



FLORA OF NEW ZEALAND

FERNS AND LYCOPHYTES

OSMUNDACEAE



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Fascicle 4 – DECEMBER 2014

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CATALOGUING IN PUBLICATION

Brownsey, P.J. (Patrick John), 1948-

Flora of New Zealand [electronic resource] : ferns and lycophytes. Fascicle 4. Osmundaceae / P.J. Brownsey and L.R. Perrie. -- Lincoln, N.Z. : Manaaki Whenua Press, 2014.

1 online resource

ISBN 978-0-478-34757-9 (pdf)

ISBN 978-0-478-34761-6 (set)

1.Ferns -- New Zealand -- Identification. I. Perrie, L.R. (Leon Richard). II. Title. III. Manaaki Whenua-Landcare Research New Zealand Ltd.

DOI: 10.7931/J2BG2KW4

This work should be cited as:

Brownsey, P.J. & Perrie, L.R. 2014: Osmundaceae. *In*: Breitwieser, I.; Heenan, P.B.; Wilton, A.D. *Flora of New Zealand - Ferns and Lycophytes*. Fascicle 4. Manaaki Whenua Press, Lincoln.

<http://dx.doi.org/10.7931/J2BG2KW4>

Cover image: *Leptopteris superba*, mature plant growing on the forest floor.

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Introduction

The family Osmundaceae is represented in New Zealand by two native genera (*Leptopteris* and *Todea*), with three species, and one naturalised genus (*Osmunda*) with one species. The two endemic species of *Leptopteris* have membranous, translucent fronds and are widespread, but confined to forest where they sometimes hybridise. *Todea barbara* has coriaceous fronds and is confined to the far north of New Zealand where it is a rare and threatened species. *Osmunda regalis* is characterised by markedly different fertile and sterile pinnae on the same frond, and is naturalised in wet or swampy areas of northern New Zealand. All members of the family form short, sometimes trunk-like stems, and produce sporangia that are not arranged in discrete sori and contain green spores.

Osmundaceae Martinov, *Tekhno-Bot. Slovar*, 445 (1820)

Type taxon: *Osmunda* L.

Terrestrial ferns. Rhizomes erect, sometimes forming short trunk-like stems, hairy at apex. Fronds monomorphic or dimorphic, not articulated to rhizome. Stipes with 2 lateral wings (stipules) at base, glabrous or hairy. Laminae 2–3-pinnate, catadromous, glabrous or hairy. Veins free. Sporangia not in sori, partially or completely covering abaxial surface of fertile lamina segments, or completely covering highly modified and reduced lamina segments; paraphyses absent; exindusiate. Sporangia with a group of thickened annulus cells at one side of the capsule, dehiscing by a longitudinal slit over the apex; maturing \pm simultaneously; usually hundreds of spores per sporangium. Homosporous; spores trilete, tuberculate, chlorophyllous.

Taxonomy: A family of four genera (Metzgar et al. 2008) and about 20 species (Smith et al. 2006).

The family is interpreted here to include four distinct genera: *Leptopteris*, *Osmunda*, *Osmundastrum* and *Todea*. Based on phylogenetic analysis of plastid DNA sequences, Metzgar et al. (2008) showed that *Osmundastrum*, with a single extant species, is distinct from *Osmunda* and sister to the rest of the Osmundaceae, and that four genera should be recognised rather than three, as in previous treatments (e.g. Smith et al. 2006). The four genera are well supported by both molecular and morphological evidence.

Species are reasonably well defined in *Osmundastrum* (1 species), *Leptopteris* (6–7 species) and *Todea* (2 species). Metzgar et al. (2008) recognised three subgenera in *Osmunda* but species estimates vary between seven and 30, with nine recognised by Kramer (1990), excluding *Osmundastrum*.

The family is represented in New Zealand by two indigenous genera (*Leptopteris* and *Todea*) and one fully naturalised genus (*Osmunda*).

The family name Osmundaceae was attributed to Berchtold & Presl (1820) by Pichi Sermolli (1970). Berchtold & Presl treated Osmundaceae at the rank of "řad" (order), but Pichi Sermolli argued that this should be regarded as equivalent to the modern family. However, a change to the rules of botanical nomenclature in the Vienna Code of 2006 (Art. 18.2, Note 1, Ex. 4) specifically states that "names published at the rank of order ("řad") by Berchtold & Presl (1820) are not to be treated as having been published at the rank of family, since the term family ("čeled") was sometimes used to denote a rank below the rank of order". The name Osmundaceae was attributed to Martinov (1820) by Smith et al. (2006).

- | | |
|---|--|
| 1 | Fertile and sterile pinnae markedly different; sporangia borne on highly reduced, non-photosynthetic pinnae <i>Osmunda</i> |
| | Fertile and sterile pinnae similar; sporangia borne on abaxial surface of unreduced, photosynthetic pinnae 2 |
| 2 | Laminae membranous, translucent; sporangia scattered on abaxial surface <i>Leptopteris</i> |
| | Laminae coriaceous, opaque; sporangia densely packed on abaxial surface <i>Todea</i> |

Distribution: Distributed in north and south temperate regions, and in tropical south-east Asia. Two non-endemic and one naturalised genera with four species in New Zealand.

Biostatus: Indigenous (Non-endemic).

Table 1: Number of species and named hybrids in New Zealand within *Osmundaceae* Martinov

Category	Number
Indigenous (Endemic)	3
Indigenous (Non-endemic)	1
Exotic: Fully Naturalised	1
Total	5

Recognition: The Osmundaceae comprises terrestrial ferns characterised by stipules at the base of the stipe, sporangia not aggregated into sori, each with a lateral group of annular cells opening by a longitudinal slit, green spores, and a base chromosome number of 22.

***Leptopteris* C.Presl, Suppl. Tent. Pterid., 70 (1845)**

Type taxon: *Leptopteris hymenophylloides* (A.Rich.) C.Presl

Etymology: From the Greek *lepto-* (thin), and *pterus* (a fern), a reference to the membranous fronds.

Terrestrial ferns. Rhizomes erect, sometimes forming a short woody trunk. Rhizome scales absent. Fronds monomorphic. Stipes hairy. Laminae 2-pinnate-pinnatifid, membranous, translucent, lacking stomata, evergreen, hairy. Sporangia scattered on abaxial surfaces, generally confined to proximal half of primary and secondary pinnae. Spores trilete, radially symmetrical, tuberculate with tubercles bearing slender echinate processes.

Taxonomy: A genus of about seven species. *Leptopteris* was first recognised as a distinct genus by Presl (1845). Although closely related to *Todea*, two genera have usually been recognised within New Zealand, with the notable exception of Allan (1961) who included *Leptopteris* within *Todea*. *Leptopteris* has membranous, translucent fronds that lack stomata, and sporangia that are only sparsely scattered on the abaxial surfaces. *Todea* has coriaceous, opaque fronds with stomata, and sporangia that densely cover the abaxial surfaces. Phylogenetic analysis of DNA sequences from seven plastid loci (Metzgar et al. 2008) confirmed that both groups were monophyletic and sister to each other.

- 1 Laminae elliptic in outline; basal pair of pinnae 1–20 mm long; primary pinnae 6–23 mm wide; stipes usually 20–125 mm long; ultimate lamina segments bent at 90° to the plane of the frond *superba*
- Laminae ovate to triangular in outline; basal pair of pinnae 50–120 mm long; primary pinnae 25–55 mm wide; stipes 110–480 mm long; ultimate lamina segments flattened in the plane of the frond *hymenophylloides*

Distribution: About seven species in New Guinea, Australia, New Zealand and the Pacific; one species each in New Guinea, the Solomon Islands, New Caledonia to Samoa, Australia and Lord Howe Island. Two species endemic to New Zealand.

Biostatus: Indigenous (Non-endemic).

Table 2: Number of species and named hybrids in New Zealand within *Leptopteris* C.Presl

Category	Number
Indigenous (Endemic)	3
Total	3

Cytology: n = 22 (Kramer 1990).

***Leptopteris hymenophylloides* (A.Rich.) C.Presl, Suppl. Tent. Pterid., 71 (1845)**

≡ *Todea hymenophylloides* A.Rich., Voy. Astrolabe, Essai 97, t. 16 (1832)

≡ *Osmunda hymenophylloides* (A.Rich.) J.B.Armstr., *Trans. & Proc. New Zealand Inst.* 13: 368 (1881)
Lectotype (selected by Brownsey 1981): Baie des Îles [Bay of Islands, Northland], Nouvelle Zélande, Décembre, *Astrolabe*, Herb. A. Richard in Herb. Drake, P 00523203!

= *Todea pellucida* Carmich. ex Grev. & Hook., *Bot. Misc.* 3: 232 (1833)

Lectotype (selected by Brownsey 1981): banks of the Cowa-cowa R. [Kawakawa R.], Bay of Islands, New Zealand, A. Cunningham, Oct. 1826, K! (photo WELT E466/3)

= *Todea marginata* Colenso, *Trans. & Proc. New Zealand Inst.* 29: 419 (1897)

≡ *Leptopteris marginata* (Colenso) C.Chr., *Index Filic.*, 390 (1906)

Lectotype (selected by Brownsey 1981): no locality, Herb. W. Colenso, WELT P003363!

Etymology: From the Latin *Hymenophyllum* (a filmy fern), and *-oides* (like), a reference to the texture of the frond.

Vernacular names: heruheru; single crepe fern

Rhizomes erect, short or sometimes forming woody trunks up to 500 mm (rarely to 1000 mm) tall. Fronds 220–980 mm long. Stipes 110–480 mm long, pale brown, sparsely woolly hairy. Laminae 2-pinnate-pinnatifid, elliptic, ovate, or triangular, 140–725 mm long, 95–330 mm wide, green, membranous and translucent, sparsely hairy particularly on abaxial surfaces of costae of primary and secondary pinnae. Primary pinnae in 15–30 pairs, narrowly ovate to narrowly triangular, with acute apices, widely spaced along rachis; the longest at or below the middle of the rachis, 60–180 mm long,

25–55 mm wide; the basal pair 50–120 mm long. Secondary pinnae oblong or narrowly elliptic, 14–28 mm long, 5–10 mm wide, sessile or adnate, divided most of the way to the midrib. Ultimate lamina segments linear, attenuate, flattened in plane of frond. Sporangia scattered on abaxial surfaces, confined to proximal part of primary and secondary pinnae.

Distribution: North Island: Northland, Auckland, Volcanic Plateau, Gisborne, Taranaki, Southern North Island.

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

Chatham Islands, Stewart Island.

Altitudinal range: 10–950 m.

The species has a predominantly northern distribution. It is abundant in much of the North Island, especially in lowland and montane areas, from 10 to 950 m, but is uncommon in truly coastal regions, especially on the east coast and in Taranaki. In the South Island it is more common in lowland regions, but extends locally to 925 m in montane areas of inland Marlborough; it is absent from much of the high country.

Biostatus: Indigenous (Endemic).

Habitat: A terrestrial fern that occurs in lowland to montane areas, under kauri, podocarp, broadleaved and beech forest, especially on damp banks and along streams, but also on drier valley sides and ridge tops. It frequently occurs with *L. superba*, but the latter is usually confined to damper sites and valley floors.

Recognition: *Leptopteris hymenophylloides* has very thin, membranous fronds, resembling filmy ferns and can be confused with them when very young. It is distinguished from *L. superba* by its longer stipe, triangular lamina, longer and broader pinnae, and by its ultimate laminal segments, which are flattened in the plane of the frond. The basal pinnae (50–120 mm long) are significantly longer than those in *L. superba* (1–20 mm long) and this character alone will usually distinguish the two species.

Cytology: n = 22 (Manton 1950; Brownlie 1958; Brownsey 1981).

Hybridisation: *Leptopteris hymenophylloides* and *L. superba* frequently occur together in wet, forested areas, and they hybridise readily. Hybrids (*Leptopteris ×intermedia*) show regular bivalent formation at meiosis and have spores of normal appearance, but there is no evidence for second-generation hybrids (Brownsey 1981).

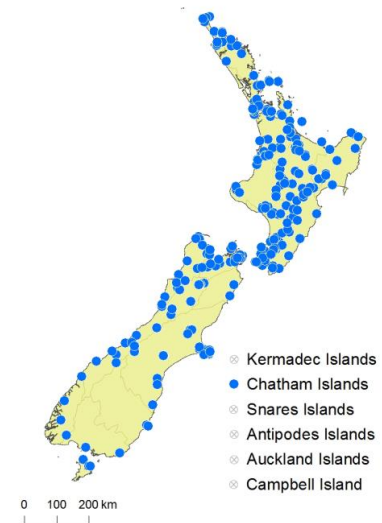


Fig. 1: *Leptopteris hymenophylloides* distribution map based on databased records at AK, CHR and WELT.



Fig. 2: *Leptopteris hymenophylloides*: mature frond showing long basal pinnae and stipe.



Fig. 3: *Leptopteris hymenophylloides*: primary pinna showing deeply divided secondary pinnae, hairs on the underside of the pinna midribs, ultimate laminal segments lying in the plane of the frond, and scattered sporangia.

Leptopteris superba (Colenso) C.Presl, *Gefässbündel Farrn*, 18 (1847)

≡ *Todea superba* Colenso, *Tasmanian J. Nat. Sci.* 2: 188 (1845)

≡ *Osmunda superba* (Colenso) J.B.Armstr., *Trans. & Proc. New Zealand Inst.* 13: 368 (1881)

Lectotype (selected by Allan 1961): near Waikare[moana] Lake, New Zealand, *W. Colenso*, 1841, WELT P003278!

Etymology: From the latin *superbus* (magnificent, superior), a reference to the striking appearance of this fern.

Vernacular names: Prince of Wales feathers fern; crepe fern; heruheru; ngutukākāriki; ngutungutu kiwi

Rhizomes erect, short or sometimes forming woody trunks up to 1000 mm tall. Fronds 250–1000 mm long. Stipes 15–190 mm long, pale brown, woolly hairy. Laminae 2-pinnate-pinnatifid, elliptic, 160–980 mm long, 60–250 mm wide, dark green, membranous and translucent, densely woolly hairy especially on costae of primary and secondary pinnae. Primary pinnae in 30–60 pairs, narrowly ovate to linear, with acute apices, crowded along rachis; the longest at or about the middle of the rachis, 30–130 mm long, 6–23 mm wide; the basal pair 1–20 mm long. Secondary pinnae oblong or narrowly elliptic, 6–11 mm long, 3–5 mm wide, sessile, divided most of the way to the midrib. Ultimate laminal segments linear, obtuse, bent upwards at 90° to plane of frond. Sporangia scattered on abaxial surfaces, confined to proximal part of primary and secondary pinnae.

Distribution: North Island: Northland, Auckland, Volcanic Plateau, Gisborne, Taranaki, Southern North Island.

South Island: Western Nelson, Sounds-Nelson, Westland, Canterbury, Otago, Southland, Fiordland.

Stewart Island.

Altitudinal range: 0–1600 m.

Leptopteris superba has a predominantly southern distribution, occurring from Mt Te Aroha southwards, apart from an isolated record (Rawlings 1972) from c. 700 m in Waipoua Forest (CHR 191223) and a 19th century collection by E.M. Smith from Little Barrier Island (AK 119092). In the North Island it is common in montane forest from Te Aroha to Wellington, occurring from about 250 m up to 1400 m on Maungapōhatu in the Urewera Ranges. In the South Island it is abundant in wet forest on the west side of the Main Divide, in the Marlborough Sounds, and around Dunedin and the Catlins, extending also to Stewart Island. It occurs from sea level in Fiordland to about 1600 m in the Takitimu Ranges near Monowai.

Biostatus: Indigenous (Endemic).

Habitat: A terrestrial fern that occurs in lowland to montane forest, growing best in cool, shaded forest in wetter sites and valley floors, sometimes in boggy ground. It requires constant high humidity, and cannot tolerate high temperature or light intensity. It is found primarily in beech, podocarp or kāmahī forest, extending locally into subalpine scrub.

Recognition: *Leptopteris superba* has very thin, membranous fronds, resembling filmy ferns, and can be confused with them when very young. It is distinguished from *L. hymenophylloides* by its shorter stipe, lamina that tapers to both ends, shorter and narrower pinnae, and by its ultimate laminal segments that are bent upwards away from the lamina surface like the pile of a carpet. The basal pinnae (1–20 mm long) are significantly shorter than those in *L. hymenophylloides* (50–120 mm long) and this character alone will usually distinguish the two species.

Cytology: n = 22 (Manton 1950; Brownlie 1958; Brownsey 1981).

Hybridisation: *Leptopteris superba* and *L. hymenophylloides* frequently occur together in wet, forested areas, and they hybridise readily. Hybrids (*Leptopteris ×intermedia*) show regular bivalent formation at meiosis and have spores of normal appearance, but there is no evidence for second-generation hybrids (Brownsey 1981).

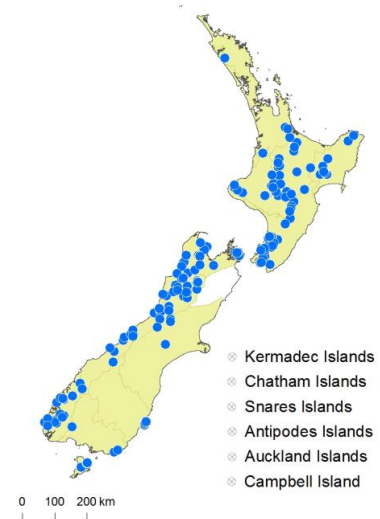


Fig. 4: *Leptopteris superba* distribution map based on databased records at AK, CHR and WELT.



Fig. 5: *Leptopteris superba*: mature plant growing on the forest floor.



Fig. 6: *Leptopteris superba*: mature frond showing very short basal pinnae and stipe.



Fig. 7: *Leptopteris superba*: lamina showing primary pinnae with deeply divided secondary pinnae, and ultimate laminal segments bent upwards at 90° to the plane of the frond.



Fig. 8: *Leptopteris superba*: primary pinna showing deeply divided secondary pinnae, hairs on the underside of the pinna midribs, and scattered sporangia.

***Leptopteris ×intermedia* (André) Brownsey, *New Zealand J. Bot.* 19: 351 (1981)**

≡ *Todea intermedia* André, *L'illustration Horticole* 24: 141, t. 290 (1877)
Type: New Zealand, not located (Brownsey 1981)

Etymology: From the Latin *intermedius* (intermediate), a reference to the hybrid origin of this fern, which is intermediate between *L. hymenophylloides* and *L. superba*.

Biostatus: Indigenous (Endemic).

Recognition: *Leptopteris hymenophylloides* and *L. superba* frequently occur together in wet, forested areas, and they hybridise readily. Plants of *Leptopteris ×intermedia* are intermediate in morphology between the two parent species (Brownsey 1981, fig. 1). They often have a degree of hybrid vigour and fronds are frequently larger than those of either parent species. The laminae are generally elliptic in outline, like *L. superba*, but the basal pair of pinnae are longer and the primary pinnae broader than in that species. The ultimate laminal segments are sometimes bent at 90° to the plane of the frond, but not as frequently as in *L. superba*.

Cytology: $n = 22$ (Brownsey 1981). Hybrids show regular bivalent formation at meiosis and have spores of normal appearance, suggesting some degree of fertility (Brownsey 1981).



Fig. 9: *Leptopteris xintermedia*: mature frond with pinnae decreasing in length towards the base, and a few ultimate laminal segments bent upwards.



Fig. 10: *Leptopteris xintermedia*: lamina showing primary and secondary pinnae, with a few ultimate laminal segments bent upwards.

***Osmunda* L., Sp. Pl., 1063 (1753)**

Type taxon: *Osmunda regalis* L.

Etymology: Derivation unclear, but an old English name either for Osmund the ferryman, who saved the lives of his wife and daughter by hiding them amongst these ferns (Field 1890), or for Osmunder, the Anglo-Saxon god of thunder, equivalent to the Norse god Thor (Gledhill 2008), or King Osmund who reigned over the South Saxons about 785 AD (Burrows 1990 – see under *Osmunda regalis*).

Terrestrial ferns. Rhizomes erect, often forming a short woody trunk covered with persistent stipe bases. Rhizome scales absent. Fronds dimorphic. Stipes glabrous or woolly hairy. Laminae 2-pinnate, coriaceous, opaque, with stomata, deciduous, glabrous or hairy. Sporangia borne on highly modified and reduced laminal segments. Spores trilete, radially symmetrical, tuberculate with tubercles bearing slender echinate processes.

Taxonomy: A genus of about 10 species. Phylogenetic analysis of DNA sequences from seven plastid loci by Metzgar et al. (2008) has shown that *Osmundastrum* is distinct from *Osmunda*, and that the latter comprises three separate subgenera. A single naturalised species is present in New Zealand (Brownsey in Webb et al. 1988; Brownsey & Smith-Dodsworth 2000), which is easily distinguished from the native species of *Todea* and *Leptopteris* by its markedly different fertile and sterile pinnae.

Distribution: About 10 species, with one very widespread species, another in temperate North America and Eurasia, and the rest in east and south-east Asia. One species fully naturalised in New Zealand.

Biostatus: Exotic; fully naturalised.

Table 3: Number of species in New Zealand within *Osmunda* L.

Category	Number
Exotic: Fully Naturalised	1
Total	1

Cytology: n = 22 (Kramer 1990).

***Osmunda regalis* L., Sp. Pl., 1065 (1753)**

Lectotype (selected by Jonsell & Jarvis in Jarvis et al. 1993): Herb. Burser XX: 26, UPS

Etymology: Derivation uncertain. From the Latin *regalis* (royal), a possible reference to the majestic quality of this fern in Europe. Alternatively *Osmunda regalis* may have been named after King Osmund who reigned over the South Saxons about 785 AD (Burrows 1990).

Vernacular name: royal fern

Rhizomes erect, forming woody trunks up to 1500 mm tall. Fronds 500–2070 mm long. Stipes 240–550 mm long, green turning yellow-brown with age, woolly hairy when young, becoming glabrous with age. Laminae 2-pinnate, or rarely 2-pinnate-pinnatifid, elliptic to obovate, 300–1700 mm long, 150–350 mm wide, rarely up to 2000 mm long and 750 mm wide, yellow-green, coriaceous, glabrous

or hairy on costae; rachises green turning yellow-brown with age. Sterile primary pinnae on fertile fronds in 2–5, or rarely up to 9 pairs, elliptic, narrowly ovate or ovate; the longest at or about the middle, 180–330 mm long, 70–125 mm wide, often acroscopic at a narrow angle to the rachis. Fertile primary pinnae in distal half of lamina, in 5–10 pairs, up to 135 mm long, 45 mm wide. Sterile secondary pinnae oblong, narrowly oblong or ovate, 20–84 mm long, 8–19 mm wide, shortly stalked; apices acute; margins entire or minutely toothed, very occasionally deeply divided more than halfway to midrib; bases unequal, truncate to auriculate. Fertile secondary pinnae up to 30 mm long, 4 mm wide. Sporangia densely clustered on highly modified and reduced pinnae.

Distribution: North Island: Northland, Auckland, Volcanic Plateau, Taranaki.

Altitudinal range: 0–460 m

A sub-cosmopolitan species from Europe, western Asia, Africa, India and North and South America, first recorded in 1885 (without a voucher specimen) from the Rangitikei River by Field (1890) who suggested that spores may have been accidentally introduced from Europe with grass seed. It is no longer known from the Rangitikei, but is naturalised in scattered sites from Lake Waiparera, Aupouri District, to the Bay of Plenty and Rotorua, with isolated records south to Whangamomona, Taranaki. It is abundant in the Waikato and Hauraki Plains areas. It occurs most frequently in lowland sites, but there are isolated records up to 460 m in the Atiamuri district.

Biostatus: Exotic; fully naturalised.

Habitat: In swampy areas, wet ground, lake margins, streamsides and drains, under *Salix*, mānuka scrub or remnant *Dacrycarpus dacrydioides* forest; common in the Waikato Region where very large plants are well established in wet areas.

First record: Field (1890, p. 145). Voucher: AK 259352, 1951.

Recognition: *Osmunda regalis* is immediately recognisable by its dimorphic fronds. On fertile fronds, the upper pinnae bear clusters of sporangia that completely replace the normal laminal tissue. No other species in New Zealand has such distinctively different fertile and sterile pinnae on the same frond except aberrant forms of *Blechnum* (especially *B. novae-zelandiae*).

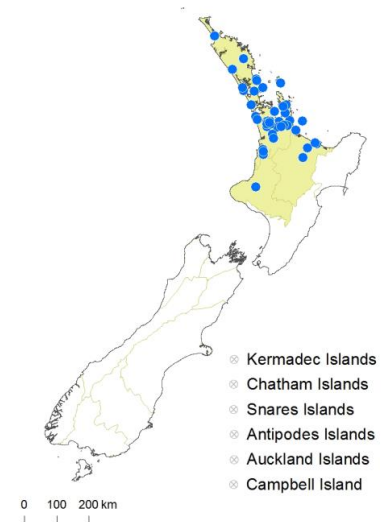


Fig. 11: *Osmunda regalis* distribution map based on databased records at AK, CHR, NZFRI and WELT.



Fig. 12: *Osmunda regalis*: mature plants in dry, peaty soil.



Fig. 13: *Osmunda regalis*: mature plant in dry, peaty soil.



Fig. 14: *Osmunda regalis*: mature, sterile, bipinnate frond.



Fig. 15: *Osmunda regalis*: base of mature fronds showing yellow-green stipes.



Fig. 16: *Osmunda regalis*: mature frond showing fertile pinnae with immature, green sporangia.



Fig. 17: *Osmunda regalis*: mature frond showing dimorphic sterile and fertile pinnae, and dehiscent, orange-brown sporangia.

***Todea* Willd. ex Bernh., *J. Bot. (Schrader)* 1800(2): 126 (1801)**

Type taxon: *Todea africana* Willd. ex Bernh. = *Todea barbara* (L.) T.Moore

Etymology: Named in honour of Heinrich Julius Tode (1733–1797), German botanist and clergyman, author of *Fungi Mecklenburgenses Selecti* (1790–1791).

Terrestrial ferns. Rhizomes erect, sometimes forming a short woody trunk. Rhizome scales absent. Fronds monomorphic. Stipes glabrous. Laminae 2-pinnate, coriaceous, opaque, with stomata, evergreen, glabrous or hairy. Sporangia partially or completely covering fertile laminal segments, confined to proximal half of primary and secondary pinnae in proximal half of the lamina. Spores trilete, radially symmetrical, tuberculate with tubercles bearing slender echinate processes.

Taxonomy: A genus of two species. *Todea* was first recognised as a distinct genus by Bernhardt (1801). Although closely related to *Leptopteris*, two genera have usually been recognised within New Zealand, with the notable exception of Allan (1961) who included *Leptopteris* within *Todea*. *Leptopteris* has membranous, translucent fronds that lack stomata, and sporangia that are only sparsely scattered on the abaxial surfaces. *Todea* has coriaceous, opaque fronds with stomata, and sporangia that densely cover the abaxial surfaces. Phylogenetic analysis of DNA sequences from seven plastid loci (Metzgar et al. 2008) confirmed that both groups were monophyletic and sister to each other.

Distribution: One species in South Africa, Australia and New Zealand and the other in New Guinea.

Biostatus: Indigenous (Non-endemic).

Table 4: Number of species in New Zealand within *Todea* Willd. ex Bernh.

Category	Number
Indigenous (Non-endemic)	1
Total	1

Cytology: n = 22 (Kramer 1990).

***Todea barbara* (L.) T.Moore, *Index Fil.*, cxix, 7 (1857)**

≡ *Acrostichum barbarum* L., *Sp. Pl.*, 1072 (1753)

≡ *Osmunda barbara* (L.) Thunb., *Prodr. Pl. Cap.*, 171 (1800)

Lectotype (selected by Brownsey & Parris 2012): Africa, Herb. Clifford, p. 476, BM 000647612!

= *Todea africana* Willd. ex Bernh., *J. Bot. (Schrader)* 1800(2): 126 (1801) nom. illeg.

Etymology: From the Latin *barbarus* (foreign), a reference to its distant origin when first described by Linnaeus.

Vernacular name: hard todea

Rhizomes erect, forming woody trunks up to 1000 mm tall. Fronds 210–1250 mm long, rarely up to 2200 mm in sheltered forest. Stipes 65–400 mm long, rarely up to 780 mm in sheltered forest, up to 8 mm in diameter, yellow-brown to chestnut, glabrous. Laminae 2-pinnate, ovate or elliptic, 150–750 mm long, 70–350 mm wide, rarely up to 1430 mm long and 500 mm wide in sheltered forest, yellow-green to chestnut, coriaceous, glabrous or with scattered long hairs, scented like hay when old. Primary pinnae in 11–25 pairs, narrowly elliptic, narrowly ovate or narrowly triangular, with acuminate to acute apices; the longest below the middle, 70–310 mm long, 16–110 mm wide. Secondary pinnae narrowly ovate, narrowly elliptic or narrowly oblong to almost linear, the longest 16–80 mm long, 4–10 mm wide, sessile or adnate; apices acute or acuminate; margins serrate; bases unequal, acute to truncate or adnate. Sporangia partially or completely covering fertile laminal segments, confined to proximal part of primary pinnae in proximal part of the lamina.

Distribution: North Island: Northland, Auckland

Three Kings Islands

Altitudinal range: 0–280 m

Confined to the Three Kings Islands, Poor Knights Islands and from North Cape to Whangārei and Kai Iwi Lakes, near Maunganui Bluff. It grows from sea level to about 280 m in Waipoua Forest.

Also Zimbabwe, Mozambique, South Africa, Australia (Queensland, NSW, Victoria, Tasmania).

Biostatus: Indigenous (Non-endemic).

The species was given a conservation status of Nationally Endangered by de Lange et al. (2013).

Habitat: Occurs in coastal and lowland areas, in open sunny situations, on clay banks and rocks, in kānuka and mānuka scrub, on gumland, in gullies, in swampy areas, under *Pinus* plantation, and in open pōhutukawa forest.

Recognition: *Todea barbara* is recognised by its coriaceous, bipinnate fronds, bearing sporangia that are not aggregated into sori but completely cover the undersides of the proximal pinnae. Older plants have short woody trunks. Fronds vary considerably in size from c. 200 mm long in exposed scrub to c. 2000 mm long in sheltered forest.

Cytology: n = 22 (Brownlie 1961).

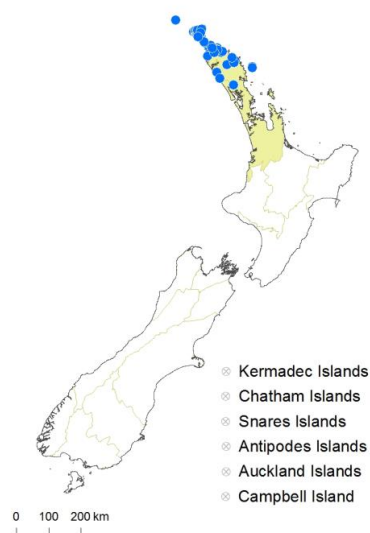


Fig. 18: *Todea barbara* distribution map based on databased records at AK, CHR and WELT.



Fig. 19: *Todea barbara*: plant with depauperate, sterile fronds.



Fig. 20: *Todea barbara*: mature plant growing in cultivation.



Fig. 21: *Todea barbara*: underside of frond showing arrangement of the sporangia.



Fig. 22: *Todea barbara*: underside of cultivated frond showing mature sporangia covering the lamina surface, not in discrete sori.

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Acknowledgements

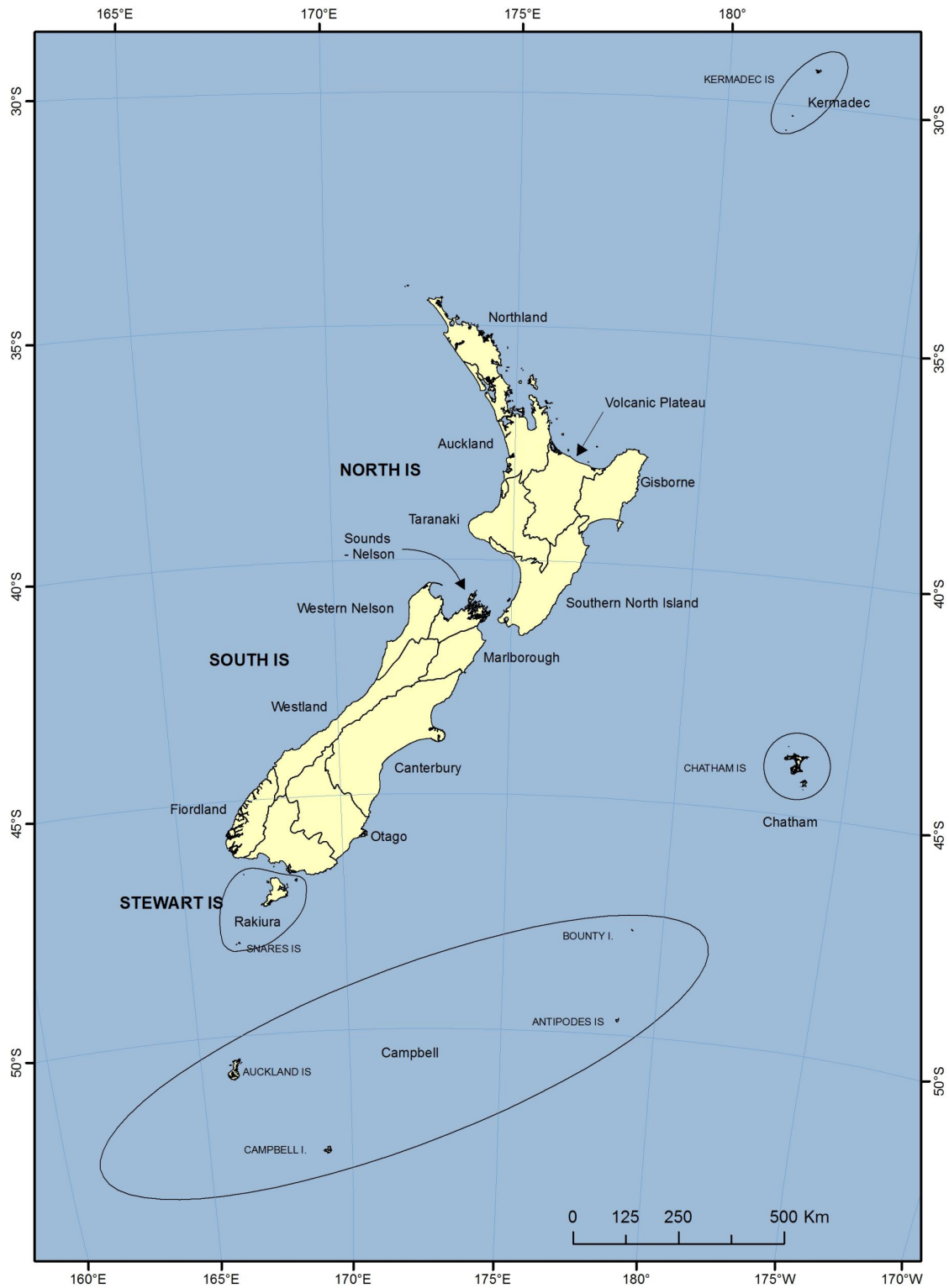
We thank the staff at AK, CHR, NZFRI, WAIK and WELT for loans of specimens and for databasing and providing spreadsheets of collection data. We are grateful to staff at CHR for the preparation of maps and for assistance in editing and formatting the text, and to Barbara Parris for reviewing the manuscript.

P.J. Brownsey and L.R. Perrie

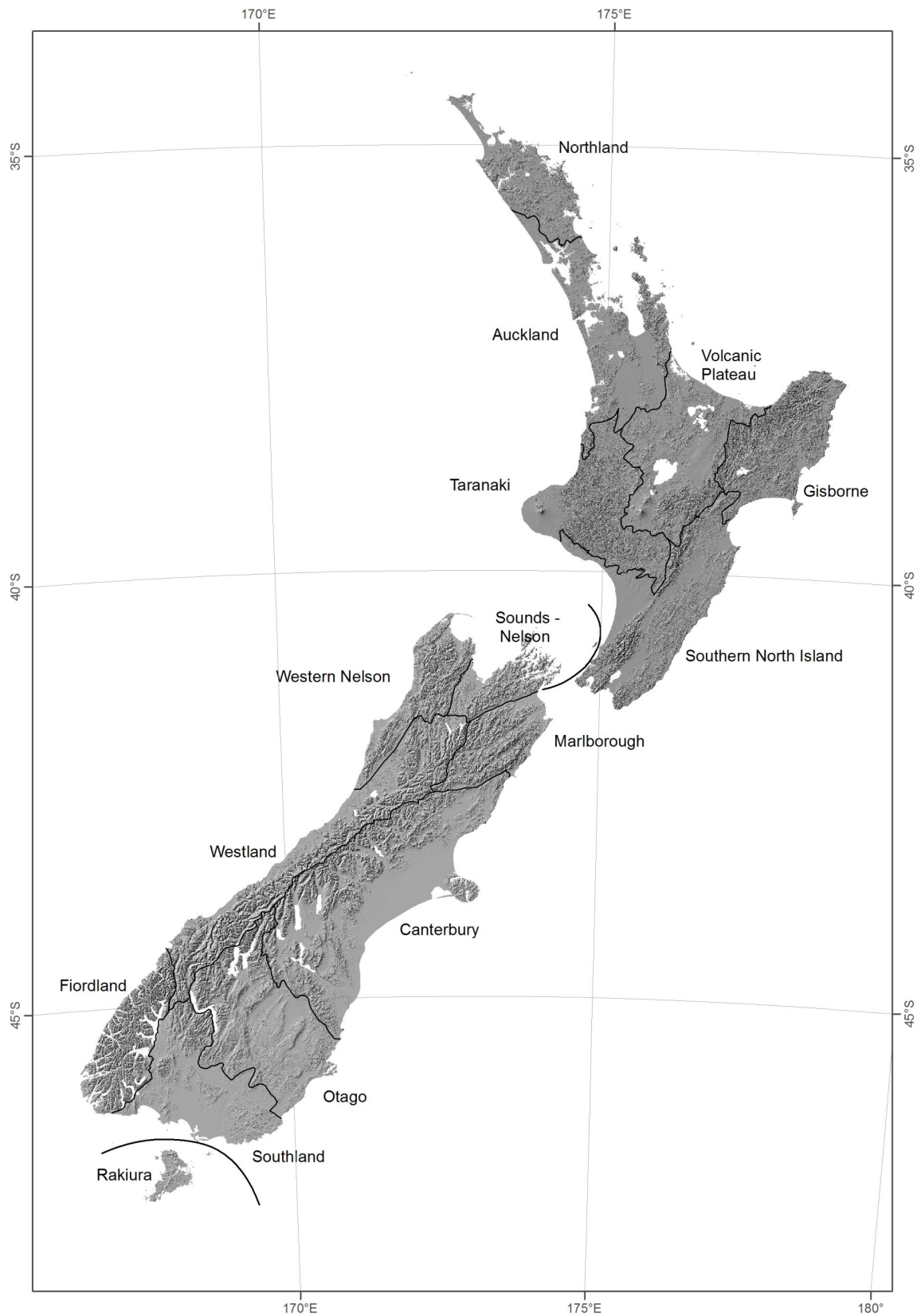
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Map 1: Map of New Zealand and offshore islands showing Ecological Provinces



Map 2: Map of New Zealand showing Ecological Provinces

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