u				
Metrosideros colensoi		x	x		x	x	
Metrosideros diffusa		x	x	x	x	x	
Metrosideros perforata		x					
Muehlenbeckia australis	pohuehue	x	x	x	x	x	
Parsonia capsularis	NZ jasmine	x	x	x	x	x	
Parsonia heterophylla	NZ jasmine	x	x		x		
Passiflora tetrandra	kohia, NZ passionflower	x	x	x	x		
Rubus australis	bush lawyer		u				
Rubus cissoides var. ? (unc)	bush lawyer				x	x	
Rubus schmidelioides var. schmidelioides	bush lawyer	x	x	x	x	x	
Rubus squarrosus	leafless lawyer					u	
LYCOPODS							
Huperzia varia (Lycopodium varium)	hanging clubmoss		u	u			
Tmesipteris sp. (unidentified)			x				
FERNS							
Adiantum cunninghamii	maidenhair fern		x	x		x	
Adiantum diaphanum	maidenhair fern		x				
Anarthropteris lanceolata		x	x	x	x		
Arthropteris tenella (!)		u!					
Asplenium bulbiferum s.s.	hen & chickens fern	x	x	x	x	x	
Asplenium flaccidum	hanging spleenwort	x	x	x	x	x	
Asplenium gracillimum		x!	x	x			
Asplenium hookerianum			u			u	
Asplenium oblongifolium	shining spleenwort		x	x	x	x	
Asplenium polyodon	sickle spleenwort	x	x	x	x	x	
Asplenium bulbiferum x A. flaccidum			u	u			
Azolla filiculoides ssp. rubra	floating red water fern					x	
Blechnum chambersii	lance fern, nini	x	x	x	x	x	
Blechnum colensoi	Colenso's hard fern, peretao				u		
Blechnum discolor	crown fern	u		u	u		
Blechnum filiforme	climbing blechnum	x	x	x	x		
Blechnum fluviatile agg.	creek fern, kiwakiwa	x	x	x	x	x	
Blechnum membranaceum			u	u			
Blechnum minus (of NZ authors)	swamp kiokio					x	
Blechnum novae-zelandiae	kiokio	x	x	x	x	x	
Blechnum triangularifolium	cliff kiokio			u		u	
Cyathea dealbata	ponga, silver fern	x	x	x	x	x	
Cyathea medullaris	mamaku	u	u	u	u		
Cyathea smithii	katote, soft tree fern	u		u	u	u	
Dicksonia fibrosa (unc)	wheki-ponga	x	x	u	x	x	

Formal Name	Common Name	Locations					
		M	S1	S2	L	Ng	Nm
Dicksonia squarrosa	wheki	x	x	x	x	x	
Diplazium australe		u	u				
Grammitis ciliata			u				
Histiopteris incisa	water fern, mata	u	x	u			
Hymenophyllum demissum	a filmy fern		x	x	x	x	
Hymenophyllum flabellatum	a filmy fern		?			u	
Hymenophyllum sanguinolentum agg.	a filmy fern		u		u		
Hymenophyllum scabrum	a filmy fern		u				
Hypolepis ambigua		x	x	x	x	x	
Lastreopsis glabella	smooth shield fern	x	x	x	x	x	
Lastreopsis hispida	hairy fern	x					
Lastreopsis velutina	velvet fern				u		
Leptolepia novae-zelandiae		u		x			
Leptopteris hymenophylloides		x	x	x	x	x	
Microsorium pustulatum	hound's tongue fern	x	x	x	x	x	
Microsorium scandens	fragrant fern, mokimoki	x	x	x	x	x	
Paesia scaberula	ring fern	x	x	x	x		
Pellaea rotundifolia	button fern	x	x	x	x	x	
Pellaea sp. (unnamed; cf. P.falcata/rotundifolia)		x					
Pneumatopteris pennigera	gully fern	x	x		x	x	
Polystichum neozelandicum	shield fern, pikopiko						
Polystichum wawaranum	shield fern, pikopiko	x!					
Polystichum sp. (P. nz and/or P. waw.)	shield fern, pikopiko	x	x	x	x	x	
Polystichum silvaticum				u	u	u	
Polystichum vestitum	prickly shield fern, puniu		u		u	u	
Pteridium esculentum	bracken	x	x	x	x	x	
Pteris pendula (P. macilenta of NZ authors)	sweet fern	u	u	u	u	u	
Pteris tremula	shaking brake	u	u			u	
Pyrrosia eleagnifolia	leather-leaf fern	x	x	x	x	x	
Trichomanes venosum (unc)	veined bristle fern	u	x	u	u	x	
ORCHIDS							
Bulbophyllum tuberculatum	a perching orchid	u?	u ⁴	?			
Chiloglottis cornuta			u				
Corybas trilobus s.s.	a spider orchid		x	x			
Drymoanthus adversus		u	u!				
Earina autumnalis	autumn orchid		u	u	u	u	
Earina mucronata s.s		x	x	x	x	x	
Pterostylis alobula	a hood orchid		u			u	
Pterostylis banksii	a hood orchid		x				
Winika cunninghamii	native dendrobium		x	x			
GRASSES							

⁴ Seen & collected for CHR on 2 Oct 2004 from fallen podocarps after Feb 2004 storm; flowered in cultivation May 2005 for I Bell, Mt View Rd Wanganui, and seen flowering at Sutherlands Bush 4 June 2005. CCO

Formal Name	Common Name	Locations					
		M	S1	S2	L	Ng	Nm
Cortaderia toetoe	toetoe		x	p?		x	
Echinopogon ovatus	hedgehog grass		x			x	
Microlaena avenacea	bush ricegrass	x	x	x	x	x	
Microlaena stipoides	meadow ricegrass	x	x			x	
Oplismenus imbecillis			x				
Poa anceps ssp. anceps		u!	x				
Poa imbecilla						u	
Rytidosperma clavatum	danthonia		x			x	
Rytidosperma unarede	danthonia		x				
SEDGES		u					
Baumea tenax		u	u				
Carex dipsacea var. dipsacea						u	
Carex dissita			x				
Carex flagellifera						u	
Carex forsteri			x				
Carex geminata s.s.	cutty grass		x	x		x	
Carex inversa			x			x	
Carex lambertiana		x	x				
Carex secta s.s	purei			x		x	
Carex solandri			x	x	x		
Carex testacea s.s			x				
Carex virgata	cutty grass	x	x			x	
Carex sp (unnamed; aff. C.geminata) (much larger than C. geminata; lvs up to 2.5cm wide)	cutty grass	u					
Gahnia setifolia (unc) ⁵							
Isolepis reticularis			x				
Schoenoplectus tabernaemontani	kapungawha	u					
Schoenus maschalinus			u				
Uncinia banksii	a hook sedge		x			x	
Uncinia distans	a hook sedge		x				
Uncinia ferruginea	a hook sedge		u				
Uncinia scabra	a hook sedge		x			x	
Uncinia uncinata	a hook sedge	x	x	x	x	x	
RUSHES							
Juncus australis	a leafless rush					x	
Juncus edgariae	a leafless rush	x!				x	
Juncus pallidus	a leafless rush					x	
Juncus sarophorus	a leafless rush					x	
Luzula picta s.s.	woodrush	x	x		x	x	

⁵ In general area (lower Turakina V.), but not seen in bush reserves or around lakes.
WGNCO-54179 Wanganui plant list 86 McPherson's, Sutherland's,.doc

Formal Name	Common Name	Locations					
		M	S1	S2	L	Ng	Nm
MONOCOT HERBS (OTHER THAN ORCHIDS, GRASSES, SEDGES, RUSHES)							
<i>Arthropodium candidum</i>	dwarf renga lily		x				
<i>Astelia fragrans</i>			u	u			u
<i>Collospermum hastatum</i>		x	x	x	x		x
<i>Collospermum microspermum</i>			x	x	x		
<i>Dianella nigra</i>	turutu, blueberry		x				
<i>Lemna</i> sp (L minor auct NZ)	duckweed						x
<i>Libertia ixioides</i>	bush iris		u				
<i>Phormium cookianum</i>	wharariki, mountain flax	u!	x				
<i>Phormium tenax</i>	harakeke, swamp flax	u	p ⁶	p?			
<i>Potamogeton cheesemanii</i>	floating pondweed						x
<i>Typha orientalis</i>	raupo	x					x
COMPOSITE HERBS							
<i>Cotula coronopifolia</i>	batchelor's button						
<i>Euchiton audax</i>	a cudweed						x
<i>Euchiton collinus</i> (<i>Gnaphalium gymnocephalum</i>)	a cudweed		x				x
<i>Euchiton sphaericus</i> u	a cudweed		u				
<i>Pseudognaphalium</i> sp (<i>P. luteo-album</i> agg. (lvs mostly lin-spath to linear, acute tips)	a cudweed						x
<i>Senecio glomeratus</i>	a native fireweed		o!				
<i>Senecio minimus</i>	a native fireweed		u!				x
<i>Senecio rufiglandulosus</i> var. (unc) ⁷							
DICOT HERBS OTHER THAN COMPOSITES							
<i>Acaena anserinifolia</i>	piripiri, bidibid		x	x			x
<i>Australina pusilla</i>				x	x		
<i>Callitriche muelleri</i>	a native starwort		u				
<i>Cardamine</i> sp. (a) (<i>C. debilis</i> agg) ("Narrow Petal" of Pritchard 1957)	a native bittercress	x	x	x	x		x
<i>Cardamine</i> sp (b) (<i>C. debilis</i> agg.) ("Long Style" of Pritchard 1957)	a native bittercress		x		x		
<i>Dichondra</i> sp. (unnamed) [slender]			x				x
<i>Epilobium nummulariifolium</i>	a willow-herb	x	x		x		x
<i>Epilobium rotundifolium</i>	a willow-herb						x
<i>Galium propinquum</i>	a native bedstraw		x				x
<i>Geranium</i> aff. <i>microphyllum</i> (unc)							x
<i>Geranium potentilloides</i> var. <i>potentilloides</i>							x
<i>Haloragis erecta</i> ssp. <i>erecta</i> (unc)		x	x		u		x
<i>Hydrocotyle elongata</i>	forest pennywort	x	x	x	x		x

⁶ Planted only?

⁷ In general area (lower Turakina V.), but not seen in bush reserves or around lakes.
WGNCO-54179 Wanganui plant list 86 McPherson's, Sutherland's,.doc

Formal Name	Common Name	Locations					
		M	S1	S2	L	Ng	Nm
Hydrocotyle heteromeria	waxweed	x	x				
Hydrocotyle moschata	hairy pennywort					x	
Hydrocotyle novae-zeelandiae s.s.	swamp pennywort					x	
Leptostigma setulosum						x	
Mazus novaezeelandiae (ssp. novaezeelandiae?)	dwarf mazus	u					
Myriophyllum sp. (unidentified)	milfoil					x	
Nertera depressa (incl. N. cunninghamii)						u	
Oxalis exilis	creeping oxalis	x	x		x	x	
Parietaria debilis					u		
Plantago raoulii var.	a native plantain					u	
Pratia angulata agg.			u				
Ranunculus amphitrichus	waoriki		u				
Ranunculus reflexus	bush buttercup	u!	x			x	
Stellaria parviflora	a native chickweed	x	x			x	
Urtica incisa	nettle		x	x	x	x	
Wahlenbergia rupestris (inc. W. colensoi)	white harebell		x			x	
Wahlenbergia violacea	blue harebell		x			x	
<u>TOTAL NO. OF SPECIES:</u>		13	182	11	10	14	0
		4		4	3	7	

(M) - McPherson Bush (Jan 1990)

(S1) - Sutherland Bush (Turakina Valley Rd) - Druce's distributions had all been listed under "S1" during typing in July 1995.

(S2) - Sutherland Bush (Mangahoe Rd)

(L) - Laird Bush

(Ng) - Ngaruru Lake) – Druce combined the 2 lakes under "N" in his list. (Nm) - Namunamu Lake) during typing in July 1995, we listed them all in column "Ng", pending re-survey.

On 4 June 2005 members of the Wanganui Museum Botanical Group visited MacPhersons Bush, partly to assess recovery of the forest following the floods of Feb. 2004. John Marsh of Rangitikei Forest and Bird told us that the flood reached 40 feet (c. 13 m) at the farm bridge just upstream on the Turakina River and that 3 m of water ponded across the valley road at the reserve entrance for about 3 weeks. Except for one elevated part, the reserve was under water most of that time. By June 2005, the most obvious impact was the death of whole stands of tawa trees on the river terraces, except for a few on the rim of the terraces where there is better drainage and probably less silt. Elsewhere, new silt to a depth of 0.5 m or more appears to have cut off air supply to the tree roots. Some dead tawa trees are already falling as their roots rot. In a few places, *Coprosma* shrubs (*C. robusta* and/or *C. grandifolia*) had also died and the odd kahikatea tree looked stressed – more deaths may yet ensue. What had been an intact canopy dominated by tawa was now open to the sky, with a massive influx of weeds. We recorded the following adventive plants on 4 June 2005:

Formal name	Common name	Abundance	Formal name	Common name	Abundance
<i>Cirsium vulgare</i>	Scotch thistle	c	<i>Ranunculus repens</i>	creeping buttercup	c
<i>Clematis vitalba</i>	old man's beard	o	<i>Rorippa sp.</i>	watercress	o
<i>Conium maculatum</i>	hemlock	o	<i>Rumex crispus</i>	curled dock	u
<i>Conyza albida</i>	fleabane	a	<i>Salix fragilis</i>	crack willow	u
<i>Dactylis glomerata</i>	cocksfoot	o	<i>Senecio bipinnatisectus</i>	Australian fireweed	o
<i>Digitalis purpurea</i>	foxglove	o	<i>Senecio jacobaea</i>	ragwort	u
<i>Galium aparine</i>	cleavers	u	<i>Solanum chenopodioides</i>	velvety nightshade	u
<i>Holcus lanatus</i>	Yorkshire fog	c	<i>Solanum nigrum</i>	black nightshade	a
<i>Hypochoeris radicata</i>	catsear	o	<i>Sonchus asper</i>	prickly sow-thistle	u
<i>Leucanthemum vulgare</i>	ox-eye daisy	u	<i>Sonchus oleraceus</i>	puwaha	U
<i>Lolium perenne</i>	perennial ryegrass	la	<i>Stachys sylvatica</i>	hedge woundwort	o
<i>Mentha pulegium</i>	pennyroyal	u	<i>Stellaria media</i>	chickweed	la
<i>Myosotis laxa</i>	water forget-me-not	o	<i>Tradescantia fluminensis</i>	wandering Jew	la
<i>Phytolacca octandra</i>	inkweed	o	<i>Verbena bonariensis</i>	purpletop	u
<i>Prunella vulgaris</i>	selfheal	u			

Abundance ratings: a = abundant; c = common; o = occasional; u = uncommon
l = local (species in small area, but can be common or abundant there)

Fleabane (*Conyza albida*) was probably the most prolific weed through the summer of 2004-05, but the one of most immediate concern for the future of the reserve is *Tradescantia*. John Marsh did not know this weed in the bush before the flood, but new patches are now common over wide areas of the lower river terraces. Seedlings of old man's beard also need eradicating before they reach flowering size. Hedge woundwort can be quite invasive in such a disturbed site and young crack willows should be removed. Most of the other weeds noted are short-lived annuals or biennials and will decrease over time as natural forest regeneration occurs.

Although wide areas of the forest appear devastated, seedlings of a number of native tree and shrub species are appearing. Some seedlings are dense over many square metres, and among the densest are kahikatea and tawa. Others noted (abundance ratings as for adventive plants in the above table) were karamu (o), lacebark (u), mahoe ©, titoki (o), pohuehue (o), kawakawa (o), poroporo (u), kanuka (1 seen), rewarewa (o), NZ jasmine (species uncertain) (o), pukatea (lc, karaka (lc). We discussed the place of karaka in this reserve (it appears to be adventive here) and whether it should be included in the targeted weeds. Young herbs such as a native fireweed (*Senecio glomeratus*) and a willowherb (*Epilobium nummulariifolium*) and young ferns such as *Pteris pendula* are also appearing in disturbed areas.

Considering the density of young tawa seedlings in places, it is likely that the previously dense, even-age stands of tawa forest on the lower terraces of the reserve began following a major flood event like the 2004 event. The big difference between then and now is the weed presence. For the future of the reserve, the challenge is to let tawa and other species regenerate again, without being swamped by weeds.

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