PROVISIONAL CLASSIFICATION OF SOUTH ISLAND VIRGIN INDIGENOUS FORESTS

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ABSTRACT

A largely subjective provisional classification of virgin indigenous forests has been produced for the South Island of New Zealand. Three geographical zones were recognised, and within each zone forest types were identified from a combination of two approaches. Canopy-tree stocking data collected during the systematic line-plot sampling of the National Forest Survey of New Zealand (1946–55) were examined with the assistance of a computerised cluster analysis technique. In areas not covered by the National Forest Survey plot sampling, forest descriptions from more recent work were used. The resultant 94 forest types were distributed between 10 forest classes to produce a three-level classification.

INTRODUCTION

The provisional classification of North Island indigenous forests (McKelvey & Nicholls 1957) was produced from data collected by two extensive forest inventories – the National Forest Survey (Thomson 1946; Masters *et al.* 1957) and a supplementary survey of forests in the North Auckland Land District in which more emphasis was placed on ecological aspects (McKelvey & Nicholls 1957; Nicholls 1976a). The combined results of these two inventories provided a conspectus of the North Island forests and enabled the major forest types to be identified. The classification, albeit at first a provisional one, correlated the patterns of the various forest tracts, enabling series of North Island forest type maps to be produced on a common basis. These maps have been useful for various management objectives, including the identification of areas of forest where reservation is justifiable for nature conservation and scientific objectives (Thomson & Nicholls 1973). After 1957, Nicholls steadily refined the provisional classification as more field data were collected during extension of the supplementary survey to all districts, and then published a revised classification (Nicholls 1976a). This tested classification for North Island forests is being used constantly and effectively.

Unfortunately, no such detailed classification exists for the South Island forests. Valuable descriptive accounts of various South Island forest tracts have been produced by many workers but, without a comprehensive South Island classification, it is difficult to make detailed comparisons or contrasts between them. Prominent among these

workers was Holloway (1954) who covered much of the South Island in his major paper on the forests and climates. A detailed account of the distribution and composition of the black beech / mountain beech* forests of the South Island has been published by Wardle (1970), and there has been much descriptive work presented more recently (*see* below).

The purpose of this paper is to provide a preliminary stratification of the indigenous forests of the South Island, as a foundation for an eventual comprehensive classification comparable to that which exists for the North Island forests (Nicholls 1976a). Most reliance has been placed on the field data collected during the 1946–55 National Forest Survey (Masters *et al.* 1957), but this comprehensive inventory, in which both timber and ecological data were collected, was concentrated on the lower and intermediate altitude forests where there were known or probable resources of timber. The sampling in some montane forests was much less intensive, sometimes comprising only notes made during reconnaissances; other montane areas were not covered at all. However, this deficiency has been made good by a range of workers since 1955, including scientists of the Forest Research Institute in the South Island and other staff of the New Zealand Forest Service. Much of this work has been incorporated into the classification so that the approach adopted has been eclectic.

CONCEPT OF A FOREST TYPE

Spurr & Barnes (1980) offered the useful basic concept of a forest community (type) as being ". . . a group of interrelated plants and animals that occur together more frequently than can be ascribed to chance. . . ." Further, they recognised "discrete" and "merging" forest types which have resulted respectively from abrupt and gradual changes in growing conditions. Discrete forest types tend to be more uniform in composition and so are more readily demarcated. Merging forest types, on the other hand, represent continua of vegetative change along environmental gradients and so are less uniform. These continua may be divided into forest types with arbitrary subjective boundaries placed across the gradients (McKelvey 1973). By far the greater part of South Island forests comprise merging forest types, with continua of change along environmental gradients (McKelvey 1970).

Whether there are clear examples of merging and discrete forest types or whether there are types which are intermediate in character between these two extremes, the number of types which can be recognised (i.e., the intensity of forest pattern which can be recognised) will depend on considerations of scale. For management reasons the complexity of any system of forest classification is limited by legibility and workability at the mapping scale chosen. The mapping scale for this classification of South Island forests is 1 : 50 000, which is the same as that chosen for the North Island forests (Nicholls 1976a). This means, in practical terms, that types not known to occur over more than 10 ha in any one place cannot be shown. Such types may be of high ecological importance but, if they consistently occupy areas of less than 10 ha, they cannot be mapped at the specified scale and so are not accommodated in this classification.

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* For botanical nomenclature, see Appendix 1

The indigenous forests of the South Island are regarded as multiple-use forests, which are or can be managed for sustained production of timber, soil and water conservation, recreation and amenity, conservation of indigenous biota, and scientific study. The upper forest storeys are of principal interest for the first two objectives – for timber production because they will comprise the mature timber crops, for soil and water conservation because the canopies and the deep root webs of the upper storey trees have important protective roles. The situation is less clear-cut in relation to recreation and amenity. Canopy trees form attractive backdrops but species in the shrub storey, in the floor cover, and those which are epiphytic have recreational and amenity value too. Of course, upper storeys do not possess any inherent primacy in conservation of indigenous biota. It is pertinent to scientific values that Wilkinson & Daly (1976) found that some National Forest Survey (NFS) types, which were differentiated primarily on the basis of canopy species, proved useful for the designation of biological reserves in the Longwood forests of Southland and that they reflected quite subtle ecological variation. It must be added, though, that P. Wardle (1974) found that three NFS types in Westland reflected only part of the botanical variation present.

On the whole, all these considerations indicate the importance of the upper storeys in any classification of forest for a range of management objectives and so the classification outlined in this paper will concentrate on the species which form the forest canopy. This means that physiognomic prominence is regarded as being more important than floristic occurrence. This interpretation is similar to that accepted by Nicholls (1976a), who stated that each forest type in his revised North Island classification was determined purely by the specific association of trees 30 cm or more in diameter at breast height (d.b.h.) in high forest (15 m or more canopy height), and 10 to 30 cm d.b.h. in low forest (6–15 m tall). In the current context, then, a forest type is recognised as the particular occurrence of upper storey species, together or singly, in discrete communities or continua, which can be usefully depicted on a map with the scale of 1 : 50 000.

THE NATIONAL FOREST SURVEY DATA

During the period 1946–55 approximately 12 000 temporary 0.4-ha (1-acre) sample plots were measured in the North and South Island indigenous forests on a basic grid of east-west lines 1.6 km (1 mile) apart with plots 402 m ($\frac{1}{4}$ mile) or 805 m ($\frac{1}{2}$ mile) distant along the lines, the more intensive sampling being in the heavier timber. The aim was to collect both volumetric and ecological data, with emphasis on the former so that the sample plots were concentrated in the low and mid-altitude timber stands, although some large tracts of montane and other non-merchantable forest were covered by the survey teams. Data collected relevant to this paper comprised, for each plot, the stockings (densities) of all tree species having diameters at breast height of 30.48 cm (12 inches) or more. Full details of the field procedures have been given in the definitive report on the project (Masters *et al.* 1957).

An important consideration is whether or not a rectangular plot of 0.4 ha exceeds the "minimal area" in which the characteristics of the forest types can be expressed. This has not been established definitely or even examined comprehensively but it is noteworthy that Wilkinson & Daly (1976) found in the Longwood Forest that an area of radius 15 m (0.07 ha) included most species present in any one forest stand.

Also, J. Wardle (1970) found in the black beech / mountain beech forests, that very few new species were located on a plot site once an area of approximately 0.04 ha had been covered. While acknowledging that "minimal areas" for the various forest types are not known, the 0.4-ha plots can be regarded as relatively large areas which should provide adequate sampling of the trees in the forest canopies.

More plot sheets were available for analysis than could be used, for a variety of reasons. Firstly, as the principal objective was to develop a classification for virgin forests, many plot records for forest which had been logged or burnt, or both, were discarded. Secondly, to obtain a uniform intensity of sampling, many plots in the more heavily timbered and so more intensively sampled forests had to be discarded. The uniform sampling intensity settled on, which was governed by the extensive sampling in the less important timber stands, was one plot per about 600 ha and altogether 2882 plots were selected for analysis (about 40% of the plots available). Criteria used for plot selection were even geographical spread, wide altitudinal range, and lines of plots done by the most competent (in a botanical sense) of the party-leaders (who were known to the writer).

ANALYSIS OF THE NATIONAL FOREST SURVEY DATA

An initial division was made zonally, principally as a precaution to ensure that significant latitudinal variation did not become obscured. The largely beech-free belt from the Taramakau River to the Paringa River in Westland, which extends eastwards to include the stands of kaikawaka and Hall's totara in the mountains of central Canterbury, forms a major botanical zone which separates southern and northern tracts of beech and softwood-hardwood-beech forest. This beech-free belt is characterised in Westland by extensive areas of terrace softwood forest and hill softwood-hardwood forest. There are marked differences between the forest tracts south and north of it, due partly to an admixture in the north of various species which are otherwise restricted to North Island forests. Three zones were recognised – Southern, Mid, and Northern, respectively containing subdivisions of 727, 774, and 1381 plots. Figure 1 shows the boundaries of the zones, the extent of indigenous forest, and those areas covered by NFS plot sampling. The zonal boundaries have been rigidly followed, even though certain forest types in different zones may appear broadly similar, in case later and fuller botanical descriptions reveal significant differences in smaller species.

Nicholls (1977) has produced a condensed classification of the indigenous forests of New Zealand which deals with classes (aggregations of broadly similar forest types). Nicholls recognised 13 classes of virgin forest and five classes of culturally modified forest, and described nine of the virgin and three of the culturally modified classes as occurring in the South Island. Nicholls' broad classification at the class level was accepted and, within each zone, the NFS plots were allocated to his classes. The adoption of Nicholls' classes and the allocation of the NFS plots to these classes constitute a subjective basis for the classification.

Classification then proceeded separately within each class within each zone, using the agglomerative technique of cluster analysis. Cluster analysis has been used in New Zealand indigenous forests on an extensive scale and with success (e.g., J. Wardle 1970;

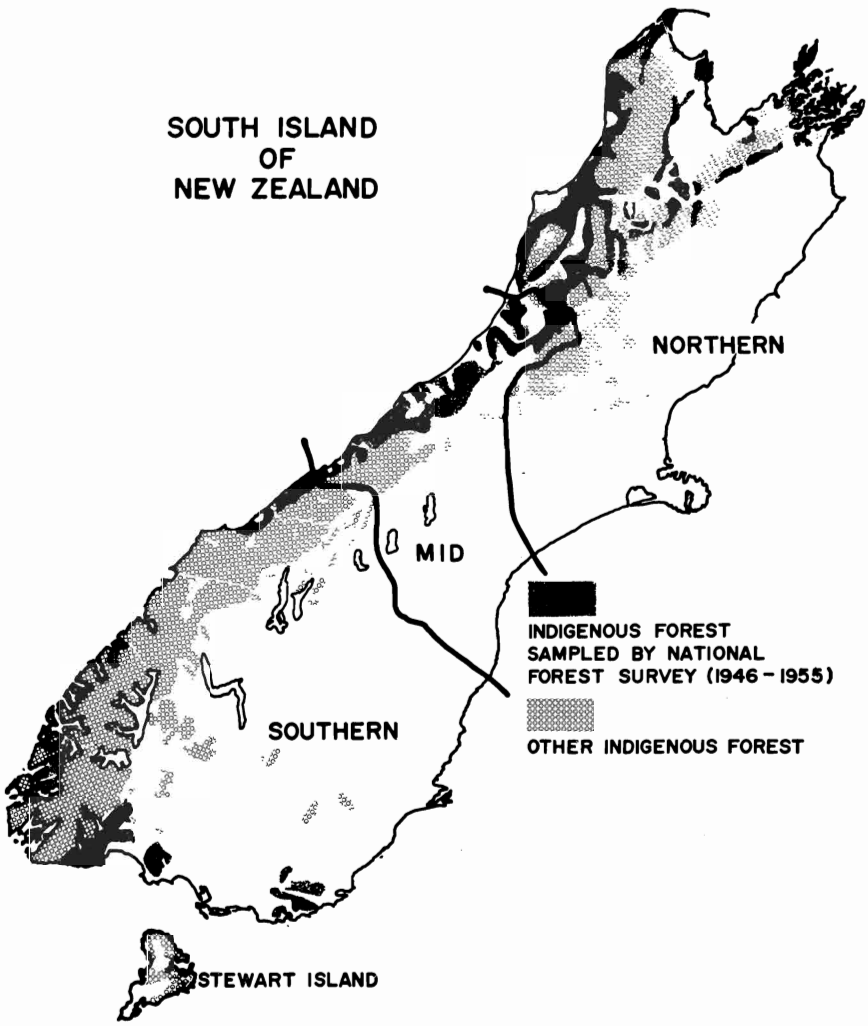

FIG. 1—Indigenous forest on South and Stewart Islands, zone boundaries and National Forest Survey sampling.

Herbert 1973; J. Wardle & Guest 1977). A computerised cluster analysis programme (Allen & McLennan 1983) was obtained from the New Zealand Forest Research Institute. The attributes involved in the clustering were canopy species and stockings per plot of those species; plots with most similar canopy species and most similar specific stockings were clustered first. Coefficients of similarity between pairs and groups of plots were calculated in a manner based on the method of Sørensen (*in* Greig-Smith

1967; Shimwell 1971) but modified to the extent that stocking (stems/ha) is the attribute used, viz:

$$\text{Coefficient of similarity} = \frac{\Sigma 2a_i}{\Sigma x_i + \Sigma y_i};$$

where x_i = stocking of species i in plot x;
y_i = stocking of species i in plot y;
and a_i = minimum stocking for species i in either plot.

Selection of an arbitrary, uniform coefficient of similarity as a "cut-off" value for clustering did not produce the most useful results as it divided up groups of plots very unevenly. Instead, the "cut-off" value for each group (forest class) was decided individually and subjectively, having regard for the inherent complexity of each group (the number of canopy species), the number of plots in each group, and the pattern of each dendrogram. Where it became difficult to decide on a "cut-off" value, the decision was made in favour of fewer rather than more types, i.e., favouring a higher coefficient of similarity. As the computer matrix could not exceed 500 plots if the clustering was to be done economically, four broad groupings of fewer than 500 plots each had to be made manually in the Northern Rimu – General Hardwoods – Beeches class. This was done subjectively on the presence or absence of important canopy species: red beech and hard beech together, hard beech the sole beech species present, hard beech absent, and all other plots. Then clustering proceeded within each of these four groupings.

The mean stockings per hectare of all constituent species in each resultant cluster (type) were calculated and qualified with the product of the standard error of each mean and the value of "t" at the 5% level of probability to provide limits of confidence. Within each class, the specific stockings of the resultant types were compared to ensure that differences between types were significant. Where they were judged subjectively not to be significant, the types were merged and the mean stockings recalculated. Such modification of the cluster analysis technique further indicates the subjective nature of the classification.

The mean stockings resulting from cluster analysis may not be identical with the mean stockings of mapped types. For them to be identical with the means of mapped forest types it would be necessary for those types not to include, as undetected enclaves or even enclaves which are detected but too small to map, small areas of other forest types.

Integration with Other Work

As explained above and also as illustrated by Fig. 1, large areas of the forests were not sampled by the National Forest Survey teams. The work of others has been consulted for descriptions of these stands and is acknowledged. Forest types have been identified subjectively from this descriptive work, which often includes local classifications, and those which are not duplicated by types recognised from the cluster analysis exercise have been added to the classification, each to the relevant class recognised by Nicholls.

THE CLASSIFICATION

The classification comprises three levels: zones (3), classes (10), and types (94). The zones – Southern, Mid, Northern – are respectively characterised by the symbolic letters S, M, and N.

The forest classes (after Nicholls 1977) and the recognised forest types are set out in tabular detail below. The types identified from the NFS data by clustering are described quantitatively in terms of mean specific stockings per hectare and confidence limits. Also included in the tables are species common in the understorey and on the forest floor. It must be acknowledged that the NFS data are old, having been collected between 1946 and 1955. This should not reduce significantly the validity of the stocking data for canopy trees but there is less certainty about the validity of the data for species in the understorey and on the forest floor, for these will have been subjected for a long time to browsing from introduced animals, principally deer. Accordingly, lists of understorey and forest floor species have been made brief and general. Where it is not possible to give the abundance of canopy species quantitatively, the practice of Nicholls (1976a) of using "occasional (O)" for fewer than 15 stems/ha, "frequent (F)" for 15 to 50 stems/ha, and "abundant (A)" for more than 50 stems/ha is followed. In some places where the work of others has been used, these symbols have had to be used inferentially with a great deal of approximation, and also with the prefix L meaning "locally". Following the conventions of Nicholls (1976a), "softwood" includes all conifers except kauri; "hardwood" includes all other species except beeches; and "general hardwood" includes all "hardwoods" except *Beilschmiedia* spp. Finally, the definition of forest accepted by Nicholls (1976a) is used as a guide: generally comprising trees 15 m or more in height with diameters at breast height of 30 cm or more, but near timberline and on a few infertile or very exposed lowland sites heights may drop to 6 m and diameters to 10 cm.

The types recognised from the cluster analysis exercise represent virgin forest as plot records of culturally modified forest were rejected. Many thousands of hectares of virgin forest have been logged since the NFS plot data were collected but no comprehensive data about the composition and density of these modified stands are readily available. (Of course, such data collected from the then-virgin forest have been used in this classification.) Culturally modified forest, both old and new, is now so large in total area that it must be included in any comprehensive classification. This important addition is a task for the future.

This classification can only be provisional. More descriptive data, preferably quantitative, are required for large areas. Also, there are bound to be faults in interpreting the work of others. However, it is hoped that, as in the comparable North Island work, progressive refinement will lead eventually to an increasingly effective and useful classification.

The Classes

The classes are characterised by the symbolic letters shown parenthetically.

Three broad altitudinal strata – high, intermediate, low – are used in the class and type descriptions, as follows:

Northern zone	high	– above 760 m
	intermediate	– 380–760 m
	low	– up to 380 m
Mid and Southern zones	high	– above 600 m
	intermediate	– 300–600 m
	low	– up to 300 m

This subdivision is based on Kirkland (1975).

Rimu–Tawa Class (D): Occasional rimu and miro; frequent tawa and kamahi; occasional hinau and pukatea; abundant shrub hardwoods; low altitudes; confined mainly to the Marlborough Sounds.

Rimu – General Hardwoods Class (F): Occasional to frequent rimu and miro; occasional to frequent kamahi and southern rata; abundant shrub hardwoods; kahikatea locally frequent; low and intermediate altitudes.

Highland Softwoods–Hardwoods Class (G): Occasional to abundant Hall's totara with abundant shrub hardwoods and often abundant kamahi and southern rata; kaikawaka and pink pine occur locally; high altitudes (also at intermediate altitudes on steeplands in Westland).

Rimu–Tawa–Beeches Class (H): Rimu–tawa forest with an admixture of beeches; low and intermediate altitudes.

Rimu – General Hardwoods – Beeches Class (I): Abundant beeches; occasional to frequent rimu; occasional miro; occasional to frequent kamahi, southern rata and quintinia; kahikatea is often the dominant softwood on alluvial sites; low and intermediate altitudes. On boggy sites abundant silver pine or yellow silver pine, and kaikawaka supplant rimu; pink pine, bog pine and mountain toatoa may also be locally abundant.

Highland Softwoods–Beeches Class (J): Abundant beeches with occasional to frequent Hall's totara, miro, and kaikawaka; intermediate and high altitudes.

Beeches Class (K): Forest where one or more of the beeches clearly predominate and softwoods are absent or rare; mainly high altitudes.

Softwoods Class (L): Forest where one or more of the softwoods clearly predominate; mainly low altitudes.

Rimu–Matai–Hardwoods Class (M): Occasional to frequent matai occur consistently; occasional to frequent kahikatea, totara, rimu, and miro are also often present but each of these species may be locally absent; frequent to abundant kamahi and southern rata often present; hinau may occur locally in abundance; low and intermediate altitudes.

General Hardwoods Class (P): Abundant southern rata, kamahi, and shrub hardwoods; mainly high and intermediate altitudes.

The Types

Type descriptions are set out in the tables below, under class headings and by zones. The types are characterised by numbers. Accordingly each type is referred to by a letter denoting the zone, a letter denoting the class, and a number, in that order.

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APPENDIX 1

GLOSSARY OF PLANT NAMES

black beech	*Nothofagus solandri* (Hook. f.) Oerst. var. *solandri*
bog dacrydium spp.	variable mixtures of *Dacrydium bidwillii* Kirk, *D. biforme* (Hook.) Pilger, *D. colensoi* Hook., *D. intermedium* Kirk
bog pine	*Dacrydium bidwillii* Kirk
broadleaf	*Griselinia littoralis* Raoul
fuchsia	*Fuchsia excorticata* (Forst. f.) L. f.
Hall's totara	*Podocarpus hallii* Kirk
hard beech	*Nothofagus truncata* (Col.) Ckn.
hinau	*Elaeocarpus dentatus* (J.R. et G. Forst.) Vahl
hutu	*Ascarina lucida* Hook. f.
kahikatea	*Podocarpus dacrydioides* A. Rich.
kaikawaka	*Libocedrus bidwillii* Hook. f.
kaikomako	*Pennantia corymbosa* J.R. et G. Forst.
kamahi	*Weinmannia racemosa* L. f.
kidney fern	*Trichomanes reniforme* Forst. f.
kiekie	*Freycinetia baueriana* Endl. subsp. *banksii* (A. Cunn.) B.C. Stone
kowhai	*Sophora microphylla* Ait.
lancewood	*Pseudopanax crassifolius* (A. Cunn.) C. Koch
mahoe	*Melicytus ramiflorus* Forst.
manuka	*Leptospermum scoparium* J.R. et G. Forst.
matai	*Podocarpus spicatus* Mirb.
miro	*Podocarpus ferrugineus* D. Don
mountain beech	*Nothofagus solandri* var. *cliffortioides* (Hook. f.) Poole
mountain toatoa	*Phyllocladus alpinus* Hook. f.
pate	*Schefflera digitata* J.R. et G. Forst.
pepperwood	*Pseudowintera colorata* (Raoul) Dandy
pigeonwood	*Hedycarya arborea* J.R. et G. Forst.
pink pine	*Dacrydium biforme* (Hook.) Pilger
pokaka	*Elaeocarpus hookerianus* Raoul
quintinia	*Quintinia acutifolia* Kirk
red beech	*Nothofagus fusca* (Hook. f.) Oerst.

rimu	*Dacrydium cupressinum* Lamb.
shrub hardwoods	Hardwood shrubs and small trees which seldom exceed 10 m in height; principal genera are *Aristotelia, Carpodetus, Coprosma, Fuchsia, Griselinia, Pseudopanax, Myrsine, Pseudowintera*
silver beech	*Nothofagus menziesii* (Hook. f.) Oerst.
silver pine	*Dacrydium colensoi* Hook.
southern rata	*Metrosideros umbellata* Cav.
stinkwood	*Coprosma foetidissima* J.R. et G. Forst.
supplejack	*Ripogonum scandens* Forst.
toro	*Myrsine salicina* Hook. f.
totara	*Podocarpus totara* D. Don
treeferns	*Dicksonia* spp., *Cyathea* spp.
wineberry	*Aristotelia serrata* (Forst.) Oliver
yellow silver pine	*Dacrydium intermedium* Kirk

NOTE: Botanical nomenclature for tree and shrub gymnosperms and angiosperms follows Poole & Adams (1980); for *Chionocloa,* Zotov (1963); for other grasses, Cheeseman (1925); for other monocotyledons, Moore & Edgar (1970); for all other plants including ferns, Allan (1961).

TYPE DESCRIPTIONS OF SOUTH ISLAND INDIGENOUS FORESTS

Type symbol	No. plots	Canopy Trees (≥30.48 cm d.b.h. for NFS data) Species	Stems/ha or abundance symbol	SE × t (p=0.95)	Occurrence plots	Common Species Understorey	Floor cover	Altitude, location	Source
SOUTHERN ZONE (S)									
RIMU — GENERAL HARDWOODS CLASS (F)									
SF 1	135	kamahi	73.14	± 7.47	133	*Pseudopanax* spp.,	*Blechnum discolor*,	Near sea level to about 350 m. Catlins, Longwood Range, West Waiau, Hokonui Mts, South Westland: level and easy terrain at lower altitudes to moderately steep hill sites.	NFS
		rimu	16.31	± 2.61	115	pepperwood,			
		southern rata	6.81	± 2.58	38	supplejack,			
		miro	6.79	± 1.50	85	fuchsia,	*Blechnum capense*,		
		broadleaf	2.82	± 1.03	42	*Coprosma* spp.,	*Todea* spp.,		
		fuchsia	2.05	± 0.90	28	broadleaf,	*Polystichum vestitum*,		
		kahikatea	1.78	± 0.90	26	treeferns,	*Microlaena avenacea*.		
		Hall's totara	1.52	± 0.96	15	*Myrsine australis*,			
						kamahi,		Stewart Island (no beech).	Wells & Mark (1966), Williamson (unpubl.)
						mahoe,			
						pigeonwood.			
SF 2		southern rata	A			manuka,	*Blechnum capense*,	Stewart Island, exposed sites, especially in south and west, at higher altitudes than SF 1.	Williamson (unpubl.)
		kamahi	A			pink pine,	moss.		
		rimu	F			*Dracophyllum*,			
		manuka	O			*Cyathodes*,			
		miro	O			*Myrtus pedunculata*,			
		Hall's totara	O			*Senecio bennettii*,			
		pink pine	O			kamahi,			
						yellow silver pine,			
						Myrsine divaricata,			
						stinkwood.			
SF 3		kamahi	A			treeferns,	*Blechnum discolor*,	Stewart Island, coastal, near sea level.	Williamson (unpubl.)
		broadleaf	A			*Myrsine australis*,	*Uncinia*,		
		rimu	F			kamahi,	*Microlaena avenacea*.		
		Carpodetus serratus	O			*Coprosma* spp.,			
						supplejack,			
						Carpodetus serratus.			
RIMU — GENERAL HARDWOODS — BEECHES CLASS (I)									
SI 1	164	silver beech	67.23	± 5.46	164	pepperwood,	*Blechnum discolor*,	Near sea level to 450 m: Catlins, Longwood Range, West Waiau, South Westland.	NFS
		kamahi	24.11	± 4.21	145	kamahi,			
		rimu	20.55	± 3.23	157	stinkwood,	*Blechnum capense*,		
		miro	9.27	± 1.78	116	*Pseudopanax* spp.,	*Todea* spp.,		
		mountain beech	6.25	± 2.12	46	*Myrsine australis*,	*Polystichum vestitum*,	Fiordland.	Holloway (1951), P. Wardle (1963), Mark & Smith (1975), Nicholls (1976b)
		southern rata	4.79	± 1.31	69	broadleaf,	*Grammitis billardieri*,		
		Hall's totara	3.62	± 1.18	58	pigeonwood,	*Astelia spp.*		
		kahikatea	1.75	± 0.96	27	treeferns.			
		totara	1.72	± 0.79	35				
SI 2	17	mountain beech	64.39	± 12.96	17	kamahi,	*Blechnum capense*,	100-300 m, West Waiau.	NFS
		silver beech	43.17	± 15.46	16	*Myrsine australis*,	*Blechnum discolor*,		
		kamahi	8.43	± 5.52	8	*Myrtus pedunculata*,	*Nertera dichondraefolia*.	Fiordland.	P. Wardle (1963), Nicholls (1976b)
		rimu	7.12	± 4.73	16	*Pseudopanax* spp.,			
		Hall's totara	4.36	± 3.64	7	mountain toatoa.			
		miro	2.76	± 2.00	7				

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SI 3	3	silver beech	241.34		3	kamahi, *Pseudopanax* spp., *Myrtus pedunculata*, *Myrsine divaricata*, pepperwood.	*Blechnum discolor*, *Microlaena avenacea*.	South Westland, on easy, slow-draining terrain at lower altitudes.	NFS
		kahikatea	42.83		3				
		pokaka	9.06		2				
		rimu	8.24		2				
		kamahi	8.24		1				
		miro	5.77		2				
		totara	2.47		2				
		kaikawaka	2.47		1				
		matai	1.65		1				
		Hall's totara	1.65		1				
SI 4		mountain beech kamahi southern rata rimu kahikatea				Hall's totara, mountain toatoa, pepperwood, hutu, *Pittosporum colensoi*, broadleaf, *Pseudopanax* spp., *Olearia arborescens*.	bryophytes, *Lycopodium*, *Blechnum minus*.	Fiordland, peaty soils, near sea level.	P. Wardle (1963)
SI 5		kahikatea	A			*Coprosma* spp., *Myrsine divaricata*, *Myrtus pedunculata*, pepperwood, seedlings of kahikatea, rimu, and Hall's totara.		Fiordland, lower altitudes, alluvial flats.	Nicholls (1976b)
		rimu	A						
		mountain beech	A						
		silver beech	LA						
		pokaka	O						
SI 6		yellow silver pine mountain beech kamahi rimu southern rata				manuka, pink pine, Hall's totara, mountain toatoa, *Pseudopanax* spp.	bryophytes, *Blechnum minus*.	Fiordland, poorly drained sites, 60-300 m.	P. Wardle (1963)
SI 7		silver beech	A					Fiordland, 300-450 m; bog dacrydiums and manuka prominent on exposed, boggy sites.	Nicholls (1976b)
		mountain beech	A						
		rimu	O-LF						
		yellow silver pine	LA						
		pink pine	LA						
		bog pine	LA						
		manuka	LA						
SI 8		silver pine	A-F			*Myrtus pedunculata*, silver pine, *Coprosma*, mountain toatoa.	*Blechnum minus*, *Gleichenia*.	South Westland, boggy sites, near sea level.	Mark & Smith (1975)
		rimu	A-F						
		silver beech	F						
		mountain beech	LF						
		mountain toatoa	LF						
		Hall's totara	LF						
		kamahi	LF						
SI 9		rimu	A			southern rata, kamahi, yellow silver pine, pink pine, rimu, Hall's totara, beech, *Cyathodes*.	kidney fern, *Lycopodium*, mosses, *Blechnum discolor*.	Fiordland, poorly drained infertile soils, lower altitudes.	Nicholls (1976b)
		yellow silver pine	LA						
		pink pine	LA						
		silver beech	O-LA						
		mountain beech	O-LA						
		Hall's totara	LF						
		southern rata	LF						
		pokaka	LF						

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BEECHES CLASS (K)									
SK 1	140	silver beech	115.03	± 12.42	139	stinkwood, pepperwood, *Carpodetus serratus*, *Pseudopanax* spp., treeferns.	*Blechnum discolor*, *Polystichum vestitum*, *Todea* spp., *Uncinia*.	100 m to timberline at c. 900 m where trees are stunted and windshorn: Catlins, South Westland, Longwood Range, West Waiau, Whakaea.	NFS
		*kamahi	13.31	± 4.75	61				
		red beech	1.59	± 1.38	9				
		mountain beech	1.38	± 0.82	18				
		southern rata	1.06	± 0.84	14				
								South Westland.	J. Wardle *et al.*(1973)
								Fiordland.	P. Wardle (1963), Scott *et al.* (1964), J. Wardle *et al.* (1971).
* below timberline									
SK 2		*silver beech	A			*mountain toatoa, *Coprosma pseudocuneata*, *Podocarpus nivalis*, *Coprosma ciliata*, *Gaultheria crassa*.	**Polystichum vestitum*, *Coprosma cheesemanii*, *Ranunculus hirtus*, *Uncinia* spp.	500-1050 m, Waitaki-Lake Hawea Catchments.	J. Wardle & Guest (1977)
		mountain beech	O						
		Pseudopanax simplex	O						
* typical of timberline stands									
SK 3	11	silver beech	22.02	± 12.33	11	kamahi, *Pseudopanax* spp., *Carpodetus serratus*, *Coprosma* spp., treeferns	*Blechnum* spp., *Polystichum* spp.	100-500 m: West Waiau, South Westland.	NFS
		kamahi	11.68	± 6.03	9				
		fuchsia	3.82	± 8.51	1				
		southern rata	2.70	± 3.82	3				
		mountain beech	2.70	± 4.10	3			South Westland.	J. Wardle *et al.* (1973)
		miro	2.70	± 3.60	4				
SK 4	55	red beech	61.15	± 9.88	52	*Coprosma* spp., *Carpodetus serratus*, *Pseudopanax* spp., pepperwood, broadleaf.	*Blechnum* spp.	200-700 m, Whakaea Valley. Occurs also near Lake Te Anau.	NFS
		silver beech	31.63	± 7.93	51				
		mountain beech	9.39	± 4.96	34				
SK 5	40	mountain beech	60.79	± 12.90	40	*Myrsine divaricata*, *Carpodetus serratus*, broadleaf, small-leaved *Coprosma* spp., *Pseudopanax* spp.	*Blechnum capense*, *Blechnum discolor*, *Grammitis billardieri*.	Near sea-level to 700 m but mainly below 400 m, West Waiau, Whakaea.	NFS
		silver beech	45.10	± 11.81	36				
		red beech	6.61	± 6.34	10				
		kamahi	4.26	± 3.46	9				
		Hall's totara	2.84	± 1.96	13			Eyre Mts.	J. Wardle (1970)
		pokaka	1.05	± 0.96	8				
								Fiordland.	Scott *et al.* (1964), J. Wardle *et al.* (1971).
SK 6		mountain beech	A			Best development in Hawea catchment: *Myrsine divaricata*, *Coprosma parviflora*, *C. rhamnoides*, *C. lucida*, *C. propinqua*, *Gaultheria antipoda*, mountain toatoa, *Rubus cissoides*.	Hawea catchment: *Blechnum pennamarina*, *Corybas triloba*, *Grammitis billardieri*, *Lagenophora petiolata*.	500-1100 m, Waitaki-Lake Hawea	J. Wardle & Guest (1977)
		silver beech	A						
		Hall's totara	O						
		*lancewood	F						
		*broadleaf	F						
		**Coprosma linariifolia*	F						
* lower altitudes on easy terrain in Hawea catchment									

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SK 7		mountain beech manuka pink pine, yellow silver pine mountain toatoa southern rata	A LA LA LA O O			pink pine, manuka, *Cyathodes juniperina.*		Intermediate altitudes and up to 850 m where it forms scrub, Fiordland, on shallow infertile soils.	Holloway (1951) P. Wardle (1963), J. Wardle *et al.* (1971)
SK 8		mountain beech silver beech pink pine *kaikawaka yellow silver pine southern rata Hall's totara pokaka kamahi	A F LA LA LA F F F O			mountain toatoa, broadleaf, *Pseudopanax* spp., *Archeria traversii,* *Coprosma* spp.	moss, *Blechnum minus,* *Hymenophyllum* spp.	Intermediate altitudes and up to 970 m where it forms scrub, Fiordland and South Westland, on infertile poorly drained soils.	Holloway (1951), P. Wardle (1963), J. Wardle *et al.* (1971, 1973)
SK 9		mountain beech	A			Best developed between 900 and 1200 m near Lake Ohau: mountain toatoa *Podocarpus nivalis,* *Coprosma parviflora,* *C. pseudocuneata,* *Gaultheria antipoda,* *Dracophyllum longifolium.*	Between 900 and 1200 m near Lake Ohau: *Grammitis billardieri,* *Hypolepis millefolium.*	550-1200 m, Waitaki-Lake Hawea catchments.	J. Wardle & Guest (1977)
SK 10		red beech silver beech miro kamahi Hall's totara broadleaf *Pseudopanax* spp.	A A F F F F F			pepperwood, *Coprosma* spp.	*Blechnum discolor,* *Blechnum capense,* *Blechnum minus.*	Mean altitude 450 m, South Westland	J. Wardle *et al.* (1973)
						SOFTWOODS CLASS (L)			
SL 1	127	rimu kamahi miro southern rata silver beech Hall's totara mountain beech totara kahikatea	92.59 28.06 25.19 24.17 7.51 7.45 4.84 4.13 3.19	± 7.13 ± 5.12 ± 3.41 ± 5.78 ± 3.16 ± 2.47 ± 2.66 ± 2.01 ± 1.66	124 101 117 94 47 46 18 35 23	broadleaf, stinkwood, kamahi, *Pseudopanax* spp., pepperwood, small-leaved *Coprosma* spp., *Myrsine australis,* *Carpodetus serratus.*	*Blechnum discolor,* *Blechnum capense.*	Catlins, Longwood Range, West Waiau, South Westland: on terraces and easy interfluves, near sea level up to 300 m.	NFS

* South Westland

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		Species	Stems/ha or abundance symbol	SE × t (p=0.95)	Occurrence plots	Understorey	Floor cover		
SL 2	24	kahikatea rimu kamahi silver beech miro	135.91 33.26 29.34 17.81 9.68	± 76.22 ± 18.28 ± 10.21 ± 12.53 ± 5.50	24 19 21 12 17	kamahi, *Pseudopanax* spp., broadleaf, pokaka, treeferns, pepperwood, supplejack, pigeonwood.	*Blechnum discolor*, *Blechnum capense*, *Todea superba*.	South Westland, swampy sites, up to 100 m.	NFS
SL 3	1	silver pine rimu southern rata	88.96 59.31 42.01		1 1 1	mountain toatoa, kamahi, manuka, pokaka.	*Gahnia*, *Blechnum*.	South Westland, bog sites, near sea level.	NFS
SL 4		rimu Hall's totara pink pine mountain toatoa southern rata kamahi miro	A A A A A F F			broadleaf, pokaka, *Dracophyllum longifolium*, young rimu.		Longwood Range, Hump Ridge, higher elevations up to 620 m.	Bathgate (1981)
SL 5		rimu kamahi Hall's totara yellow silver pine pink pine southern rata	A A A F-LA F F			kamahi, Hall's totara, *Cyathodes*, yellow silver pine, rimu, *Myrtus pedunculata*.	moss, *Blechnum capense*, *Gleichenia*.	Stewart Island, terraces and slopes at lower altitudes.	Williamson (unpubl.)
		RIMU-MATAI-HARDWOODS CLASS (M)							
SM 1	8	kahikatea fuchsia kamahi totara matai broadleaf	19.77 6.18 5.87 3.40 3.09 1.24	± 12.15 ± 13.02 ± 6.62 ± 5.29 ± 3.27 ± 2.92	8 2 4 2 4 1	kamahi, treeferns, *Coprosma* spp., fuchsia, pepperwood, broadleaf, pate, supplejack.	*Todea* spp., *Blechnum* spp.	Near sea level in South Westland to 250 m in Longwood Range, level slow-draining or swampy sites.	NFS
SM 2	2	fuchsia matai broadleaf *Hoheria glabrata* *Pittosporum eugenioides* rimu	34.60 14.83 14.83 3.71 3.71 2.47		2 2 2 2 2 1	fuchsia, broadleaf, *Myrsine australis*, pepperwood wineberry, treeferns.	*Polystichum*, *Asplenium*.	Hokonui Mts, 100-200 m.	NFS

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MID ZONE (M) RIMU — GENERAL HARDWOODS CLASS (F)									
MF 1	274	rimu	49.49	± 2.47	273	kamahi, treeferns, quintinia, kiekie, lancewood, supplejack, stinkwood, southern rata, toro.	*Blechnum* spp., moss, *Hymenophyllum* spp., *Microlaena avenacea*, *Todea* spp.	Up to 500 m on Westland terraces and rolling foothills.	NFS
		kamahi	26.17	± 2.02	256				
		miro	16.07	± 1.69	239				
		southern rata	15.76	± 2.35	177				
		quintinia	6.77	± 1.15	138				
		Hall's totara	1.52	± 0.48	57				
MF 2	162	kamahi	59.32	± 4.43	159	kamahi, treeferns, quintinia, supplejack, stinkwood.	*Blechnum* spp., moss, *Microlaena avenacea*, *Todea* spp.	Up to 500 m on easy to moderately steep Westland foothills.	NFS
		miro	17.54	± 2.35	139				
		rimu	17.45	± 2.23	153				
		quintinia	6.53	± 1.68	77				
		southern rata	3.58	± 1.48	48				
		hinau	2.67	± 0.94	39				
		kahikatea	1.89	± 1.00	30				
MF 3	68	kamahi	28.67	± 2.66	68	kamahi, treeferns, supplejack, kiekie.	*Polystichum*, *Todea*, *Blechnum*, *Asplenium*, *Metrosideros*.	Up to 300 m on easy to moderately steep Westland foothills.	NFS
		rimu	9.27	± 1.56	59				
		miro	4.43	± 0.97	52				
		southern rata	2.14	± 1.01	18				
MF 4	53	southern rata	28.11	± 6.55	46	kamahi, quintinia, treeferns, *Coprosma*, *Pseudopanax*.	*Blechnum*, *Asplenium*.	Westland foothills, easy to moderately steep slopes, 100-600 m.	NFS
		kamahi	21.87	± 3.79	53				
		rimu	14.13	± 4.03	45				
		Hall's totara	12.36	± 5.94	26				
		miro	10.77	± 3.39	37				
		quintinia	6.90	± 3.04	26				
MF 5	13	kahikatea	54.55	± 16.77	13	fuchsia, *Coprosma*, treeferns, broadleaf, kamahi.	*Uncinia*, *Blechnum*, *Hymenophyllum*, moss, kidney fern.	Up to 100 m on poorly drained alluvial flats in Westland.	NFS
		kamahi	38.02	± 30.52	10				
		rimu	5.32	± 6.95	6				
		miro	2.09	± 2.18	4				
		matai	1.71	± 2.06	3				
		silver pine	1.71	± 3.73	1				
MF 6	4	rimu	27.80		4	kamahi, silver pine, Hall's totara, mountain toatoa.	*Astelia*, *Blechnum*.	Westland, usually on level or easy terrain, 100-200 m.	NFS
		Hall's totara	23.48		4				
		kaikawaka	12.36		3				
		silver pine	8.03		2				
		mountain toatoa	6.18		3				
		miro	5.56		3				
		kamahi	4.94		4				
		southern rata	4.94		3				
		pokaka	3.71		3				
		quintinia	2.47		2				
MF 7	2	miro	32.12		2	treeferns, pepperwood, kamahi, wineberry, *Myrsine*, mountain toatoa, *Myrtus*.	*Todea*, *Microlaena avenacea*.	Westland, poorly drained alluvial flats.	NFS
		kahikatea	30.89		2				
		rimu	23.48		2				
		kamahi	11.12		2				
		kaikawaka	7.41		2				
		mountain toatoa	6.18		1				
		totara and Hall's totara	2.47		1				
		pokaka	1.24		1				
		southern rata	1.24		1				

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MF 8		kamahi miro rimu Hall's totara	A O O O			pate, mahoe, *Cyathea smithii,* *Dicksonia squarrosa,* supplejack, *Rubus cissoides.*	*Asplenium bulbiferum.*	On moraines at lower altitudes in Fox and Waiho Valleys.	P. Wardle (1977)
HIGHLAND SOFTWOODS-HARDWOODS CLASS (G)									
MG 1		kaikawaka pink pine broadleaf southern rata	A F F O			*Archeria traversii,* *Pseudopanax lineare,* *P.colensoi,* *Coprosma ciliata,* mountain toatoa, pepperwood, stinkwood.	*Gahnia procera,* *Phormium cookianum,* *Microlaena avenacea,* *Uncinia filiforme,* *Histiopteris incisa.*	Near timberline about 950 m on steep Westland mountain lands, concentrated in north of zone.	Coleman *et al.* (1980)
MG 2 * below 840 m		southern rata kaikawaka Hall's totara *Pseudopanax simplex* broadleaf *kamahi	A F F A F F			*Coprosma astonii,* *C.wallii,* *Myrsine divaricata,* pepperwood, mountain toatoa, stinkwood.	*Astelia nervosa,* *Cyathea colensoi,* *Blechnum capense,* *Todea superba,* *Polystichum vestitum,* *Microlaena avenacea,* *Histiopteris incisa,* *Gahnia procera.*	Westland mountains, 550-900 m.	P. Wardle (1977)
MG 3		kaikawaka Hall's totara broadleaf mountain toatoa *Hoheria* spp. *Olearia ilicifolia*	A A F F F O			*Coprosma* spp., *Myrsine divaricata,* *Archeria traversii.*	*Polystichum vestitum,* *Blechnum capense,*	600-1000 m, Mathias and Wilberforce catchments, Canterbury.	N.Z. Forest Service (unpubl.)
MG 4		Hall's totara mountain toatoa broadleaf *Pittosporum tenuifolium* lancewood	A O O O O			*Cassinia fulvida.*	*Blechnum* spp., *Polystichum vestitum,* *Rubus schmidelioides,* *Senecio bellidioides,* *Helichrysum bellidioides.*	Higher altitudes in Wilberforce catchment, Canterbury.	N.Z. Forest Service (unpubl.)
MG 5 * at higher altitudes		southern rata kamahi broadleaf lancewood *Pittosporum eugenioides* kowhai *kaikawaka *Hall's totara	A F F F F O O O			*Myrsine australis,* *Coprosma rhamnoides,* *C.linariifolia,* pepperwood, *Pseudopanax* spp.	*Blechnum capense,* *B.discolor,* *Phymatodes diversifolium,* *Polystichum vestitum,* *Uncinia* spp., *Hypolepis tenuifolia,* *Lycopodium* spp.	370-700 m, Mt. Peel, Canterbury.	Halkett (1974)

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MG 6		kaikawaka broadleaf *Olearia lacunosa* *Dracophyllum traversii* *Pseudopanax simplex* **Hoheria glabrata*	A A A F F LA			*Coprosma pseudocuneata*, *Myrsine divaricata*, *Archeria traversii*.	*Polystichum vestitum*, *Cyathea colensoi*, *Uncinia filiforme*, *Blechnum* spp.	About 900 m, often timberline, Grey Valley, Westland.	J. Wardle (1974)
MG 7		kamahi southern rata quintinia Hall's totara miro	A A A A O			broadleaf, *Pseudopanax simplex*, stinkwood, pepperwood, *Myrsine divaricata*, *Coprosma banksii*.	*Blechnum* spp., *Grammitis billardieri*, *Hymenophyllum* spp., *Cyathea colensoi*.	On mid slopes, commonly 500-600 m, Grey Valley, Westland. Widespread in Westland.	J. Wardle (1974)
						SOFTWOODS CLASS (L)			
ML 1	119	rimu miro kamahi southern rata Hall's totara quintinia silver pine kahikatea	156.36 29.09 18.25 8.26 3.63 3.49 3.32 1.35	± 10.32 ± 4.49 ± 3.37 ± 2.03 ± 1.70 ± 1.44 ± 2.17 ± 1.11	119 113 101 73 42 43 23 13	*Myrtus*, hutu, *Coprosma*, treeferns, kamahi, *Pseudopanax*, quintinia, broadleaf.	*Blechnum*, *Gleichenia*, *Polystichum*.	Flat to undulating alluvium in Westland, up to 200 m but usually below 150 m.	NFS
ML 2	28	kahikatea rimu kamahi silver pine miro matai silver beech	224.34 27.54 17.30 5.47 1.94 1.59 1.06	± 32.28 ± 19.25 ± 7.66 ± 6.99 ± 1.09 ± 2.39 ± 2.17	28 15 19 3 11 4 1	*Coprosma*, treeferns, kamahi, broadleaf, pate.	moss, *Astelia*, *Blechnum*, kidney fern.	Swampy, alluvial flats in Westland, near sea level.	NFS
ML 3	24	miro rimu kamahi southern rata Hall's totara quintinia hinau mountain toatoa	64.66 58.48 39.43 16.47 12.66 5.15 4.84 3.29	± 12.85 ± 9.29 ± 9.34 ± 6.81 ± 7.62 ± 2.49 ± 4.18 ± 4.08	24 24 24 18 17 14 7 4	treeferns, *Pseudopanax*, *Myrsine australis*, *Coprosma*, broadleaf, kamahi, quintinia.	*Blechnum*.	Easy to moderately steep terrain in Westland, up to 300 m.	NFS
ML 4	9	Hall's totara southern rata rimu kamahi miro quintinia pokaka	90.33 49.97 45.85 20.32 16.75 7.69 3.84	± 18.64 ± 15.86 ± 10.96 ± 10.35 ± 8.38 ± 6.61 ± 3.57	9 9 9 9 9 5 5	kamahi, mountain toatoa, *Myrtus pedunculata*, *Coprosma*, quintinia, *Pseudopanax*, broadleaf.	*Blechnum*, *Gahnia*, *Microlaena avenacea*.	Easy to steep terrain on Westland foothills, 150-300 m.	NFS

* on old slips

TYPE DESCRIPTIONS OF SOUTH ISLAND INDIGENOUS FORESTS

Type symbol	No. plots	Canopy Trees (≥30.48 cm d.b.h. for NFS data) Species	Stems/ha or abundance symbol	SE × t (p=0.95)	Occurrence plots	Common Species Understorey	Floor cover	Altitude, location	Source
ML 5	2	rimu silver pine miro mountain toatoa kamahi	77.84 53.13 46.95 6.18 1.24		2 2 2 2 1	stinkwood, kamahi, quintinia, broadleaf, *Myrsine australis*, mountain toatoa, lancewood, *Myrtus pedunculata.*	*Blechnum* spp., kidney fern, *Gleichenia cunninghamii*, sphagnum moss.	Boggy sites in Westland, up to 100 m.	NFS
ML 6	10	silver pine kaikawaka pink pine rimu Hall's totara southern rata manuka kamahi mountain toatoa	50.41 13.10 12.11 11.37 8.15 4.45 2.47 1.73 1.73	± 31.87 ± 10.87 ± 14.05 ± 9.72 ± 9.86 ± 4.99 ± 5.59 ± 2.77 ± 3.91	8 7 4 5 5 5 1 3 1	quintinia, manuka, mountain toatoa, *Pseudopanax*, *Coprosma*, kamahi.	*Gahnia*, *Gleichenia*, *Blechnum.*	Boggy sites in Westland, up to 300 m.	NFS
RIMU-MATAI-HARDWOODS CLASS (M)									
MM 1	6	kamahi southern rata matai totara and Hall's totara miro rimu kahikatea broadleaf hinau kaikawaka	64.25 37.48 9.06 8.65 8.65 8.24 6.18 2.06 1.65 1.24		5 2 6 3 2 4 4 2 2 1	treeferns, *Coprosma* spp., kamahi, *Pseudopanax*, pepperwood.	moss, *Blechnum*, *Microlaena avenacea*, *Astelia*, kidney fern, *Nertera dichondraefolia*, *Uncinia egmontiana.*	Mainly well-drained alluvial sites in Westland, up to 300 m.	NFS P. Wardle (1977)
MM 2		kahikatea matai totara pokaka broadleaf *Plagianthus betulinus* *Hoheria angustifolia* kaikomako	F F F F F F F F			fuchsia, *Coprosma rotundifolia*, pepperwood, pate, *Pittosporum tenuifolium*, mahoe, *Dicksonia fibrosa*, wineberry, *Pseudopanax arboreum*, *Myrsine australis.*	*Polystichum vestitum*, *Blechnum discolor*, *Phymatodes diversifolium*, *Asplenium* spp., *Uncinia* spp., *Hymenophyllum demissum.*	Lower altitudes, Mt Peel, Canterbury. Banks Peninsula (variation in hardwood complex, e.g., ngaio).	Halkett (1974) Holloway (1969)
GENERAL HARDWOODS (P)									
MP 1		southern rata kamahi	A A			broadleaf, kamahi, *Pseudopanax colensoi*, *P. simplex*, *Coprosma lucida*, pate, miro seedlings, Hall's totara seedlings, *Cyathea smithii*, stinkwood.	*Asplenium bulbiferum*, *Nertera dichondraefolia*, *Astelia fragrans*, *A. nervosa*, *Blechnum capense*, *Phymatodes diversifolium.*	Recent fluvio-glacial deposits in Westland, lower altitudes.	P. Wardle (1977)

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NORTHERN ZONE (N)									
RIMU-TAWA CLASS (D)									
ND 1	2	tawa kamahi mahoe hinau rimu toro miro pukatea fuchsia matai pigeonwood	45.72 42.01 21.00 13.59 4.94 4.94 3.71 3.71 2.47 1.24 1.24		2 2 1 2 1 1 2 2 2 1 1	tawa, mahoe, pigeonwood, *Cyathea* spp., kamahi, supplejack, fuchsia.	kiekie.	A minor type in northern Marlborough, 200-300 m.	NFS
RIMU — GENERAL HARDWOODS CLASS (F)									
NF 1	31	kamahi rimu miro southern rata quintinia hinau Hall's totara	47.91 18.89 8.53 7.41 2.15 1.28 1.20	± 12.43 ± 7.52 ± 4.14 ± 3.09 ± 2.36 ± 1.09 ± 1.12	28 28 23 23 8 7 7	kamahi, quintinia, supplejack, *Cyathea* spp., stinkwood, *Pseudopanax* spp., toro, *Pseudowintera axillaris.*	*Nertera dichondraefolia,* *Blechnum* spp., kidney fern, *Astelia* spp., kiekie.	Up to 500 m on level to steep terrain. Widely distributed and variable type, principally Karamea and Western Paparoa.	NFS
NF 2	5	pukatea kamahi southern rata rimu northern rata miro kahikatea pokaka	42.01 20.26 4.94 2.47 2.47 1.98 1.48 1.48		5 5 4 1 2 2 1 2	supplejack, *Cyathea* spp., *Coprosma australis,* wineberry, *Olearia rani,* nikau, mahoe, *Geniostoma ligustrifolium,* pukatea.	kiekie, *Blechnum* spp.	North-west Nelson, up to 150 m.	NFS
NF 3	1	kahikatea pukatea northern rata kamahi	31 9 1 1		1 1 1 1	toro, kamahi, *Dicksonia squarrosa,* pukatea, supplejack.	kiekie, *Gahnia* sp., *Blechnum discolor,* *Uncinia* sp.	North-west Nelson at lower altitudes on flat, slow-draining sites.	NFS
HIGHLAND SOFTWOODS-HARDWOODS CLASS (G)									
NG 1		Hall's totara	A			broadleaf, lancewood, *Coprosma linariifolia,* *C. parviflora,* fuchsia, *Carpodetus serratus,* *Rubus cissoides.*	*Uncinia* spp., *Polystichum vestitum.*	Flanks of Seaward Kaikoura Range, 400-1050 m.	J. Wardle (1971)

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		Species	Stems/ha or abundance symbol	SE × t (p=0.95)	Occurrence plots	Understorey	Floor cover		
RIMU-TAWA-BEECHES CLASS (H)									
NH 1	7	kamahi	62.13	± 27.79	7	tawa,	*Blechnum* spp.,	North Marlborough, 250-500 m, easy to steep terrain.	NFS
		rimu	13.06	± 9.11	6	kamahi,	kiekie,		
		red beech	8.47	± 8.54	5	toro,	*Todea hymenophylloides.*		
		miro	7.41	± 6.98	6	stinkwood,			
		tawa	6.00	± 3.70	7	*Coprosma australis,*			
		hinau	5.30	± 10.09	3	*Pseudowintera axillaris,*			
		hard beech	3.18	± 4.11	4	*Olearia rani,*			
		toro	3.18	± 4.11	4	supplejack,			
		fuchsia	1.77	± 2.54	3	mahoe,			
		pukatea	1.41	± 2.23	2	*Pseudopanax* spp.,			
		broadleaf	1.41	± 2.59	2	pigeonwood.			
		silver beech	1.06	± 2.59	1				
RIMU — GENERAL HARDWOODS — BEECHES CLASS (I)									
NI 1	96	hard beech	33.75	± 5.65	95	kamahi,	*Uncinia* spp.,	Dissected terrain, often steep, Inangahua and Grey Valleys, Karamea, 150-400 m.	NFS
		red beech	29.40	± 5.16	96	toro,	kiekie,		
		kamahi	23.60	± 4.88	78	quintinia,	*Blechnum discolor,*		
		rimu	18.40	± 3.55	92	lancewood,	*Astelia* spp.,		
		miro	5.97	± 1.95	64	stinkwood,	kidney fern.		
		quintinia	3.78	± 1.27	44	*Cyathea* spp.,			
		southern rata	3.50	± 1.48	29	broadleaf,			
						Pseudopanax spp.,			
						Cyathodes fasciculata.			
NI 2	143	hard beech	57.85	± 5.63	143	quintinia,	kiekie,	Widely distributed over easy to steep terrain, 100-500 m: Grey and Inangahua Valleys, Western Paparoa, Karamea, North-west Nelson, North Marlborough.	NFS
		rimu	34.80	± 5.06	139	kamahi,	*Astelia* spp.,		
		kamahi	12.68	± 2.81	104	toro,	*Blechnum* spp.,		
		southern rata	8.57	± 2.03	81	*Cyathodes fasciculata,*	*Gahnia* spp.		
		miro	2.78	± 0.80	62	*Coprosma* spp.,			
		quintinia	1.78	± 0.82	34	*Dracophyllum* spp.,			
						Cyathea spp.,			
						Pseudowintera spp.,			
						Olearia rani.			
NI 3	89	silver beech	63.53	± 6.71	89	pepperwood,	*Microlaena avenacea,*	Less steep and flat terrain, 100-400 m: Grey, Inangahua, Buller and Mokihinui Valleys, Western Paparoa.	NFS
		red beech	16.66	± 3.52	69	*Myrtus* spp.,	*Blechnum* spp.,		
		rimu	8.94	± 2.80	65	lancewood,	*Todea superba,*		
		mountain beech	8.16	± 3.34	29	*Coprosma* spp.,	*Uncinia* spp.		
		kamahi	7.22	± 2.60	44	pokaka,			
		miro	6.39	± 1.81	60	*Cyathea smithii.*			
		kahikatea	4.39	± 1.64	46				
NI 4	89	red beech	47.15	± 7.03	87	kamahi,	*Blechnum* spp.,	Widely distributed on easy to moderately steep terrain, 100-500 m: Inangahua, Grey, Buller and Mokihinui Valleys, Western Paparoa, Karamea.	NFS
		kamahi	22.35	± 4.48	75	quintinia,	*Uncinia* spp.,		
		silver beech	11.44	± 3.28	46	*Myrtus pedunculata,*	mosses,		
		rimu	11.33	± 2.61	78	pepperwood,	*Polystichum vestitum.*		
		miro	6.44	± 1.69	61	stinkwood,			
		quintinia	2.30	± 1.04	27	*Pseudopanax* spp.,			
		kahikatea	2.22	± 1.47	20	broadleaf,			
		southern rata	1.69	± 1.18	14	*Cyathea smithii.*			
		Hall's totara	1.14	± 0.74	14				

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NI 5	46	rimu	49.74	± 9.67	45	kamahi, quintinia, mountain toatoa, southern rata, pokaka, broadleaf, *Pseudopanax* spp., stinkwood, *Myrtus* spp.	*Blechnum* spp., kidney fern, mosses.	Widely distributed on easier terrain, often slow-draining, 150-500 m: Grey, Inangahua, Buller and Mokihinui Valleys, Western Paparoa, Karamea.	NFS
		mountain beech	16.81	± 6.26	30				
		kamahi	9.19	± 6.84	25				
		southern rata	7.90	± 3.51	25				
		miro	5.80	± 2.71	20				
		red beech	4.51	± 2.04	23				
		silver beech	4.19	± 2.25	16				
		quintinia	3.28	± 2.84	9				
		silver pine	2.79	± 2.01	10				
		kahikatea	1.77	± 1.54	9				
		kaikawaka	1.50	± 1.01	10				
		Hall's totara	1.34	± 1.16	9				
NI 6	14	kahikatea	43.77	± 12.31	14	pokaka, *Myrtus pedunculata*, pepperwood, kamahi, *Coprosma* spp., *Pseudopanax anomalus*.	*Blechnum* spp., *Todea superba*, *Polystichum vestitum*.	Level slow-draining sites in Inangahua and Grey Valleys, 100-250 m.	NFS
		rimu	19.42	± 7.40	12				
		red beech	12.71	± 6.52	12				
		silver beech	7.41	± 5.48	8				
		kamahi	5.65	± 5.32	6				
		miro	5.12	± 3.69	8				
		pokaka	3.00	± 3.07	6				
		kaikawaka	3.00	± 3.46	4				
		matai	1.77	± 1.72	4				
NI 7	12	mountain beech	62.19	± 20.93	12	pokaka, mountain toatoa, *Myrtus pedunculata*, *Pseudopanax* spp., *Myrsine divaricata*, broadleaf, *Coprosma* spp.	*Microlaena avenacea*, *Blechnum* spp., *Todea* spp.	Undulating or level terrain with slow-drainage in Inangahua and Grey Valleys, 150-450 m.	NFS
		silver beech	24.71	± 17.94	9				
		kahikatea	7.83	± 6.02	8				
		kaikawaka	4.12	± 5.11	4				
		Hall's totara	2.06	± 3.59	3				
		pokaka	1.65	± 2.79	2				
		rimu	1.44	± 2.27	3				
		yellow silver pine	1.03	± 1.41	3				
NI 8	8	silver pine	61.16	± 46.75	8	pokaka, manuka, mountain toatoa, *Myrtus pedunculata*, stinkwood, bog dacrydium spp.	*Uncinia*, *Gahnia*, *Astelia*, *Juncus*.	Level boggy sites in Grey Valley and Western Paparoa, 150-400 m.	NFS
		mountain beech	21.93	± 6.19	8				
		rimu	6.49	± 6.80	4				
		kaikawaka	4.63	± 4.05	5				
		pink pine	2.78	± 6.57	1				
		southern rata	1.24	± 1.91	2				
NI 9	6	kaikawaka	40.77		6	pokaka, mountain toatoa, stinkwood, *Myrtus pedunculata*, *Cyathodes fasciculata*, lancewood, *Myrsine divaricata*.	moss, *Blechnum capense*, *Uncinia*.	On boggy sites in Grey and Inangahua Valleys, 150-350 m.	NFS
		mountain beech	24.30		6				
		silver beech	14.41		3				
		red beech	9.88		3				
		silver pine	9.88		3				
		rimu	7.00		3				
		kahikatea	2.88		5				
		pokaka	2.47		3				
NI 10	12	rimu	40.36	± 11.68	12	mountain toatoa, quintinia, stinkwood, kamahi, lancewood.	moss, *Blechnum* spp.	On level or easily sloping sites where drainage is often slow, 100-500 m: Inangahua and Grey Valleys, Western Paparoa.	NFS
		silver pine	25.95	± 16.31	10				
		hard beech	7.83	± 4.48	12				
		mountain beech	6.38	± 3.10	10				
		silver beech	5.77	± 9.43	4				
		kaikawaka	5.35	± 7.77	3				
		kahikatea	5.15	± 10.36	3				
		southern rata	3.50	± 3.69	6				
		kamahi	2.68	± 3.99	2				
		Hall's totara	2.47	± 2.92	4				
		yellow silver pine	1.24	± 2.72	1				
		miro	1.24	± 1.57	3				
		pink pine	1.03	± 2.26	1				

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		Species	Stems/ha or abundance symbol	SE × t (p=0.95)	Occurrence plots	Understorey	Floor cover		
NI 11	35	silver beech	56.06	± 11.36	34	kamahi, *Myrtus* spp., stinkwood, pepperwood, treeferns, fuchsia, toro.	*Astelia*, *Uncinia*, *Blechnum* spp., *Microlaena avenacea*, *Todea superba*.	Tends to be on rolling or flat terrain, 100-350 m: Inangahua and Grey Valleys, Western Paparoa, Karamea.	NFS
		mountain beech	15.39	± 7.68	14				
		hard beech	15.32	± 5.08	35				
		rimu	14.54	± 4.37	30				
		red beech	8.26	± 3.80	22				
		miro	6.14	± 1.66	27				
		kamahi	5.86	± 2.35	20				
		kahikatea	4.17	± 2.04	20				
		Hall's totara	1.77	± 1.21	10				
NI 12	57	silver beech	34.29	± 5.02	57	kamahi, quintinia, toro, broadleaf, stinkwood, *Carpodetus serratus*, lancewood, pepperwood, *Pseudopanax anomalus*, *Myrtus pedunculata*.	*Blechnum* spp., *Astelia*, *Uncinia*, *Microlaena avenacea*.	Widely distributed on easy to steep terrain, 100-600 m: Buller, Mokihinui, and Inangahua Valleys, Western Paparoa, Moutere.	NFS
		red beech	33.34	± 3.10	57				
		kamahi	18.29	± 4.61	44				
		hard beech	17.51	± 4.15	57				
		rimu	10.06	± 2.69	56				
		miro	5.25	± 1.56	35				
		quintinia	1.30	± 0.85	11				
		southern rata	1.13	± 1.29	5				
		mountain beech	1.04	± 1.04	6				
NI 13	303	hard beech	44.35	± 3.18	301	kamahi, Hall's totara, toro, quintinia, southern rata, *Dracophyllum*, *Cyathodes fasciculata*, *Coprosma* spp., mountain toatoa, *Myrtus* spp., *Pseudopanax* spp.	*Gahnia*, *Blechnum* spp., *Astelia*, kiekie, kidney fern, *Uncinia*, *Microlaena avenacea*.	Widely distributed on easy to steep terrain, 100-550 m: Grey, Inangahua, Buller, and Mokihinui Valleys, Western Paparoa, Karamea, North-west Nelson.	NFS
		silver beech	17.12	± 1.75	278				
		rimu	20.81	± 1.66	298				
		kamahi	14.97	± 2.15	241				
		southern rata	8.91	± 1.50	170				
		red beech	5.23	± 1.37	111				
		miro	2.85	± 0.53	132				
		mountain beech	2.62	± 0.79	62				
		quintinia	1.47	± 0.38	86				
		Hall's totara	1.42	± 0.34	80				
NI 14	53	rimu	77.40	± 5.66	53	kamahi, mountain toatoa, *Myrtus* spp., *Coprosma* spp., *Cyathodes fasciculatus*, toro, quintinia, *Dracophyllum*, *Pseudopanax* spp.	*Astelia*, *Gahnia*, *Blechnum* spp., kiekie.	Concentrated on undulating and level terrain, sometimes slow-draining, 100-450 m: Grey and Inangahua Valleys, Western Paparoa, Karamea, North-west Nelson.	NFS
		hard beech	48.21	± 9.54	53				
		silver beech	10.26	± 3.26	38				
		southern rata	7.74	± 3.57	28				
		kamahi	6.71	± 2.68	30				
		mountain beech	4.06	± 1.85	20				
		miro	3.03	± 2.02	15				
		quintinia	1.91	± 1.22	14				
		red beech	1.63	± 1.89	7				
		silver pine	1.21	± 1.29	6				
NI 15	4	pukatea	30.27		4	pigeonwood, *Coprosma australis*, *Cyathea* spp., mahoe, pukatea, supplejack, nikau.	*Blechnum* spp., kiekie.	North-west Nelson, steep terrain, up to 150 m.	NFS
		hard beech	9.88		4				
		northern rata	8.03		2				
		rimu	8.65		3				
		kamahi	4.94		4				
		southern rata	2.47		4				
		miro	2.47		4				
		kahikatea	1.24		1				
		matai	1.24		1				
		silver beech	1.24		1				

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NI 16		black or mountain beech matai Hall's totara totara rimu miro red beech hinau	A F O O O O O O			*Carpodetus serratus*, lancewood, broadleaf, *Pseudopanax arboreum*, *Myrsine australis*, mahoe, fuchsia, *Coprosma linariifolia*, *C. rhamnoides*, *Pittosporum tenuifolium*, *Cyathodes fasciculata*.	*Mycelis muralis*, *Uncinia*.	Seaward Kaikoura Range, Canterbury foothills, mean altitude 420 m.	J. Wardle (1970)
HIGHLAND SOFTWOODS-BEECHES CLASS (J)									
NJ 1	34	red beech silver beech hard beech kamahi Hall's totara miro southern rata kaikawaka mountain beech quintinia	38.23 32.34 16.50 12.79 12.14 7.49 5.60 1.74 1.67 1.02	± 9.53 ± 10.26 ± 10.61 ± 7.66 ± 5.07 ± 2.98 ± 7.44 ± 2.55 ± 1.88 ± 1.02	32 26 15 17 21 20 8 2 4 6	*Pseudopanax* spp., kamahi, broadleaf, fuchsia, *Pseudowintera* spp., Hall's totara, quintinia, toro, stinkwood.	*Blechnum* spp., *Microlaena avenacea*.	Widely distributed and variable, 250-850 m: Big Bush, Richmond Range, Grey and Inangahua Valleys.	NFS
NJ 2	4	mountain beech kaikawaka silver beech yellow silver pine	71.66 24.71 5.56 1.24		4 4 2 1	bog dacrydium spp., mountain toatoa, *Coprosma* spp., *Myrsine divaricata*, pokaka.		Minor type of small extent, 150-750 m: boggy sites in Grey and Inangahua Valleys.	NFS
NJ 3		red beech mountain beech silver beech Hall's totara southern rata kamahi	A A-F A-F F LF LF			broadleaf, lancewood, *Coprosma linariifolia*, *C. microcarpa*, *Carpodetus serratus*, pokaka, fuchsia, wineberry.	*Grammitis billardieri*, *Blechnum* spp.	Wairau Valley, 700-1070 m.	Manson & Gu[illegible] (1975)
BEECHES CLASS (K)									
NK 1	179	red beech silver beech hard beech mountain beech	61.56 51.55 1.34 1.28	± 5.42 ± 4.81 ± 0.73 ± 0.73	173 177 20 23	*Myrtus pedunculata*, *Pseudopanax anomalus*, *Coprosma* spp., *Myrsine divaricata*, lancewood, pepperwood.	*Blechnum discolor*, *Uncinia*, *Microlaena avenacea*.	On easy to moderately steep terrain in the Inangahua, Maruia, Matakitaki, and upper Buller Valleys, 200-700 m.	NFS
NK 2	41	kamahi red beech silver beech hard beech miro quintinia southern rata broadleaf	34.47 31.28 12.72 8.20 3.31 3.19 2.77 1.27	± 8.57 ± 7.99 ± 5.66 ± 3.96 ± 1.37 ± 1.87 ± 2.25 ± 1.21	39 34 18 21 21 17 11 6	kamahi, *Carpodetus serratus*, stinkwood, treeferns, *Pseudowintera* spp., broadleaf, quintinia.	*Blechnum* spp., *Todea* spp.	On easy to steep terrain in the Grey and Inangahua Valleys, northern Marlborough, 150-550 m.	NFS

TYPE DESCRIPTIONS OF SOUTH ISLAND INDIGENOUS FORESTS

Type symbol	No. plots	Canopy Trees (≥30.48 cm d.b.h. for NFS data)				Common Species		Altitude, location	Source
		Species	Stems/ha or abundance symbol	SE × t (p=0.95)	Occurrence plots	Understorey	Floor cover		
NK 3	56	hard beech red beech silver beech kamahi southern rata miro quintinia mountain beech	60.32 16.77 11.30 5.82 1.77 1.72 1.50 1.37	± 6.99 ± 5.66 ± 4.03 ± 2.07 ± 1.44 ± 0.76 ± 1.06 ± 1.18	56 32 31 34 9 22 12 8	kamahi, stinkwood, quintinia, lancewood, broadleaf, pepperwood, *Myrtus pedunculata.*	kidney fern, *Blechnum discolor,* *Blechnum capense,* *Uncinia.*	Widespread type occurring mainly on steep or moderately steep terrain, 100-700 m: Inangahua and Grey Valleys, Karamea, Moutere.	NFS
NK 4	21	mountain beech silver beech red beech kamahi southern rata hard beech quintinia	56.48 33.07 14.36 10.00 7.88 1.77 1.65	± 15.57 ± 12.69 ± 9.52 ± 7.58 ± 5.99 ± 2.14 ± 1.60	20 21 11 9 6 4 4	kamahi, *Myrtus pedunculata,* *Pseudopanax anomalus,* stinkwood, *Cyathea smithii,* lancewood, *Cyathodes fasciculata.*	*Uncinia,* *Blechnum* spp., *Microlaena avenacea.*	Easy to steep terrain, 150-700 m: Grey and Inangahua Valleys, Western Paparoa, Nelson lakes.	NFS
NK 5		silver beech	A			*Olearia lacunosa,* *Dracophyllum traversii,* *Coprosma pseudocuneata,* stinkwood, *Archeria traversii.*	*Uncinia filiformis,* *Chionochloa conspicua,* *Coprosma cheesemanii,* *Cyathea colensoi,* *Grammitis billardieri.*	Grey Valley, about 1100 m, often timberline.	J. Wardle (1974)
NK 6		mountain beech	A			*Coprosma pseudocuneata,* *C. parviflora,* *C. microcarpa,* *C. linariifolia,* Hall's totara, broadleaf, *Pseudopanax* spp.	*Polystichum vestitum,* *Blechnum penna-marina,* *Acaena,* moss, *Uncinia.*	Widespread, often at or near timberline, 1000-1450 m.	J. Wardle (1970), Manson & Guest (1975), Guest & Wilkinson (1977), N.Z. Forest Service (unpubl.)
NK 7		mountain beech silver beech	A-F A-O			*Coprosma pseudocuneata,* *C. parviflora,* *C. ciliata,* *Pittosporum patulum,* *Gaultheria* spp., *Myrsine divaricata,* *Olearia lacunosa,* broadleaf.	*Polystichum vestitum,* *Grammitis billardieri,* moss, *Uncinia filiformis.*	Widespread, dry steep slopes, 750-1400 m, in places at timberline.	J. Wardle (1974), Manson & Guest (1975), Guest & Wilkinson (1977), Hayward (unpubl.)
NK 8		red beech silver beech	A A			broadleaf, *Pseudopanax simplex,* *P. linearis,* stinkwood, *Coprosma pseudocuneata,* *Pittosporum divaricatum,* *Myrsine divaricata,* *Archeria traversii.*	*Uncinia filiformis,* *Cyathea colensoi,* *Blechnum minus,* *Grammitis billardieri,* *Nertera dichondraefolia.*	Grey Valley, mean altitude 920 m.	J. Wardle (1974)
NK 9		red beech silver beech mountain beech	A-O A-O A-O			broadleaf, stinkwood, *Coprosma parviflora,* *C. pseudocuneata,* *C. microcarpa,* *Myrsine divaricata,* lancewood.	*Grammitis billardieri,* *Polystichum vestitum,* *Hymenophyllum,* *Uncinia.*	Widespread, often timberline, 600-1125 m.	J. Wardle (1970), Manson & Guest (1975), Guest & Wilkinson (1977), Hayward (unpubl.)

TYPE DESCRIPTIONS OF SOUTH ISLAND INDIGENOUS FORESTS

Type symbol	No. plots	Canopy Trees (≥30.48 cm d.b.h. for NFS data) Species	Stems/ha or abundance symbol	SE × t (p=0.95)	Occurrence plots	Common Species Understorey	Floor cover	Altitude, location	Source
NK 10		red beech silver beech kamahi mountain beech black beech	A A F F F			broadleaf, kamahi, *Coprosma microcarpa*, *Cyathodes juniperina*, *C. fasciculata*.	*Blechnum discolor*.	Wairau Valley, 480-880 m.	Manson & Guest (1975)
NK 11		red beech mountain beech	A A			broadleaf, *Coprosma pseudocuneata*.	*Grammitis billardieri*, *Corybas triloba*.	Hope Catchment, Canterbury, 600-900 m.	Guest & Wilkinson (1977)
NK 12		**Nothofagus solandri*	A			lancewood, *Carpodetus serratus*, broadleaf, *Pseudopanax arboreum*, *Myrsine australis*, *Coprosma* spp., *Cyathodes fasciculata*.	*Phymatodes diversifolium*, *Uncinia* spp.	Flanks of Seaward Kaikoura Range, 60-900 m.	J. Wardle (1971)
* trees approach black beech at low altitudes and mountain beech at high altitudes									
SOFTWOODS CLASS (L)									
NL 1	28	rimu southern rata hard beech silver pine kamahi quintinia mountain beech miro pokaka kaikawaka	149.24 22.33 19.15 9.27 8.47 4.59 3.71 3.00 2.03 1.06	± 17.13 ± 9.66 ± 14.42 ± 9.56 ± 4.54 ± 2.95 ± 3.97 ± 1.70 ± 1.84 ± 2.17	28 20 10 12 17 12 5 13 6 1	mountain toatoa, quintinia, kamahi, pokaka, *Myrtus pedunculata*, toro, stinkwood.	*Blechnum* spp.	On level or gently sloping terrain, 100-350 m: Grey Valley, Karamea, Western Paparoa.	NFS
NL 2	2	silver pine rimu kaikawaka yellow silver pine hard beech mountain beech pokaka	148.27 34.60 16.06 9.88 7.41 1.24 1.24		2 2 1 1 1 1 1	quintinia, manuka, mountain toatoa, kamahi, broadleaf, silver pine, *Coprosma* spp.	*Gleichenia*, *Blechnum discolor*, moss, *Uncinia*.	Boggy sites at Karamea and in Inangahua Valley, up to 300 m.	NFS
NL 3	3	kahikatea rimu kaikawaka hinau totara kamahi	124.38 10.71 9.06 3.29 1.65 1.65		3 2 1 1 1 1	kamahi, toro, *Coprosma*, wineberry, *Dicksonia*.	*Blechnum* spp., *Uncinia*, *Microlaena avenacea*.	Swampy sites at Karamea and in Grey Valley, up to 280 m.	NFS
RIMU-MATAI-HARDWOODS CLASS (M)									
NM 1		totara "Hall's totara *matai hinau †totara †rimu †kahikatea	A A A A A LA			mahoe, *Myrsine australis*, *Carpodetus serratus*, *Pseudopanax arboreum*, *Coprosma* spp., pigeonwood, *Cyathea dealbata*, kaikomako.	*Asplenium* spp., *Phymatodes diversifolium*, *Uncinia* spp.	Flanks of Seaward Kaikoura Range, 90-610 m.	J. Wardle (1971)
* higher altitudes † lower altitudes									