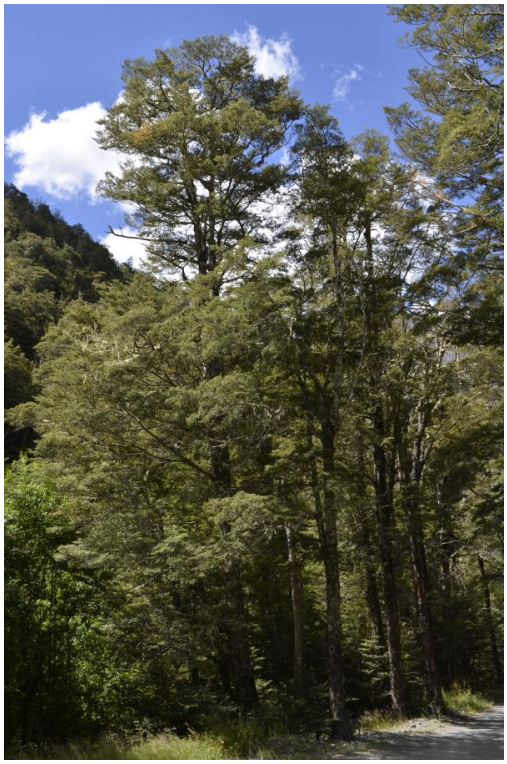
FLORA OF NEW ZEALAND

SEED PLANTS

NOTHOFAGACEAE



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Cover image: *Fuscospora cliffortioides*: mature trees.

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Contents

Introduction

Nothofagaceae is a Southern Hemisphere family of 42 species in four genera, *Fuscospora, Lophozonia, Nothofagus*, and *Trisyngyne.* Three of the four genera are represented in New Zealand: *Fuscospora* with four indigenous species, *Lophozonia* with one indigenous species, and *Nothofagus* with one naturalised species introduced from South America. Southern beech of New Zealand typically inhabit relatively infertile soils; in the lowlands in mixed forest stands with other broadleaf trees and conifers and in pure stands with increasing altitude, often forming the treeline in the subalpine zone.

Outside New Zealand, *Fuscospora* is represented by one species in each of Australia and southern South America (Chile). Similarly, *Lophozonia* has two species in Australia and four species in southern South America (Chile and Argentina). *Nothofagus* is endemic to southern South America (Chile and Argentina) with five species. *Trisyngyne* is endemic to Melanesia with c. 20 species in Indonesia (West Papua) and Papua New Guinea (including New Britain and D'Entrecasteaux Islands), and a further five species in New Caledonia.

Nothofagaceae has an abundant fossil record and is well represented by pollen that first appeared in the early Campanian of the Late Cretaceous (83.5 mya). Fossil pollen and macrofossils indicate that all four genera had diverged from each other by the Oligocene (Hill 1991).

Nothofagaceae Kuprian., *Int. Conf. Palynology* 21 (1962)

When designating the type for the family, Kuprianova (1962) gave the authority for Nothofagus incorrectly as Oerst., and incorrectly indicated the type of *Nothofagus* as *N. obliqua* Oerst.

= *Nothofageae* Baum.-Bod., *Syst. Fl. Neu-Caledonien,* 104 (1992)

= *Nothofagoideae* P.L.Wang & F.T.Pu, *Pollen Morphol. & Biogeogr. Fagac.,* 116 (2004)

Type taxon: *Nothofagus* Blume

Trees or shrubs. Monoecious. Evergreen or deciduous. Leaves, distichous, revolute when evergreen or plicate when deciduous. Stipules present, attached basally or peltate, with point of attachment associated with elongate colleters, caducous. Leaf lamina simple, pinnately veined, entire, crenate, dentate or serrate; minor leaf veins without phloem transfer cells; cuticle usually with globular glandular trichomes. Inflorescence a dichasium. Male inflorescence sessile to shortly pedunculate 1–3-flowered or a pseudanthium; perianth campanulate. Androecium 6–36 stamens; filaments long and flexible; anthers basifixed, elongate, with distal connective protrusion, proximal lobes above the point of connection, non-versatile, tetrasporangiate, dehiscing by a slit. Pollen oblate to peroblate; exine thin, with granular bacules, and small, widely spaced projections; regular foot layer and tectum; colpi 3–10, usually with raised margins. Female inflorescence sessile or shortly pedunculate, usually 3-flowered with 2 lateral trimerous flowers and 1 central dimerous flower; dichasium subtended by a cupule; perianth reduced to a minute rim. Cupule 2–4-valved, valves free throughout development, with lamellar or stalked appendages. Gynoecium: ovary inferior, 3- or 2-carpellate, each carpel with 2 pendulous anatropous ovules; ovules unitegmic; styles as many as carpels, stigmas clavate or linguiform, decurrent or weakly decurrent, glabrous, persistent. Fruit a nut, triquetrous or lenticular, 2- or 3-winged; endocarp glabrous. Cotyledons plicate, with fat reserve; endosperm absent; germination epigeal. Chromosome number n = 13.

Taxonomy: Previously, New Zealand species have been placed in either *Fagus* (Hooker 1853, 1864, Cheeseman 1906) or *Nothofagus* s.l. (Blume 1851; Cheeseman 1925; Allan 1961) in the Fagaceae. Molecular studies showed that *Nothofagus* is sister to the entire Fagales (Manos & Steele 1997; Li et al. 2004; Sauquet et al. 2012) and rejected a close relationship with Fagaceae, and in particular a sister group relationship between *Fagus* and *Nothofagus* (Kubitzki 1993). Morphological and anatomical studies (Crepet & Daghlian 1980; Nixon 1982, 1989; Jones 1986; Zheng et al. 1999; Li et al. 2004) also support the recognition of Nothofagaceae (Kuprianova 1962).

Earlier infrageneric classifications of *Nothofagus* s.l. (Steenis 1953; Philipson & Philipson 1988) based on morphology were constructed with characters that were shown to be phylogenetically uninformative; leaf vernation, deciduous or evergreen habit, and cupule valve number were convincingly argued to be the result of parallel evolution (Hill & Read 1991; Hill & Jordan 1993). A phenetic analysis by Hill & Read (1991), based on cuticular morphology, leaf morphology (including hairs and stomata) and leaf architecture, resulted in their subdividing *Nothofagus* s.l. into four subgenera consistent with the four pollen groups of extant Nothofagaceae (Cranwell 1939; Cookson 1952; Cookson & Pike 1955; Dettmann et al. 1990), i.e., *brassii*-type, *fusca a*-type, *fusca b*-type, and *menziesii*-type. A molecular analysis using the rbcL gene (Martin & Dowd 1993) provided strong support for four lineages equating to their subgenera. Subsequent DNA sequence analyses (Manos 1997; Setoguchi et al. 1997; Sauquet et al. 2012) have confirmed monophyly and the relationships among the lineages recovered by Martin & Dowd (1993).

Heenan & Smissen (2013) in new analyses using mainly the morphological data of Jordan & Hill (1999) and the published tree of Sauquet et al. (2012), showed that the four clades of Nothofagaceae are robust and well supported, with deep stem divergences, have evolutionary equivalence with other genera of Fagales, and can be circumscribed with morphological characters. They argued that these morphological and molecular differences are sufficient for recognition at the primary rank of genus, and that this classification is more informative and efficient than *Nothofagus* s.l. with four subgenera. They re-circumscribed *Nothofagus* s.l. to include five species from southern South America, reinstated *Lophozonia* and *Trisyngyne*, and described a new genus, *Fuscospora*.

Family and generic descriptions presented here are based on the New Zealand species and are therefore more narrowly circumscribed than those in Heenan & Smissen (2013), who provided family and generic descriptions based on the entire range of variation in Nothofagaceae. For Antarctic beech (*Nothofagus antarctica*), not native to New Zealand, specimens for measurements were taken from two sites where naturalisation has occurred; some of these most likely include original planted trees as well as wildling trees.

1	Leaves with solitary unicellular trichome type C present; perianth open and broadly campanulate; staminate perianth with 6–14 lobes; stamen development pseudocentrifugal, usually >20 stamens; cupule appendages stalked and glandular	*Lophozonia*
	Leaves with solitary unicellular trichome type C absent; perianth campanulate; staminate perianth with 0–4 lobes; stamen development centripetal, usually <20 stamens; cupule appendages lamellate	2
2	Evergreen, leaf vernation revolute; lamina margin entire or 1-serrate; leaves with unicellular trichome type A present	*Fuscospora*
	Deciduous, leaf vernation plicate; lamina margin double-serrate; leaves with unicellular trichome type A absent	*Nothofagus*

Distribution: Four genera and 42 species of the Southern Hemisphere; temperate New Zealand, Australia, South America, tropical Indonesia (West Papua), Papua New Guinea (incl. New Britain and D'Entrecasteaux Islands) and New Caledonia.

Biostatus:

Table 1: Number of species in New Zealand within *Nothofagaceae* Kuprian.

Category	**Number**
Indigenous (Endemic)	5
Exotic: Casual	1
Total	**6**

Recognition: Nothofagaceae comprise monoecious, evergreen or deciduous forest trees, with simple leaves and peltate or non-peltate stipules; male dichasia are small clusters of 1–3 campanulate flowers of yellow, orange or dark red stamens; the female dichasium is a cluster of 2–3 flowers, sometimes 1-flowered, the cluster subtended by a valvate cupule that becomes woody with maturity.

Fuscospora (R.S.Hill & J.Read) Heenan & Smissen, *Phytotaxa* 146: 12 (2013)

as "Fuscaspora"

≡ *Nothofagus* subgen. *Fuscospora* R.S.Hill & J.Read, *Bot. J. Linn. Soc.* 105: 69 (1991)

= *Nothofagus* sect. *Planae* Steenis, *Blumea* 7: 306 (1952) nom. illeg.

= *Nothofagus* sect. *Sempervirentes* subsect. *Quadripartitae* Steenis, *Blumea* 7: 146 (1952)

= *Nothofagus* sect. *Sempervirentes* Steenis, *Blumea* 7: 146 (1952)

= *Nothofagus* subgen. *Nothofagus* sect. *Calusparassus* subsect. *Quadripartitae* (Steenis) Steenis, *J. Arnold Arbor.* 34: 337 (1953)

= *Nothofagus* subgen. *Nothofagus* sect. *Calusparassus* subsect. *Tripartitae* Steenis, *J. Arnold Arbor.* 34: 338 (1953)

= *Pleiosyngyne* Baum.-Bod., *Syst. Fl. Neu-Caledonien,* 86 (1992) nom. inval.

= *Nothofagus* sect. *Calucechinus* subsect. *Saccofagus* Baum.-Bod., *Syst. Fl. Neu-Caledonien,* 93 (1992)

Type taxon: *Nothofagus fusca* (Hook.f.) Oerst. ≡ *Fuscospora fusca* (Hook.f.) Heenan & Smissen

Evergreen trees or shrubs up to 40 m high. Stipules peltate or non-peltate. Leaves distichous, lamina margins entire or 1-serrate; fimbrial vein incomplete; with or without large globular glandular trichomes on cuticle; with solitary unicellular trichome type A with a very small, unthickened base and with a large, unicellular, thin-walled trichome emerging; without solitary unicellular trichome type C. Stomata randomly oriented; without thickened T-pieces of cuticle at the poles separating the two guard cells; without giant stomata over the major veins; stomata size within the areoles variable. Upper epidermal cells over veins more elongate than areolar cells, with granular cell walls. Male dichasium 1–3-flowered; flowers campanulate, lobes prominent or weak, symmetric or asymmetric; stamens <20, centripetal development; anthers slightly curved, distal connective protrusion weakly developed, filament connective free, without epidermal papillae. Female dichasium with 1 central dimerous flower and 2 lateral trimerous flowers, or 1 dimerous flower and 1 trimerous flower; stigmas clavate and weakly decurrent. Cupule valves 2–4; outer surface of valves with simple trichomes; lamellae membranous becoming scarious, 1–3 rows/valve, margin entire becoming erose; nuts triquetrous or lenticular, often twisted, 3- or 2-winged.

Pollen: Peritreme, mesocolpia straight to convex; colpi short, spatulate or parallel-sided, with U-shaped ends, margins inwardly conspicuously heavily thickened, aperture 4–11 µm long, polar to equatorial lengths ratio = 0.3.

1	Lamina margins entire, smooth	2
	Lamina margins toothed	3
2	Lamina ovate to triangular-ovate, often undulate, tapered obliquely to base	*cliffortioides*
	Lamina oblong-elliptic to ovate, usually planar, tapered evenly to base	*solandri*
3	Lamina teeth sharp, apiculate, tapered obliquely to base; domatia present in the axils of the midrib and lower secondary veins on the abaxial side of the lamina	*fusca*
	Lamina teeth blunt, not apiculate, tapered equally to base; domatia absent from the axils of the midrib and lower secondary veins on the abaxial side of the lamina	*truncata*

Distribution: A genus of six species in Australia, New Zealand and Chile. *Fuscospora* is represented by one endemic species in each of Australia and Chile, and four endemic species in New Zealand.

Biostatus: Indigenous (Non-endemic).

Table 2: Number of species in New Zealand within *Fuscospora* (R.S.Hill & J.Read) Heenan & Smissen

Category	**Number**
Indigenous (Endemic)	4
Total	**4**

Hybridisation: In New Zealand hybrids have been documented between all species of *Fuscopora* the most common being that between *F. cliffortioides* and *F. solandri*. There are three formally named hybrids:

***Fuscospora* ×*apiculata* (Colenso) Heenan & Smissen**

Hybrid parentage: *Fuscospora solandri* (Hook.f.) Heenan & Smissen × *F. truncata* (Colenso) Heenan & Smissen (Cockayne & Allan 1934).

***Fuscospora* ×*blairii* (Kirk) Heenan & Smissen**

Hybrid parentage: *Fuscospora fusca* (Hook.f.) Heenan & Smissen × *F. cliffortioides* (Hook.f.) Heenan & Smissen (Cockayne & Allan 1934).

***Fuscospora* ×*dubia* (Kirk) Heenan & Smissen**

Hybrid parentage: *Fuscospora solandri* (Hook.f.) Heenan & Smissen × *F. fusca* (Hook.f.) Heenan & Smissen. (Cockayne & Atkinson 1926; Allan 1929).

Fuscospora cliffortioides (Hook.f.) Heenan & Smissen, *Phytotaxa* 146: 13 (2013)

≡ *Fagus cliffortioides* Hook.f., *Icon. Pl. 7,* 673 (1844)
≡ *Nothofagus cliffortioides* (Hook.f.) Oerst., *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* 9: 355 (1871)
≡ *Nothofagus solandri* var. *cliffortioides* (Hook.f.) Poole, *Trans. Roy. Soc. New Zealand* 85: 563 (1958)
Holotype: New Zealand. Dusky Bay, no date, '*Mr. Menzies*' (K, image) (cited by Heenan and Smissen 2013, p. 13).

Etymology: Named (in manuscript by Banks and Solander) for its resemblance to the African genus *Cliffortia*.

Vernacular names: mountain beech; tāwhairauriki

Prostrate to erect shrub to medium-sized tree, (0.45–)12–15(–25) m high; trunk short-boled and multi-stemmed or straight cylindrical, 0.5–0.75(–1) m diameter, not buttressed or flanged; crown spreading. Young branchlets terete, grooved, grey, brown or red-brown, with whitish pubescence. Stipules caducous, non-peltate, 2–3.5 mm long, oblong-oblanceolate to oblong-ovate. Leaf lamina, 4–16 ×

3.5–9 mm, ovate or triangular-ovate, coriaceous, veins indistinct, domatia absent; adaxially glossy green, glabrescent; abaxially grey-green to white, tomentose; margin entire, glabrous; apex acute to subacute, often inflexed, sometimes apiculate; base oblique; petiole 0.5–2 mm long, pubescent, sometimes pilose. Staminate inflorescences 2–4(–5)/branchlet, sessile or pedunculate to 2.0 mm long, 1 or 2 (rarely 3) flowers/dichasium, sessile to shortly pedicellate; perianth shallowly campanulate, asymmetic, 1.5–3 mm long, glabrous, green, shallowly and obtusely 3- or 4-lobed (rarely 5-lobed), margin glabrous. Stamens 7–16; filaments 1.0–3 mm long, glabrous; anthers 1.5–2.5 mm long, glabrous, dark red. Pistillate inflorescences 1 or 2/ branchlet, sessile; dichasium ovoid with (1–)2(–3) sessile flowers/cupule, trimerous and dimerous, glabrous or sparsely hairy, one trimerous flower often missing or atrophied in a 2- or 3-flowered dichasium. Mature cupule, 3–6 mm long; valves 2 or 3(rarely 4), even or uneven in length, narrow-triangular, coriaceous, pilose below or with scattered short hairs, acute; lamellae (1–)2/valve, acute. Nut 4–6 × 2.5–3.5 mm, triquetrous or lenticular, glabrous or sparsely pubescent, red-brown or brown.

Bark and wood: Bark on young trees smooth, thin, light grey to grey; bark on old trees rough and finely furrowed, grey to dark grey. Sapwood white to yellow-white when fresh, usually paler than that of *Fuscospora solandri*; heartwood black-brown or light brown when fresh.

Juvenile leaves: Often smaller than adult leaves, leaves ovate to suborbicular, with obtuse apices.

Taxonomy: Species rank was adopted for mountain beech by Heenan & Smissen (2013). They considered that mountain and black beech occur in sympatry over a wide area of the North and South Islands, have differentiated habitats, and can be distinguished by their morphology. Smissen et al. (2014) showed from DNA profiles that they are also genetically distinct although with considerable admixture at some locations. They hypothesised that they have arisen in allopatry and are in secondary contact showing hybridisation and probably introgression.

Distribution: North Island: South Auckland (Raukūmara Range, Urewera National Park, Hauhungaroa Range, Kaimanawa Range, Kaweka Range), Volcanic Plateau, Wellington (Ruahine Range, northern Tararua Range).

South Island: Nelson, Marlborough, Westland, Canterbury, Otago, Southland, Fiordland.

Biostatus: Indigenous (Endemic).

Habitat: Altitudinal range, sea level–1550 m a.s.l. (at Mt Whanokao, Raukūmara Range). Montane to sub-alpine forest and shrubland. Found in extensive pure stands in the upper montane to subalpine zones, often in association with *Lophozonia menziesii*; becoming dominant with increasing altitude and decreasing moisture, drainage and fertility; often forming the treeline as a small tree or shrub. At lower latitudes, especially in the southern parts of its range, found at sea level at sites with low fertility and impeded drainage.

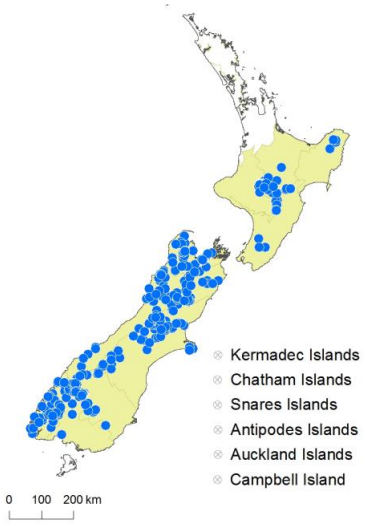

Fig. 1: *Fuscospora cliffortioides* distribution map based on databased records at AK, CHR and WELT.

Recognition: Distinguished from most other species of southern beech, except for *Fuscospora solandri*, by an entire leaf margin. Separated from *F. solandri* by an ovate to triangular-ovate lamina tapered to an oblique base and a subacute to acute apex versus a more oblong-elliptic to ovate lamina tapered equally to the base and an obtuse apex. *Fuscospora cliffortioides* is often more thickly white-tomentose on the underside of the lamina and more sparsely pilose on the cupule and flower than *F. solandri*.

Phenology: Flowering: Nov.–Jan. (mast seeding)

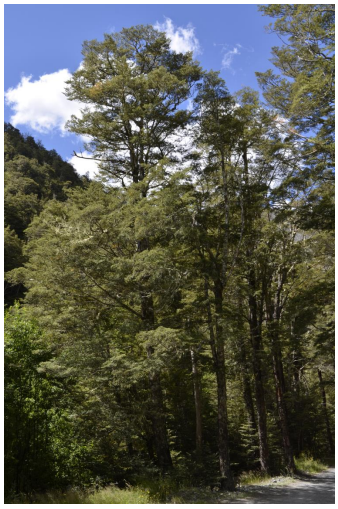

Fig. 2: *Fuscospora cliffortioides*: mature trees.

Fig. 3: *Fuscospora cliffortioides*: leaves and basally attached stipules covering leaf buds.

Fig. 4: *Fuscospora cliffortioides*: branchlets with emerging male inflorescences (dichasia).

Fig. 5: *Fuscospora cliffortioides*: a branchlet with two male and two female dichasia.

Fig. 6: *Fuscospora cliffortioides*: three female dichasia (a fourth uppermost diachasium has aborted) in leaf axials; each dichasium has two flowers (stigmata reddish), one dimerous and one trimerous.

Fig. 7: *Fuscospora cliffortioides*: mature nuts in cupules – two nuts per cupule in the top and bottom dichasia – the triquetrous nuts in near view (the middle cupule is empty).

Fig. 8: *Fuscospora cliffortioides*: winged nuts, one lenticular and one triquetrous.

Fig. 9: *Fuscospora cliffortioides*: seedlings.

Fig. 10: *Fuscospora cliffortioides*: sapling.

Fig. 11: *Fuscospora cliffortioides*: juvenile leaves.

Fig. 12: *Fuscospora cliffortioides*: bark of a young tree.

Fig. 13: *Fuscospora cliffortioides*: bark of a mature tree.

Fig. 14: *Fuscospora cliffortioides*: pure mountain beech forest at 390 m a.s.l.

Fig. 15: *Fuscospora cliffortioides*: pure mountain beech forming the treeline at approximately 1200 m a.s.l.

Fuscospora fusca (Hook.f.) Heenan & Smissen, *Phytotaxa* 146: 14 (2013)

≡ *Fagus fusca* Hook.f., *Icon. Pl. 7,* t. 630 – 631 (1844)

≡ *Nothofagus fusca* (Hook.f.) Oerst., *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* 9: 355 (1871)

Lectotype (designated by Allan 1961): New Zealand. Without locality, no date, *W. Colenso* 1767 (K, image).

Etymology: From Latin *fusca* (dark -coloured); referring to the dark, nearly black bark on mature trees.

Vernacular names: red beech; tāwhairaunui

Large tree (15–)24–30(–40) m high; trunk straight and cylindrical, 1.5–2.0(–3.0) m in diameter, usually with heavy basal flanges and root buttresses; crown massive and spreading. Young branchlets terete, grooved, red-brown to dark red, with whitish pubescence. Stipules caducous, peltate, basally bilobed or entire, 4.0–11.0 mm long, oblong to narrow oblanceolate. Leaf lamina, 12–45(–55) × 7.0–35(–40) mm, broadly ovate, broad elliptic-ovate, rhomboid-ovate to sub-orbicular, thin coriaceous, veins distinct, often with 1 or 2 fringed domatia in basal axils; adaxially glossy green, often reddish, glabrescent; abaxially lighter green to red, glabrescent; margin coarsely serrate, teeth twisted and apiculate, shortly ciliate in sinuses; apex obtuse to acute; base oblique; petiole 2–8 mm long, pubescent. Staminate inflorescences, 3–5/branchlet, on peduncles 2.0–6.5 mm long; 1–3 flowers/dichasium, sessile or on short pedicels to 1.5 mm long; perianth campanulate, 4.0–6.2 mm long, glabrous or hairy, stramineous often tinged red or pink, with 3–5 prominent obtuse to acute lobes, margin glabrous. Stamens 6–20; filaments 3.0–6.0 mm long, glabrous; anthers 3.5–5.0 mm long, glabrous, yellow or red. Pistillate inflorescences, 1–3/branchlet, sessile or subsessile; dichasium, ovoid to globose, with (2)–3 sessile flowers/cupule, flowers trimerous and dimerous, sparsely hairy. Mature cupule woody, 5–8 mm long; valves 4, broadly ovate to triangular, coriaceous, resinous, strigulose, apex acute to attenuate; lamellae 2 or 3/valve, acute to attenuate. Nut 5.5–8 × 3.5–6.5 mm, triquetrous or lenticular, sparsely hairy to pubescent, winged, red-brown to brown.

Bark and wood: Bark on young trees smooth, thin and grey-white to light brown; bark on old trees thick, fibrous, large-scaled and furrowed, brown to dark-brown. Sapwood pink or red to light yellow when fresh; heartwood dark red when fresh.

Juvenile leaves: Often smaller than adult leaves, broad ovate to rhomboid-ovate, lamina thinner and more coarsely toothed, often red or red speckled.

Distribution: North Island: South Auckland (Kaimai Range south of Te Aroha, Mamaku Range, Raukūmara Range, Urewera National Park, Hauhungaroa Range, Kaimanawa Range, Kaweka Range), Volcanic Plateau, Wellington (Tararua, Rimutaka and Aorangi Ranges).

South Island: Nelson, Marlborough, Westland, Canterbury, Otago (inland Lakes District), Southland, Fiordland.

Biostatus: Indigenous (Endemic).

Habitat: Altitudinal range, sea-level–1190 m a.s.l. (at Potae, Ruahine Range). Lowland to montane forest. Found in pure stands in inland valleys on colluvial soils of mid-slope between 400 and 850 m. Also, commonly in association in mixed broadleaf-conifer forests and with other beech species on slopes and river terraces, and particularly with *Lophozonia menziesii*.

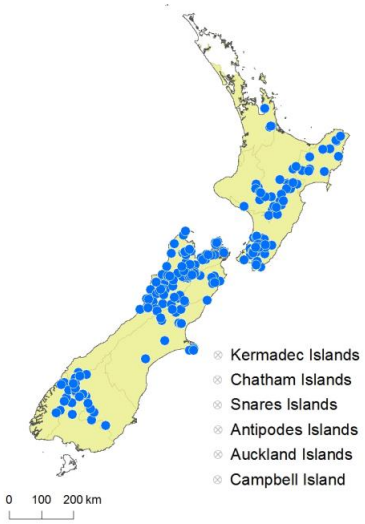

Fig. 16: *Fuscospora fusca* distribution map based on databased records at AK, CHR and WELT.

Recognition: Most similar to *Fuscospora truncata*, and distinguished from that species by thin leaves with apiculate lamina teeth that are noticeably twisted and also with the lamina tapering obliquely to the base, whereas hard beech has blunt lamina teeth that are not distinctly twisted and with the lamina tapering equally to the base. Also, red beech commonly has 1 or 2 fringed domatia in the axils of the midrib and lower secondary veins on the abaxial side of the lamina; domatia are absent in *F. truncata* and all other southern beech species in New Zealand except for *Lophozonia menziesii*.

Phenology: Flowering: Sep.–Dec. (mast seeding)

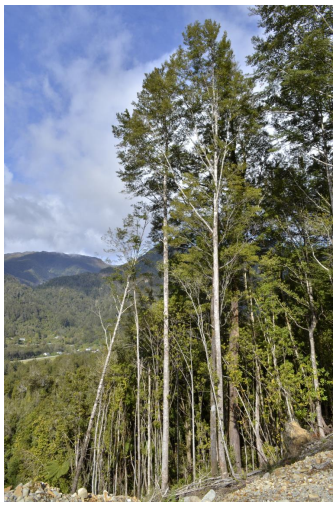

Fig. 17: *Fuscospora fusca*: exposed mature trees from a closed canopy forest.

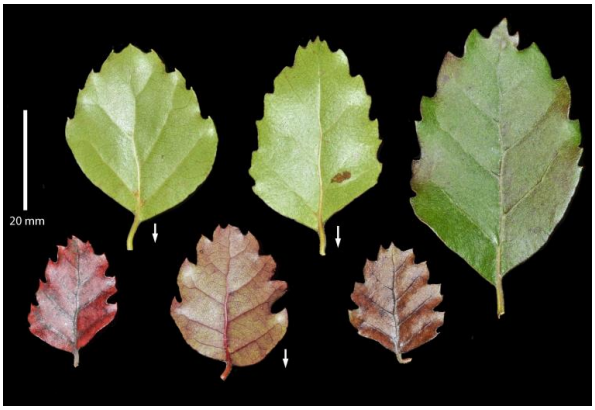

Fig. 18: *Fuscospora fusca*: leaves showing apiculate teeth on the margin and oblique leaf bases; fringed domatia showing on the abaxial lamina surfaces (abaxial side of lamina indicated by downward arrow).

Fig. 19: *Fuscospora fusca*: peltate stipules covering leaf buds.

Fig. 20: *Fuscospora fusca*: branchlet with male dichasia (abaxial leaf-lamina showing domatia).

Fig. 21: *Fuscospora fusca*: pedunculate, 3-flowered male dichasium; stamens with glabrous filaments.

Fig. 22: *Fuscospora fusca*: three developing nuts (2 triquetrous nuts visible, the singular lenticular nut not visible); rows of lamelae visible with attenuate apices.

Fig. 23: *Fuscospora fusca*: two maturing cupules, lowermost empty; uppermost with developing nuts.

Fig. 24: *Fuscospora fusca*: winged nuts, one central lenticular and two lateral triquetrous.

Fig. 25: *Fuscospora fusca*: seedling.

Fig. 26: *Fuscospora fusca*: sapling.

Fig. 27: *Fuscospora fusca*: juvenile leaves.

Fig. 28: *Fuscospora fusca*: young tree.

Fig. 29: *Fuscospora fusca*: bark of a young tree.

Fig. 30: *Fuscospora fusca*: bark of a mature tree.

Fuscospora solandri (Hook.f.) Heenan & Smissen, *Phytotaxa* 146: 14 (2013)

≡ *Fagus solandri* Hook.f., *Icon. Pl. 7,* t. 639 (1844)

≡ *Nothofagus solandri* (Hook.f.) Oerst., *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* 9: 355 (1871) — as solanderi

Lectotype (designated by Allan 1961): New Zealand. Without locality, no date, *W. Colenso 36* (K, image).

Etymology: Named for Daniel C. Solander, botanist on board the Endeavour on James Cook's first voyage to the Pacific 1768–1771.

Vernacular names: black beech; tāwhairauriki

Large tree, 20–25(–30) m high; trunk straight and cylindrical, 0.6–1.0 m diameter; crown spreading. Young branchlets terete, grooved, red-brown, dark red or grey, with whitish pubescence. Stipules caducous, non-peltate, 2.5–4 mm long, narrow oblong to narrow obovate or elliptic. Leaf lamina, 8–20 × 3.5–11 mm, oblong-elliptic to elliptic to ovate, coriaceous, veins indistinct, domatia absent; adaxially glossy green, glabrescent; abaxially grey-green, thinly tomentose; margin entire, glabrous to sparsely pilose, apex obtuse often apiculate; base cuneate; petiole 0.5–2.5 mm long, pubescent to densely pilose. Staminate inflorescences, 3–5/branchlet, peduncles 0.5–3 mm long; 1 or 2 (rarely 3) flowers/dichasium, sessile to shortly pedicellate; perianth shallow campanulate, 2–2.5 mm long, glabrous to sparsely hairy, green to stramineous, often red tinged, 3–5 obtuse to acute lobes, margin glabrous. Stamens 8–16; filaments 1.5–3.5 mm long, glabrous; anthers 1.5–2.5 mm long, glabrous to sparsely hairy, dark red. Pistillate inflorescences, 1–4/ branchlet, sessile; dichasium ovoid with (1)–2(–3) sessile flowers/cupule, trimerous and dimerous, pilose, one trimerous flower often missing or atrophied in a 2- or 3-flowered dichasium. Mature cupule 3–6 mm long; valves 2 or 3 occasionally 1, short, broad to narrow triangular or ovate, coriaceous, pilose, apex acute to attenuate; lamellae 1 or 2/valve, acute or truncate. Nut (3.5–)5–7 × 3–4.5 mm long, triquetrous or lenticular, pubescent, red-brown or brown.

Bark and wood: Bark on young trees, smooth, thin and light grey to grey; bark on old trees fibrous and fissured, dark to almost black. Sapwood white to yellow-white when fresh, usually darker than that of *Fuscospora cliffortioides*; heartwood black-brown or light brown when fresh.

Juvenile leaves: Broadly ovate, oval or suborbicular, with obtuse apices, sometimes red or bronze; saplings often with semi-divaricating habit.

Taxonomy: There are significant zones of hybridisation with *Fuscospora cliffortioides*, one occurs along the Southern Alps foothills of Canterbury, from the vicinity of the Hundalees to south of the Rakaia River to Alford Forest and Staveley. In the North Island mountain beech is likely to be introgressed with *F. solandri* where they come into contact around the central volcanoes and along the axial ranges. Hybrid populations, between approximately 300–600 m a.s.l., are often morphologically intermediate and difficult to determine to one or the other species. Specimens from populations on Banks Peninsula also show intermediate character-states between *F. solandri* and *F. cliffortioides* and possibly *F. fusca*.

Distribution: North Island: North Auckland (Little Barrier Island), South Auckland (an isolated population west of Mamaku Plateau, Raukūmara Range, Urewera National Park, Kaimanawa Range, Kaweka Range, Volcanic Plateau), Gisborne, Taranaki, Wellington (Tararua, Rimutaka and Aorangi Ranges, Wairarapa).

South Island: Nelson, Marlborough, Westland (south to the upper Inangahua and Maruia Valleys), Canterbury (mid-Canterbury south to Staveley and Banks Peninsula).

Biostatus: Indigenous (Endemic).

Habitat: Altitudinal range, sea-level–914 m a.s.l. (Raglan Range, Marlborough). Montane forest mostly below 600 m. In mixed forests with podocarp/broadleaf species and with *Fuscospora truncata* in the North Island and the north-west of the South Island. Dominant across slopes and gullies in the drier areas east of the axial ranges, becoming confined to ridges and glacial alluvial surfaces in the south-west of its range (Buller-Inangahua).

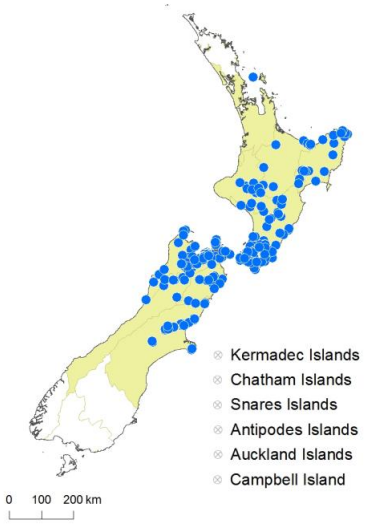

Fig. 31: *Fuscospora solandri* distribution map based on databased records at AK, CHR and WELT.

Recognition: Distinguished from most other species of southern beech, except for *Fuscospora cliffortioides*, by an entire leaf margin. Separated from *F. cliffortioides* by an oblong-elliptic to ovate lamina tapered equally to the base and with an obtuse apex versus an ovate to triangular-ovate lamina tapered obliquely to the base and with a subacute to acute apex. *Fuscospora solandri* is more densely pilose on the cupule and flower than *F. cliffortioides*.

Phenology: Flowering: Sep.–Dec. (mast seeding)

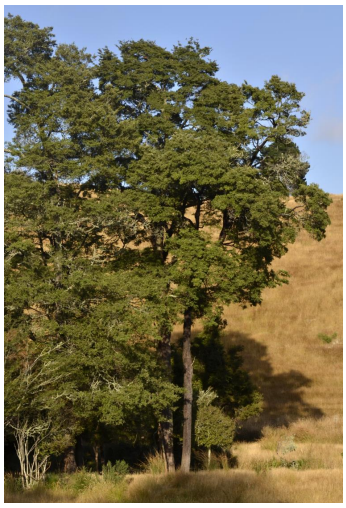

Fig. 32: *Fuscospora solandri*: a mature tree on the edge of a remnant forest patch.

Fig. 33: *Fuscospora solandri*: leaves (adaxial side).

Fig. 34: *Fuscospora solandri*: leaves (adaxial side) and stipules basally attached at the stem-leaf axials - close to falling.

Fig. 35: *Fuscospora solandri*: leaves (abaxial side) showing tomentum and withering stipules.

Fig. 36: *Fuscospora solandri*: branch with male dichasia.

Fig. 37: *Fuscospora solandri*: branchlet with male dichasia and above the stipule enclosed shoot bud with immature female dichasia and leaves.

Fig. 38: *Fuscospora solandri*: male flower.

Fig. 39: *Fuscospora solandri*: two female dichasia each with two flowers in densely pubescent cupules.

Fig. 40: *Fuscospora solandri*: two maturing nuts (one lenticular, one triquetrous) in a 3-valved cupule (two valves in view).

Fig. 41: *Fuscospora solandri*: winged nuts, one triquetrous and one lenticular.

Fig. 42: *Fuscospora solandri*: seedling.

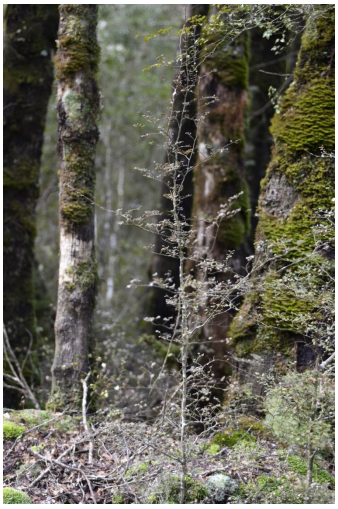

Fig. 43: *Fuscospora solandri*: sapling.

Fig. 44: *Fuscospora solandri*: bark of a mature tree.

Fig. 45: *Fuscospora solandri*: trees growing on glacial outwash (*Fuscospora fusca* on slopes above).

Fuscospora truncata (Colenso) Heenan & Smissen, *Phytotaxa* 146: 14 (2013)

≡ *Fagus truncata* Colenso, *Trans. & Proc. New Zealand Inst.* 31: 280 (1899)
≡ *Nothofagus truncata* (Colenso) Cockayne, *New Zealand State Forest Bull.*, 21 (1926)
Lectotype (designated by Allan 1961): New Zealand. Ruahine Mountain-range, October 1898, *H. Hill s.n.* (WELT SP035538)

Etymology: Named from Latin truncatus (lopped), a reference to the blunt leaf-lamina apex

Vernacular names: hard beech; tāwhairaunui; tāwhairauriki

Large tree, 24–30(–36) m high; trunk straight and cylindrical, 0.6–1.2(–1.8) m diameter, basal flanges and root buttresses often developed; crown massive, spreading. Young branchlets terete, grooved, red to red-brown, with whitish pubescence. Stipules caducous, peltate, entire or unevenly bilobed, 3.5–8.0 mm long, narrow-oblanceolate to linear-oblong. Leaf lamina 13.0–43 × 8–30 mm, broadly ovate to sub-orbicular, coriaceous, veins distinct; domatia absent; adaxially glossy green, glabrescent; abaxially lighter glossy green, glabrescent; margin coarsely toothed, teeth sub-acute to obtuse, shortly ciliate in sinuses; apex obtuse to truncate; base cuneate; petiole 2.5–4 mm long, pubescent. Staminate inflorescences, 4–7/branchlet, on peduncles 1.5–7.5 mm long; 1–3 flowers/dichasium, sessile or on short pedicels to 1.0 mm long; perianth campanulate sometimes asymmetic, 2.5–4.5 mm long, hairy, stramineous, 4 or 5 prominent obtuse to acute lobes, margin ciliate. Stamens 9–14; filaments 3.0–4.5 mm long, hairy; anthers 2.0–3.5 mm long, glabrous to sparsely hairy, red, yellow or dark orange. Pistillate inflorescences 2–5/branchlet, sessile; dichasium ovoid with 3 sessile flowers/cupule, trimerous and dimerous, sparsely hairy. Mature cupule 7–9 mm long; valves 4, broadly triangular, coriaceous, resinous, glabrous to strigulose, apex acute to subacute; lamellae 3/valve, subacute to obtuse. Nut 7.5–10 × 4–6.5 mm, triquetrous or lenticular, sparsely hairy to hairy, red-brown to brown.

Bark and wood: Bark on young trees smooth, thin and ash-grey; bark on old trees thick, fibrous, scaled and fissured, dark slate-grey to almost black. Sapwood light yellow-brown when fresh; heartwood light pink to light brown when fresh.

Juvenile plants: Leaves often slightly smaller than adult leaves, ovate to broad ovate, more coarsely toothed, often red, brown, or red speckled.

Distribution: North Island: North Auckland (isolated populations near Kaitaia, Omahuta, Waitakere Range, east coast), South Auckland (Coromandel, Kaimai Ranges, Mamaku Plateau, Raukūmara Range, Urewera National Park), Taranaki (northern Taranaki), Wellington (Tararua, Rimutaka and Aorangi Ranges, Wairarapa).

South Island: Nelson, Marlborough, Westland (south to the Taramakau River and small isolated populations at Jackson Bay in South Westland).

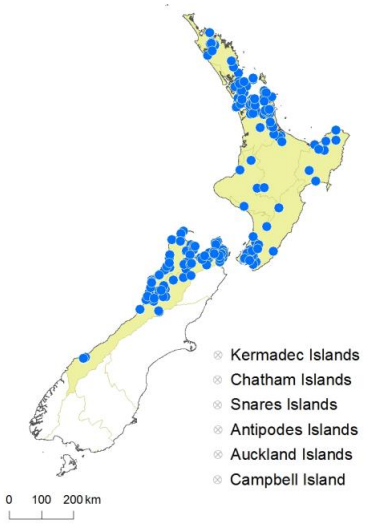

Fig. 46: *Fuscospora truncata* distribution map based on databased records at AK, CHR and WELT.

Biostatus: Indigenous (Endemic).

Habitat: Altitudinal range, sea-level–941 m a.s.l. (at Mt Honokawa, Raukūmara Range). Lowland to montane forest. Mostly found in association with other tree species in mixed broadleaf-conifer forests and with other beech species; forming localised pure stands on favourable sites within the forest, mostly on ridge crests, knolls, and steep slopes of a warm northerly aspect.

Recognition: Most similar to *Fuscospora fusca*, distinguished from that species by coriaceous leaves with blunt teeth that are barely twisted and also with the lamina tapering equally to the base whereas *F. fusca* has leaves with apiculate lamina teeth that are noticeably twisted and with an oblique lamina base. Also, hard beech never has domatia whereas red beech leaves commonly have 1 or 2 fringed domatia in the axils of the midrib and lower secondary veins on the abaxial side of the lamina. Hard beech often, but not always, has truncate leaf apices.

Phenology: Flowering: Sep.–Dec. (mast seeding)

Fig. 47: *Fuscospora truncata*: tree base showing butresses.

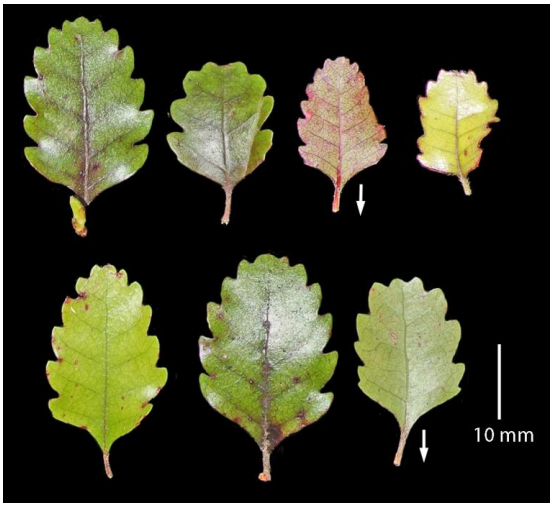

Fig. 48: *Fuscospora truncata*: leaves showing blunt teeth and cuneate leaf bases and with margins equal at the petiole; two juvenile leaves top right (abaxial side of lamina indicated by downward arrow).

Fig. 49: *Fuscospora truncata*: leaf (abaxial side).

Fig. 50: *Fuscospora truncata*: a shoot with two peltate stipules, one with an entire tail (upper) and the other with a bilobed tail (lower).

Fig. 51: *Fuscospora truncata*: branchlet with male and female dichasia.

Fig. 52: *Fuscospora truncata*: a dichasium of three male flowers showing stamens with hairy filaments.

Fig. 53: *Fuscospora truncata*: female 3-flowered dichasium in leaf axial (stigmata red); peltate stipule (with an entire tail) in view subtending the leaf above.

Fig. 54: *Fuscospora truncata*: two mature cupules, the uppermost cupule empty (showing four valves with lamelae) the other cupule with two nuts, one lenticular (nearest) and one triquetrous (the second triquetrous nut is missing, exposing the face of the lenticular nut).

Fig. 55: *Fuscospora truncata*: winged nuts, one central lenticular and two lateral triquetrous.

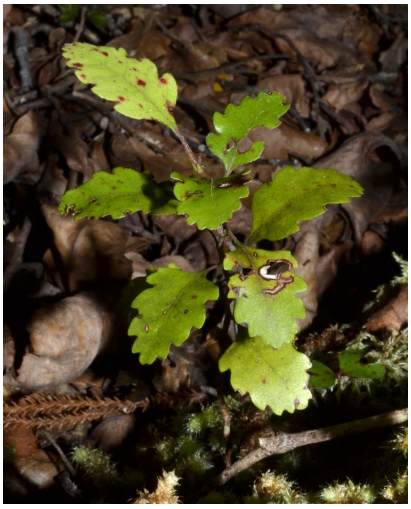

Fig. 56: *Fuscospora truncata*: seedling.

Fig. 57: *Fuscospora truncata*: sapling.

Fig. 58: *Fuscospora truncata*: bark of a young tree.

Fig. 59: *Fuscospora truncata*: bark of a mature tree.

Fig. 60: *Fuscospora truncata*: grove of mature trees.

Lophozonia Turcz., *Bull. Soc. Imp. Naturalistes Moscou* 31: 396 (1858)

≡ *Nothofagus* subgen. *Lophozonia* (Turcz.) Krasser, *Ann. K. K. Naturhist. Hofmus.* 11: 162 (1896)

= *Nothofagus* subgen. *Nothofagus* sect. *Calusparassus* subsect. *Menziesiae* Philipson & M.N.Philipson, *Bot. J. Linn. Soc.* 98: 34 (1988)

= *Nothofagus* subgen. *Menziesospora* R.S.Hill & J.Read, *Bot. J. Linn. Soc.* 105: 69 (1991)

= *Nothofagus* subgen. *Nothofagus* sect. *Adenofagus* Baum.-Bod., *Syst. Fl. Neu-Caledonien,* 94, 114 (1992)

Type taxon: *Lophozonia heterocarpa* Turcz.

Evergreen trees up to 40 m high. Stipules non-peltate. Leaves distichous, margin crenate; fimbrial vein complete; large, globular, glandular trichomes present on cuticle; solitary unicellular trichome type A absent; solitary unicellular trichomes type C present, with a large base equal to or greater than the diameter of the trichome and with a large, unicellular, thin-walled trichome emerging. Stomata randomly oriented; without thickened T-pieces of cuticle at the poles separating the two guard cells; without giant stomata over the major veins; stomata size within the areoles variable. Upper epidermal cells over veins not distinguishable from areolar cells, without granular cell walls. Male dichasium a solitary pseudanthium; perianth open and broadly campanulate, asymmetric and irregular; stamens usually >20, developing centrifugally; anthers often slightly curved; distal connective protrusion weakly developed, filament connective free, without epidermal papillae or with isomorphic rounded papillae. Female dichasium with 1 central dimerous flower and 2 lateral trimerous flowers, or 2 trimerous flowers; stigmas clavate and weakly decurrent. Cupule valves 4, with simple trichomes; with rows of stalked appendages, hairy with globular, glandular apices; nuts triquetrous or lenticular, 2- or 3-winged.

Pollen: Peritreme or goniotreme, mesocolpia straight to convex; colpi long, tenuimarginate, with V-shaped ends, margins not thickened, aperture >15.0 µm long, polar to equatorial length ratio 0.35–0.4.

Distribution: A genus of seven species in Australia, New Zealand, Chile and Argentina. *Lophozonia* has two endemic species in Australia, four endemic species in southern South America (Chile and Argentina) and one endemic species in New Zealand.

Biostatus: Indigenous (Non-endemic).

Table 3: Number of species in New Zealand within *Lophozonia* Turcz.

Category	**Number**
Indigenous (Endemic)	1
Total	**1**

Lophozonia menziesii (Hook.f.) Heenan & Smissen, *Phytotaxa* 146: 16 (2013)

≡ *Fagus menziesii* Hook.f. in Hooker, *Icon. Pl. 7,* t. 652 (1844)

≡ *Nothofagus menziesii* (Hook.f.) Oerst., *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* 9: 355 (1871)

Lectotype (designated by Allan 1961): New Zealand. Dusky Bay, 1791, *A. Menzies s.n.* (K, image). Please note that Heenan & Smissen 2013 state "1781" as the collection date for the specimen designated as Lectotype. Hooker (1844) gives the date for this collection from Dusky Bay as 1791.

Etymology: Named for Archibald Menzies, ship's surgeon on the Vancouver Expedition 1791–1795.

Vernacular names: silver beech; tāwhairauriki

Prostrate to erect shrub to large tree, (0.5–)20–25(–30) m high; trunk straight cylindrical or short-boled and branching, 0.6–1.5(–2.6) m diameter, occasionally heavily buttressed; crown spreading. Young branchlets terete, grooved, red-brown, with fulvous pubescence. Stipules 3–4(–6) mm long, oblong to linear-oblong to narrow oblanceolate. Leaf lamina (4.8–)9–12(–30) × 5.5–14(–25) mm, broadly ovate or ovate-deltoid to orbicular, coriaceous, veins indistinct, 0–4 fringed domatia in basal axils, adaxially glossy green, glabrescent on veins toward base; abaxially lighter green, hispid on veins toward base; margins 1–2(–3) crenate, shortly ciliate in sinuses; apex obtuse to subacute; base cuneate to acute-truncate; petiole 1–4 mm long, pubescent. Staminate flowers 3–5/branchlet, on peduncles 2.5–4.5 mm long; perianth broadly campanulate, 1.5–2.5 mm long, glabrous, green, with 4–6 acute to obtuse lobes

or lobes vestigial, margin ciliate. Stamens 22–36; filaments 1–2.5 mm long, glabrous; anthers 1–1.7 mm long, glabrous, pink, red or yellow. Pistillate inflorescences 1–5/branchlet, shortly pedunculate; dichasium ovoid with 2 or 3 sessile flowers/cupule, trimerous and dimerous or trimerous only, the dimerous flower often missing or atrophied, pubescent. Mature cupule 3.8–8 mm long, valves 4, narrow-triangular, coriaceous, resinous, hairy, apex subacute to acute; cupule appendages (3–)4–5 rows/valve, stalked, glandular. Nut (3–)4–5(–6) × (2–)3–4(–5) mm long, triquetrous or lenticular, pubescent, pale brown to red-brown, projected wing tips with glandular apices.

Bark and wood: Bark on young trees smooth, silver-grey with prominent horizontal white to brown lenticels; bark on old trees thick and furrowed with large flakes, light-grey to pinkish-brown or dark slaty-grey. Sapwood yellow to pink when fresh; heartwood light pink to red when fresh.

Juvenile leaves: Leaves similar to adult, smaller or larger depending on provenance, sometimes entirely red in colour.

Distribution: North Island: South Auckland (Kaimai Range south of Te Aroha, Mamaku Plateau, Raukūmara Range, Urewera National Park, Hauhungaroa Range, Kaimanawa Range, Kaweka Range, Volcanic Plateau), Taranaki (isolated populations at Tangarakau River, lower Retaruke River). Wellington (northern Ruahine Range, Tararua, Rimutaka and Aorangi Ranges).

South Island: Nelson, Marlborough, Westland, Canterbury, Otago, Southland, Fiordland.

Biostatus: Indigenous (Endemic).

Habitat: Altitudinal range, sea-level–1220 m a.s.l. (at Mt Honokawa, Raukūmara Range). Lowland to montane to sub-alpine forest and shrubland. Found in mixed broadleaf-conifer forests and in extensive pure stands. The dominant canopy tree with increasing altitude and moisture, and forming the treeline as a small tree or shrub. Also common in montane forests on mid-slope colluvium and river terraces in association with *Fuscospora fusca* and dominant at these sites or in mixed stands with podocarps outside the geographical range of *F. fusca*. Often occurs in association with *F. cliffortioides* in subalpine habitats but is less competitive with lower moisture and disturbance.

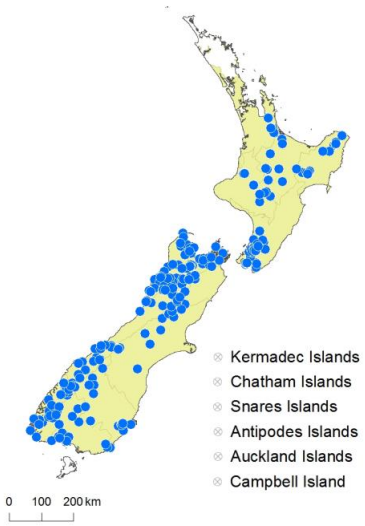

Fig. 61: *Lophozonia menziesi* distribution map based on databased records at AK, CHR and WELT.

Recognition: Distinguished from all other southern beech by broadly ovate or ovate-deltoid to orbicular leaves which are doubly crenate on the margin. The bark on young trees is a distinctive silver-grey colour with prominent horizontal lenticels that are white to brown. Deeply pitted, fringed domatia commonly occur on the underside of the leaf.

Phenology: Flowering: Nov.–Jan. (mast seeding)

Fig. 62: *Lophozonia menziesii*: mature trees at forest edge.

Fig. 63: *Lophozonia menziesii*: leafy branch (leaves adaxial side).

Fig. 64: *Lophozonia menziesii*: leafy shoot with basally attached stipules.

Fig. 65: *Lophozonia menziesii*: abaxial side of leaf showing four fringed domatia.

Fig. 66: *Lophozonia menziesii*: male flowers.

Fig. 67: *Lophozonia menziesii*: male flower (a pseudanthium derived from a dichasium).

Fig. 68: *Lophozonia menziesii*: female dichasium showing three flowers: two lateral trimerous flowers (with purplish stigmata) and one central dimerous flower.

Fig. 69: *Lophozonia menziesii*: developing nuts with prominent wing apices, and cupule valves with rows of stalked appendages with globular glands.

Fig. 70: *Lophozonia menziesii*: branchlets with empty cupules.

Fig. 71: *Lophozonia menziesii*: winged nuts, one central lenticular and two lateral triquetrous (note: glandular tipped wings).

Fig. 72: *Lophozonia menziesii*: seedling.

Fig. 73: *Lophozonia menziesii*: sapling.

Fig. 74: *Lophozonia menziesii*: bark of a young tree.

Fig. 75: *Lophozonia menziesii*: bark of a mature tree.

Nothofagus Blume, *Mus. Bot.* 307 (1851), nom. cons.

≡ *Fagus* sect. *Nothofagus* (Blume) A.DC., *Prodr. (DC.) 16,* 121 (1864)

= *Fagaster* Spach, , 142 (1841)

= *Calucechinus* Hombr. & Jacquinot, *Voy. Pôle Sud, Bot.,* Atlas t. 6 (1843)
≡ *Nothofagus* subgen. *Molischia* sect. *Calucechinus* (Hombr. & Jacquinot) Krasser, *Ann. K. K. Naturhist. Hofmus.* 11: 162 (1896) nom. inval.

= *Calusparassus* Hombr. & Jacquinot in Hombron, *Voy. Pôle Sud, Bot.,* Atlas t. 6 (1843) nom. rej.

= *Nothofagus* subgen. *Molischia* sect. *Calusparassus* (Hombr. & Jacquinot) Krasser, *Ann. K. K. Naturhist. Hofmus.* 11: 163 (1896)

= *Fagus* sect. *Eufagus* A.DC., *Prodr. (DC.) 16,* 118 (1864) nom. inval., pro parte

= *Nothofagus* subgen. *Molischia* Krasser, *Ann. K. K. Naturhist. Hofmus.* 11: 162 (1896) nom. inval.

= *Nothofagus* sect. *Deciduae* Steenis, *Blumea* 7: 146 (1952)

= *Nothofagus* sect. *Plicatae* Steenis, *Blumea* 7: 306 (1952) nom. illeg.

= *Nothofagus* sect. *Calucechinus* subsect. *Antarcticae* Steenis, *J. Arnold Arbor.* 34: 334 (1953) nom. inval.

= *Nothofagus* subgen. *Pumiliae* (Steenis) Baum.-Bod. (1929) nom. inval.
≡ *Nothofagus* sect. *Calucechinus* subsect. *Pumiliae* Steenis, *J. Arnold Arbor.* 34: 336 (1953)
≡ *Nothofagus* subgen. *Nothofagus* sect. *Pumiliae* (Steenis) Hill & Read, *Bot. J. Linn. Soc.* 105: 69 (1991)

Type taxon: *Nothofagus antarctica* (G.Forst.) Oerst.

Deciduous or evergreen trees up to 20 m high. Stipules peltate. Leaves distichous; fimbrial vein absent, with globular, glandular trichomes on cuticle; unicellular trichome type A absent; solitary unicellular trichomes type C absent. Stomata parallel to long axis of leaf; with thickened T-pieces of cuticle at the poles separating the two guard cells, without giant stomata over the major veins; stomata size within the areoles ± even. Upper epidermal cells over veins more elongate than areolar cells, with granular cell walls. Male dichasium 1–3-flowered; perianth campanulate, lobes prominent; stamens <20, developing centripetally; anthers slightly curved; distal connective protrusion weakly developed, filament connective free, without epidermal papillae. Female dichasium with 1 central dimerous flower and 2 lateral trimerous flowers, or 1 trimerous flower missing; stigmas tongue-shaped and decurrent. Cupule with 4 valves; outer surface of valves with simple trichomes; lamellae membranous; nuts triquetrous or lenticular, 2- or 3-winged.

Pollen: Peritreme, mesocolpia straight to convex; colpi short, spatulate or parallel-sided, with U-shaped ends, margins conspicuously thickened, annulate, aperture 4–11 µm long, polar to equatorial length ratio = 0.3.

Distribution: New Zealand, Chile, Argentina. *Nothofagus* is endemic to southern South America (Chile and Argentina) with five species. One species is documented as a casual naturalisation in New Zealand.

Biostatus: Exotic; casual.

Table 4: Number of species in New Zealand within *Nothofagus* Blume

Category	**Number**
Exotic: Casual	1
Total	**1**

Nothofagus antarctica (G.Forst.) Oerst., *Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd.* 9: 354 (1871)

≡ *Fagus antarctica* G.Forst., *Commentat. Soc. Regiae Sci. Gott.* 9: 42, as 24 (1789)
Lectotype (designated by Heenan & Smissen 2013): Chile. Terra del Fuego, Christmas Harbour, 1774, *W. Anderson*, BM 000949987.

Etymology: Named for the proximity to the Antarctic continent by early European explorers, who first collected specimens from Tierra del Fuego.

Vernacular names: Antarctic beech; ñire; ñirre

Deciduous shrub to medium sized tree, 3–20 m high; trunk straight cylindrical, short-boled or multi-stemmed; crown spreading. Young branchlets terete, grooved, grey to red-brown or dark red, with white pubescence. Stipules caducous, peltate, margin fimbriate, 4–7 mm long, ovate or unevenly elliptic. Leaf lamina 6–30 × 6–20 mm, broadly ovate or ovate-elliptic, thin, veins distinct, domatia absent; adaxially glossy green, glabrescent; abaxially lighter green, pubescent on veins, otherwise glabrescent; margin undulate to lobed, irregularly double-dentate, teeth subacute to obtuse, margin minutely ciliate; apex obtuse; base oblique; petiole 1–6 mm long, pubescent. Staminate inflorescences, 3–8/branchlet, on short peduncles; perianth campanulate, 5–6 mm long, green to stramineous, with 5 or 6 obtuse to subacute lobes, margin densely ciliate. Stamens 5–13; filaments 5.5–6 mm long, sparsely hairy; anthers, 3–4 mm long, glabrous, pale yellow or red. Pistillate inflorescences, 3–5/branchlet, sessile; dichasium ovoid or subglobular with 2 or 3 sessile flowers/cupule, flowers trimerous and dimerous, pubescent, one trimerous flower sometimes missing or atrophied. Mature cupule, 5–6 mm long, valves 4, elliptic, coriaceous, resinous, densely pubescent, apex obtuse to subacute; lamellae in 3 or 4 rows/valve, dark red, attenuate to acute, margin ciliate. Nut 3.5–4.5 × 3.0–4.5 mm long, triquetrous or lenticular, glabrous to pubescent, ciliate on wings above, tan brown to red-brown.

Bark: Bark on young trees smooth, grey or purplish-brown with prominent horizontal white lenticels; bark on old trees rough and fissured, grey.

Distribution: South Island: Canterbury (Mistake Flat, Havelock River; Broken River, Craigieburn Range).

Biostatus: Exotic; casual.

Habitat: Seedlings and saplings establishing from cultivated plantings at two inland montane sites. One site is on a river terrace in the Havelock River at 800 m a.s.l., and the other on a hill planting of exotic trees in the Broken River catchment of the Craigieburn Range at 976 m a.s.l.

First record: CHR 482884, *M. Harding*, 9 May 1998 (cited in Heenan, P.B.; de Lange, P.J.; Glenny, D.S.; Breitwieser, I.; Brownsey, P.J.; Ogle, C.C. 1999, p. 636).

Recognition: Distinguished from all New Zealand beech species in being deciduous and having plicate leaf vernation, not found in any species of New Zealand beech. Also by its smooth purple-grey bark with distinctive white lenticels on young trunks and stems.

Phenology: Flowering: Oct.–Nov. (mast seeding)

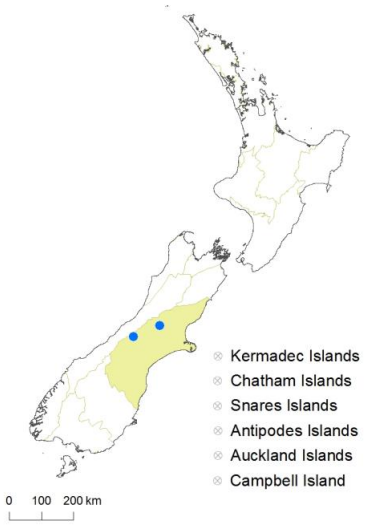

Fig. 76: *Nothofagus antarctica* distribution map based on databased records at AK, CHR and WELT.

Fig. 77: *Nothofagus antarctica*: small tree with leaves (early February).

Fig. 78: *Nothofagus antarctica*: small tree without leaves (late August).

Fig. 79: *Nothofagus antarctica*: leafy branch.

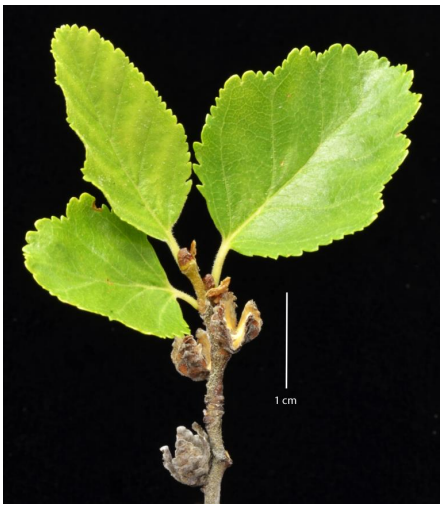

Fig. 80: *Nothofagus antarctica*: leaves showing an undulate to lobed dentate margin.

Fig. 81: *Nothofagus antarctica*: branch with buds in late August.

Fig. 82: *Nothofagus antarctica*: peltate stipules.

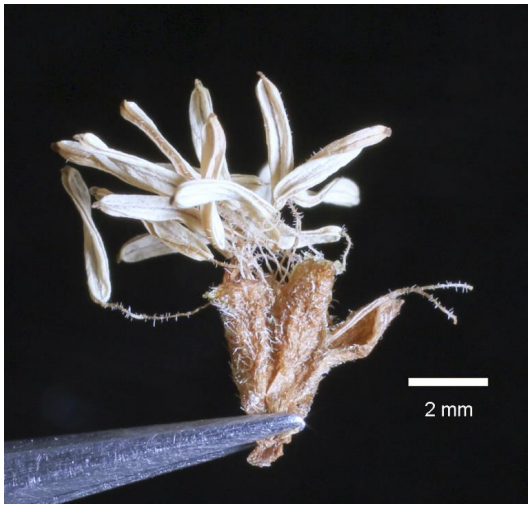

Fig. 83: *Nothofagus antarctica*: male flower showing hairy perianth and filaments.

Fig. 84: *Nothofagus antarctica*: a maturing branchlet of five female dichasia, each 3-flowered; two old, empty cupules from another season remaining on branch at bottom.

Fig. 85: *Nothofagus antarctica*: mature cupule with three nuts, one central lenticular and two lateral triquetrous.

Fig. 86: *Nothofagus antarctica*: winged nuts, one central lenticular and two lateral triquetrous.

Fig. 87: *Nothofagus antarctica*: seedlings.

Fig. 88: *Nothofagus antarctica*: bark of a young tree.

Fig. 89: *Nothofagus antarctica*: bark of a mature tree.

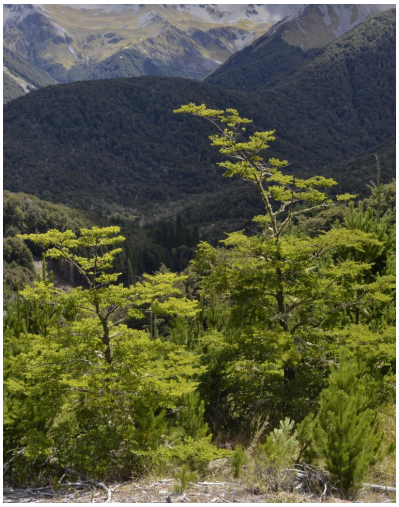

Fig. 90: *Nothofagus antarctica*: two trees at 970 m a.s.l. on Bridge Hill overlooking *Fuscospora cliffortioides* forest (Broken River, Craigieburn Range, Canterbury).

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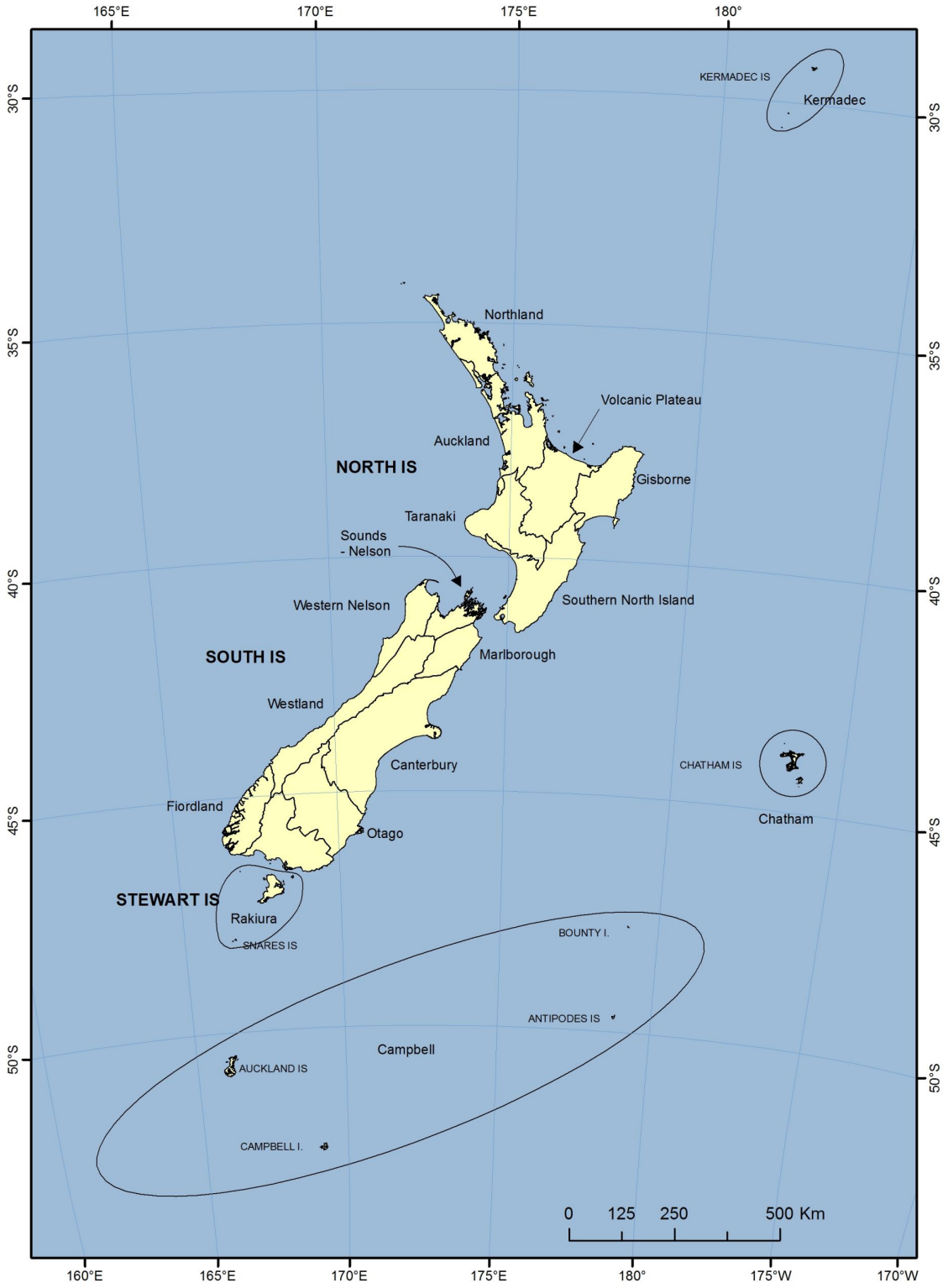
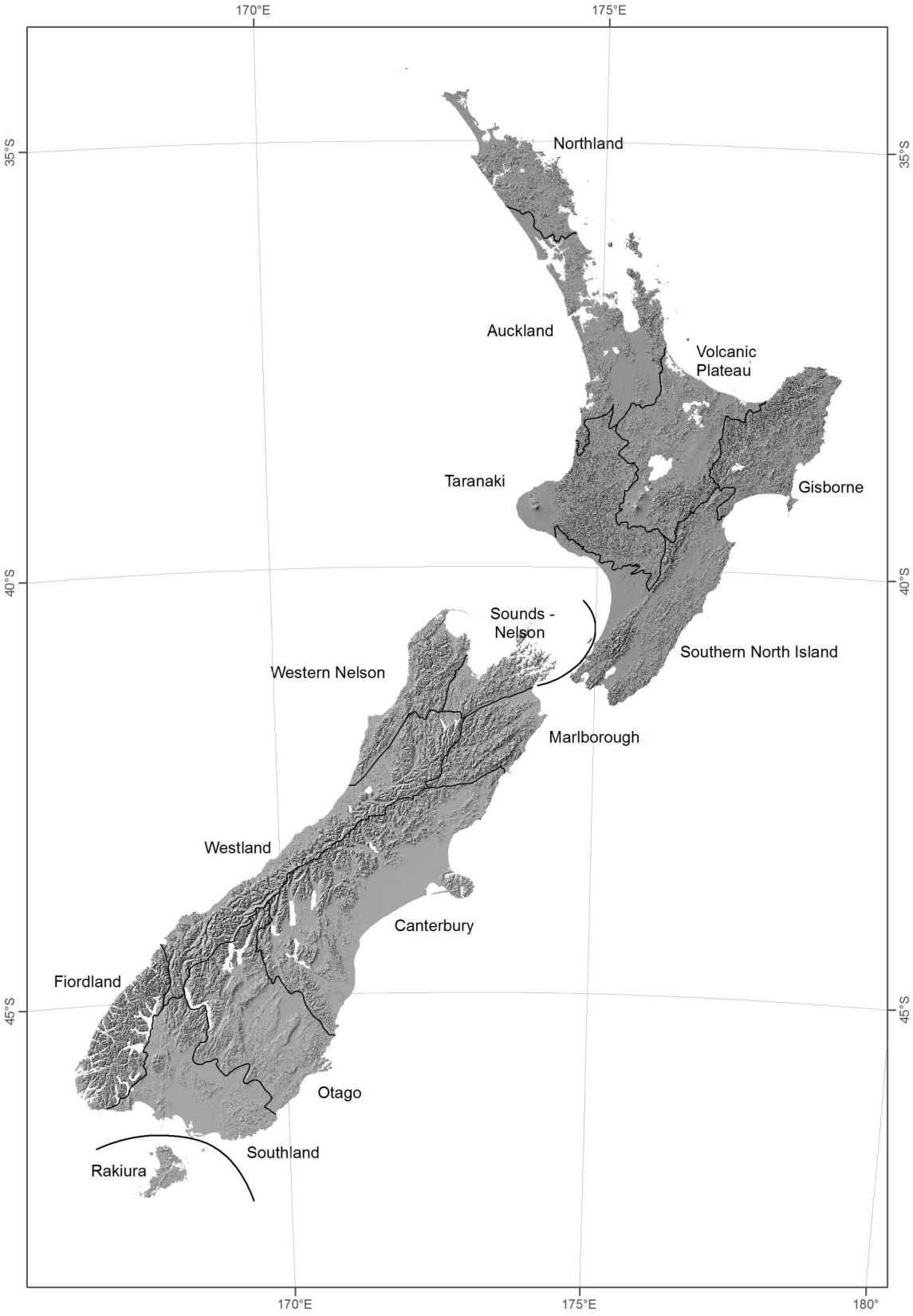


Map 1: Map of New Zealand and offshore islands showing Ecological Provinces



Map 2: Map of New Zealand showing Ecological Provinces

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