

**This document** has been scanned from hard-copy archives for research and study purposes. Please note not all information may be current. We have tried, in preparing this copy, to make the content accessible to the widest possible audience but in some cases we recognise that the automatic text recognition maybe inadequate and we apologise in advance for any inconvenience this may cause.

# TYPES IN SOUTH WALES



COMMISSION OF N.S.W.

Research Note No. 17

Sydney 1965

Reprinted 1979

RESEARCH NOTE No. 17

FOREST TYPES  
IN  
NEW SOUTH WALES

Edited by  
G. N. BAUR

FORESTRY COMMISSION OF N.S.W.  
SYDNEY 1965

Reprinted 1979

National Library of Australia card number  
ISBN 0 7240 4757 3  
ISSN 0085-3984

## PREFACE

This Research Note is intended to provide the basis for bringing some degree of uniformity to the classification of forest vegetation types in New South Wales. The need for such a uniform approach has been recognised by the Forestry Commission for many years, and whilst this Note should not be regarded as the final word on such a uniform system of classification, it does represent considerable progress towards this end.

The Note is divided into three parts. The first part outlines the general principles employed in developing the present classification of forest types and explains how these can be applied in the field. Part II lists the individual types recognised and also shows the various species mentioned in the text and indicates the major types in which each species occurs. The final, and longest part, provides a moderately detailed description of each of the 170 types recognised.

The classification adopted is the result of many years' work by a large number of officers of the Forestry Commission, and acknowledgement is made of their individual contributions.

The task of classifying the vast amount of information in Commission files and reports and finally of editing this research note has rested with Mr. G. N. Baur.

## TABLE OF CONTENTS

I.	Introduction .. .. .	6
	Recognition of Types .. .. .	6
	Type Description .. .. .	7
	Nomenclature .. .. .	7
	Forest Structure .. .. .	9
	Arrangement of Types .. .. .	10
	Sources of Information .. .. .	11
	Ecological Basis .. .. .	12
	Sub-types, Super-types and Overlapping types .. .. .	12
	References .. .. .	14
II.	Classification of Forest Types (list) .. .. .	15
	Occurrence of Species in Forest Types (list) .. .. .	18
III.	Descriptions of Groups, Leagues and Types .. .. .	27
	Rainforest Group .. .. .	27
	Subtropical Rainforest League (types 1-7) .. .. .	27
	Warm Temperate Rainforest League (11-13) .. .. .	30
	Cool Temperate Rainforest League (16-18) .. .. .	32
	Dry and Depauperate Rainforest League (21-26) .. .. .	33
	Eucalypt and Related Group .. .. .	36
	Maritime League (30-34) .. .. .	36
	Blackbutt League (36-42) .. .. .	38
	Sydney Blue Gum/Bangalay League (46-54) .. .. .	41
	Grey Gum-Grey Ironbark League (60-65) .. .. .	44
	Spotted Gum League (70-76) .. .. .	46
	Grey Box-Ironbark League (80-87) .. .. .	49
	Red Gum League (92-94) .. .. .	51
	Scribbly Gum-Stringybark-Silvertop Ash League (97-127) .. .. .	52
	Snow Gum League (136-143) .. .. .	59
	Alpine Ash League (147-148) .. .. .	61
	Messmate-Brown Barrel League (151-167) .. .. .	62
	Yellow Box-White Box-Red Gum League (172-177) .. .. .	68
	Black Cypress Pine League (180-185) .. .. .	69
	White Cypress Pine League (188-194) .. .. .	70
	River Red Gum League (199-200) .. .. .	74
	Western Box-Ironbark League (202-210) .. .. .	75
	Non-Forest and Artificial Group .. .. .	77
	Artificial Communities (216-219) .. .. .	77
	Shrub-Dominant Communities (223-226) .. .. .	78
	Herb-Dominant Communities (230-234) .. .. .	79

# FOREST TYPES IN NEW SOUTH WALES

## Part I

### INTRODUCTION

This report represents a preliminary attempt at classifying, listing and describing the various forest types which occur throughout New South Wales. The form of the report follows fairly closely the bulletin of the Society of American Foresters (1962), "Forest Cover Types of North America", though the approach used in this case differs in a number of respects from that adopted in the United States.

A *forest type*, in the sense used here, can be defined as any group of tree-dominated stands which possess a general similarity in composition and character. In this report the definition is extended to include, in broad terms, other vegetation types which lack a tree cover.

The recognition of forest types is important for many reasons. By inference, any type can reasonably be expected to occur under the influence of relatively uniform environmental conditions – of climate, soil, topography and past history. A type therefore represents a group of stands which may be expected to react or respond to treatment in a similar manner to each other, and as experience is gradually obtained it becomes possible to use forest types as indicators of the land utilisation potential of any site: for agricultural or pastoral development; for conversion to forestry plantations; as units for the production of forest products; for the protection of catchments; for their amenability to various forms of silvicultural treatment; and so on.

The Forestry Commission of N.S.W. has long appreciated this value, and officers of the Commission have for many years been accumulating information on the nature and composition of forest stands throughout the timbered areas of the state. The individual types recognised in this past work have been described and named to suit local conditions, and whilst these have undoubtedly served the purposes for which they were intended, it has been realised that there is considerable inconsistency in the manner in which they have been described and that much greater value would accrue from using a standard basis for forest type classification over the whole state. This report is intended to provide such a basis.

### RECOGNITION OF TYPES

The classification of types in this report is based on the occurrence of types actually occurring in the field, regardless of whether these are permanent (i.e. climax, in the ecological sense) or temporary (i.e. tending to change, with the passage of time, into some different type).

Each type recognised is known to occur over appreciable land areas, and thus to warrant separation for mapping purposes at the scales normally used in Commission maps. Some occupy large areas in different parts of the state, others are restricted to relatively small and local regions,

while still others tend to be of limited extent in any given region, but in aggregate to cover considerable areas.

Each type also is regarded as being sufficiently distinct from all others to warrant separate description. For many purposes the classification will prove more detailed than is necessary, while in other cases additional detail will be required; these varying requirements can be met by the recognition of super-types and sub-types, as discussed below. Because of inadequate information available at present, some very characteristic types may be omitted from this report; provision is also made for the inclusion of these. However in all cases it is intended that the classification given in this report should be used as the basic framework for the identification of types in the field.

With a few minor exceptions, the forest types proper are named from the occurrence of one or more indicator species which characteristically achieve a degree of predominance in the relevant stands. As far as possible only one or two species (or groups of related species) have been used to name the types, but in several cases it has been necessary to use up to four species for this purpose. In a few cases it has also been necessary to use additional descriptive terms.

The degree of predominance used to determine the indicator species is, quite frankly, arbitrarily based. With species of outstanding economic importance (e.g. Blackbutt, Spotted Gum), as little as 20 per cent of the stand basal area has been regarded as sufficient to confer "predominance", whilst with less valuable species a higher level has been accepted. In the case of the rainforest stands, it has been necessary to use distinctive and characteristic species in the naming of a number of types, rather than truly predominant species which frequently do not exist in these typically complex and mixed stands. Individual type descriptions should in most cases indicate the basis for the naming of the types.

## TYPE DESCRIPTION

A description of each of the recognised types is given in this report. These descriptions follow a set pattern: the type is named and given a distinctive number; its composition is described, showing those species which are commonly found as subordinate associates and, wherever possible, indicating the composition of the lower strata; notes are given on its nature, including the type of forest structure it exhibits and the environmental factors which appear (on the usually limited data available) to play a major role in determining the occurrence of the type; and the general occurrence, together with some specific examples, is outlined.

This full description is given for the more important and valuable types, while a contracted description is provided for the other types.

## NOMENCLATURE

The species names used in the report are taken from the Forestry Commission of N.S.W. (1963), with a few alterations and amendments. The changes made are as follows:—

*Gully Ash (Eucalyptus badjensis)*. Not previously included.

*Western New England Blackbutt (E. andrewsii)*. Separated from New England Blackbutt (*E. campanulata*) with which it was previously lumped.

*Booyong*. Used as a group name for both *Tarrietia* spp. *T. actinophylla* is now identified as Black Booyong.

*Western Grey Box (Eucalyptus microcarpa)*. Separated from Grey Box (*E. moluccana*).

*Pilliga Box (E. pilligaensis)*. Separated from Narrowleaved Box (*E. woollisiana*).

*Burrawang*. Extended to include *Macrozamia* spp.

*Cupaniopsis (Cupaniopsis anacardioides)*. Not previously included.

*Port Jackson Cypress Pine (Callitris cupressiformis)*. Not previously included.

*Alpine Snow Gum (Eucalyptus niphophila)*. Separated from Snow Gum (*E. pauciflora*).

*Blakely's Red Gum (E. blakelyi)*. Separated from Forest Red Gum (*E. tereticornis*).

*Dwyer's Red Gum (E. dwyeri)*. Not previously included.

*Red Gum*. Restricted in use to a group name (covering Blakely's Red, Cabbage, Dwyer's Red, Forest Red, River Red and Tumbledown Gums). The species formerly called Red Gum (*E. dealbata*) now becomes Tumbledown Gum.

*Port Jackson Mallee (E. virgata)*. Not previously included.

*Napunyah (E. ochrophloia)*. Not previously included.

*Hairy (She) Oak (Casuarina inophloia)*. Not previously included.

*Mountain Quandong (Elaeocarpus holopetalus)*. Not previously included.

*Old Man Saltbush (Atriplex nummularium)*. Not previously included.

Besides these changes, in a number of types related or similar species are included together under a general group name. Most such groupings are obvious (e.g. Boxes, Ironbarks, Red Gums, Peppermints), but the following cases should be noted:

*Stringybarks*. This group excludes the unrelated Bailey's and Needle-bark Stringybarks.

*Apples*. Where not further described, this name covers *Angophora* spp.

*Southern Blue Gums*. This group includes Mountain Grey Gum, Maiden's Gum and Shining Gum. Eurabbie also belongs here, but is separated out for typing purposes.

*Scribbly Gums*. No attempt has been made to separate the three closely related species covered by this name.

## FOREST STRUCTURE

At various stages in the type descriptions, the structure of the communities is mentioned. The terms used for this purpose are those which have become fairly well established in Australian ecological terminology, but for completeness, and because in certain cases they are used to provide the basis for major groupings of types, they are repeated here.

For the tree-dominated communities, three formations are recognised, each with a number of subformations. These formations are rainforest, sclerophyll forest and woodland. Some nine other vegetation formations are recognised also within the State. Some of these are of direct forestry interest, and all can occur within areas of forestry concern and for these reasons they are included as broad types within this classification of forest types in N.S.W. The nine formations concerned are scrub, mallee, heath, saltbush, grassland, bog, fen, herbfield and fjaeldmark, and each of these is described in the relevant type description.

For the purposes of this report a tree is defined as an erect woody plant, normally with a single stem at ground level, and exceeding about 25 feet in height. The formations and subformations in which trees are dominant or conspicuous are as follows:—

*Rainforest.* A closed, moisture-loving community of trees, usually containing one or more subordinate storeys of trees and shrubs; frequently mixed in composition; the species typically, but not invariably, broadleaved and evergreen; heavy vines (lianes), vascular and nonvascular epiphytes, stranglers and buttressing often present and sometimes abundant; floristic affinities mainly with the Antarctic or Indo-Malaysian floras; eucalypts typically absent except as relics of an earlier community. Four subformations are recognised, one of these (dry rainforest) being included as a matter of convenience, though not truly warranting description as a rainforest community in any worldwide classification of vegetation. The four sub-formations are:—

*Subtropical Rainforest:* Contains three tree storeys; very mixed in composition, Indo-Malaysian elements dominant; buttressing, lianes and vascular epiphytes common.

*Dry Rainforest:* two tree layers, the upper layer usually being discontinuous and containing deciduous or xerophytic species; very mixed in composition; Indo-Malaysian elements almost exclusively present; lianes common; buttressing and vascular epiphytes rare.

*Warm Temperate Rainforest:* Two tree layers, the upper layer being continuous; tendency towards one species being dominant; Antarctic elements dominant, buttressing rare; lianes and vascular epiphytes present but seldom conspicuous.

*Cool Temperate Rainforest:* one or two tree layers, the lower (where present) being scattered and discontinuous; simple composition with one species usually clearly dominant; Antarctic elements almost exclusively present;

buttressing, vines and vascular epiphytes usually rare; leaf size smaller than in other subformations.

**Sclerophyll Forest.** Trees forming a continuous canopy and having a bole length greater than the crown depth; typically made up of eucalypts or eucalypt-like trees with somewhat sclerophyllous leaves (rarely mesomorphic); seldom more than one tree layer. Three subformations are recognised:—

**Wet Sclerophyll Forest:** tall forest (over 100 ft in height), frequently with a scattered understorey of small trees, and with a mesomorphic shrub layer (which may however be destroyed by burning) and ground herbs.

**Dry Sclerophyll Forest:** a single tree layer, with a frequently dense, sclerophyllous shrub layer and the ground stratum sparse. Usually under 120 ft in height.

**Swamp Sclerophyll Forest:** A single tree layer, with a ground stratum of swamp-loving plants. Height can range from about 30 ft to nearly 200 ft.

**Woodland.** An open community of usually xerophytic trees, canopy discontinuous and the bole length usually less than the depth of crown. Five subformations are recognised:—

**Tall Woodland:** a single layer of tall trees; the canopy almost continuous; ground layer usually sparse. This subformation is intermediate between sclerophyll forest and woodland.

**Savanna Woodland:** trees scattered, giving a discontinuous canopy; crowns of trees usually rounded, crown depth usually appreciably greater than bole length; grass layer well developed.

**Shrub Woodland:** similar to savanna woodland, but trees more widely spaced and with large shrubs occurring in the spaces between the trees.

**Subalpine Woodland:** similar to savanna woodland, but with the grass layer largely replaced by dwarf shrubs which are covered by winter snow.

**Heath Woodland:** similar to savanna woodland, but with the grass layer replaced by a dense layer of sclerophyllous shrubs.

## ARRANGEMENT OF TYPES

A total of 170 types are described in this report. These have been divided into three major groups: those communities which have a rainforest structure; the sclerophyll forest and woodland communities which are typically dominated by eucalypts and other trees of the autochthonous flora; and those other types which either are artificially created or lack a dominance of trees.

Within each of these groups the types are further combined into assemblages of related types, called "leagues". In the rainforest group four leagues are recognised, each corresponding to one of the four rainforest subformations. Three leagues cover the third group, one each for artificial, shrub-dominated and herb-dominated communities. In the eucalypt-dominated group, which contains 138 of the 170 types, 16 leagues are described. These 16 leagues are based largely on the presence of some major indicator species (e.g. Blackbutt league, Spotted Gum league, White Cypress Pine league), or alternatively they contain a number of types which are united less by the presence of a single indicator species than by the occurrence of groups of related species, by the possession of a similar structure, or by similar site requirements.

Whilst the leagues must be recognised as being essentially artificial groupings, they serve to unite those types which are most closely related to one another.

Each type is given a distinctive number as a numerical reference. These run ordinarily through each league, and then a gap in the series has been left between leagues so that, should further types be subsequently described, these can be fitted into the existing framework of leagues and major groups.

Two types are included in two separate leagues. One contains Blackbutt and Spotted Gum as the indicator species, and the other White and Black Cypress Pine. In both cases the predominance of one or other of the species indicates in which of the possible leagues it should be placed.

## SOURCES OF INFORMATION

The type classification presented in this report is based on information obtained from a variety of sources. The initial framework was provided from the published reports of ecological surveys carried out in various parts of N.S.W., and particularly the following:—

- Davis (1936), for the Bulli District.
- Pidgeon (1937), Central Coast.
- Fraser and Vickery (1939), Barrington Tops and adjacent areas.
- Osborne and Robertson (1939), Myall Lakes.
- Pidgeon (1942), eucalypt communities in N.S.W.
- Beadle (1948), Western N.S.W.
- Morland (1949), Hume Catchment.
- Jessup (1953), parts of the New England district.
- Moore (1953), Eastern Riverina.
- Costin (1954), Monaro district.
- Pryor (1954), Australian Capital Territory.
- Newman (1955), Tumut Catchment.
- Baur (1957), rainforest communities in N.S.W.
- Baur (1962), Northeastern N.S.W.
- Biddiscombe (1963), Macquarie Region.

Data accumulated by the Forestry Commission of N.S.W. over many years was then checked against the outline scheme which had been prepared from the ecological surveys. The Commission data came from a

variety of sources, and particularly from Forest Resources Surveys carried out over a large proportion of the timbered lands in the eastern half of the State and from material collected for management plan purposes for all the more important State Forest areas. For the inland forest areas of the State, data collected by the late A. D. Lindsay, and summarised in an internal report "Forest Types of the New South Wales Cypress Pine Zone" (undated) proved of invaluable assistance.

The Commission material revealed many expected gaps in the ecological coverage, and necessitated considerable revision of the initial classification.

The amended classification was then sent to selected forest officers throughout N.S.W. for examination, and from the comments received this final form of classification was developed.

### ECOLOGICAL BASIS

The forest types described in this report are based primarily on ecological principles. In ecological surveys carried out in N.S.W. it has become usual to use the *association* as the basic unit of stand description. Beadle and Costin (1952) define an association as "a climax community of which the dominant stratum has a qualitatively uniform floristic composition, and which exhibits a uniform structure as a whole". Associations are then grouped into *alliances*, which are defined as "a group of floristically related associations of similar structure".

The similarity between associations and forest types, and between alliances and leagues, will be noted, though a type, as used in this report, need not be a climax community, may be more variable in composition than would be accepted for an association, and may on occasions vary in structure: many of the types described in this report are in fact based on several associations recognised by ecologists.

Thus, although this classification resembles and owes much to ecological classifications, it should not be regarded as an attempt at such a classification for the forest vegetation of N.S.W. Primarily, it is intended as an aid to forest management in its broadest sense.

### SUB-TYPES, SUPER-TYPES AND OVERLAPPING TYPES

As described earlier, this classification has attempted to recognise all the major combinations of tree species recurring over appreciable areas of N.S.W. The number of such combinations actually appearing in the field is almost infinite. If the hypothesis that vegetation is merely the visible reflection of site conditions is accepted, this variability of the vegetation must indeed be expected. The site conditions are made up of a large number of factors, including the various components of climate, soil, topography, biotic influence and history, and each of these is constantly varying. Consequently the vegetation itself constantly varies, to form a broad continuum covering the countryside.

The types recognised are merely the more widespread and characteristic combinations taken from this continuum. They merge into each other and they vary considerably even within the recognised types.

The type descriptions have attempted to allow for much of this variability, and further, in order to avoid an excessive number of types, related species have frequently been grouped together within a single type. Such types may prove too general in description for some forestry purposes, and in these cases sub-types (indicated numerically by the addition of the letters (a), (b), (c) . . . after the relevant type number) can be erected. Types where such sub-division is likely to be necessary are indicated in the text (see for example the White Cypress Pine - Box type, No. 193). Similarly sub-types can be erected to cover changes in site productivity within a floristically uniform type; the Silvertop Ash type (No. 112) provides an example where this may be necessary.

Conversely, for many forestry purposes a too intensive breakdown of the vegetation may have been provided in the type classification. This is particularly likely to be the case with the less valuable types, such as many included within the Scribbly Gum-Stringybark-Silvertop Ash league. In these cases the more closely related types may be grouped together into super-types, indicated numerically by the number of the first included type in the super-type. An example of this approach, as it applies to the Wyong Management Area, is given in the general description of the Scribbly Gum-Stringybark-Silvertop Ash league.

In some cases the league itself may prove suitable as a broad unit of forest classification, though this will apply more to statewide projects than to regional classifications.

Although the continuum nature of vegetation applies well over most of N.S.W., it rarely applies between the two major groups of rainforest and eucalypt-dominated forest. These two great vegetation elements tend to be mutually restrictive and distinct, but they may overlap on the one site as, for example, when rainforest invades a eucalypt stand following a prolonged period of freedom from fire.

Such overlapping types are not uncommon in parts of N.S.W., e.g. where overmature Tallowood-Sydney Blue Gum remains above a well-developed Coachwood-Crabapple type in the N.W. Jolly Memorial Grove on Moonpar State Forest, or where the Grey Box-Northern Grey Gum type stands above developing Hoop Pine type on Unumgar S.F. In such cases both the relevant types should be shown as occurring on the one site.

It must finally be stressed that although a great deal of work has gone into the preparation of this type classification, it is nonetheless provisional and will require field checking for many years. As far as possible it should be used as the basis for all future projects involving the recognition of forest types, but individual type descriptions will undoubtedly require amendment to suit local conditions and in some cases complete new types may need to be erected. However, the erection of new types should be avoided unless an examination of the described types shows that none of these, subject to some modification, is suitable for the stand encountered in the field.

## REFERENCES

- Baur, G. N. (1957). Nature and Distribution of Rain-Forests in New South Wales. *Aust. J. Bot.* 5 (2), 190-233.
- (1962). Forest Vegetation in North-eastern New South Wales. *For. Comm. N.S.W.*, Div. For. Mgt. Res. Note No. 8.
- Beadle, N. C. W. (1948). "Vegetation and Pastures of Western New South Wales". Govt. Printer, Sydney.
- & Costin, A. B. (1952). Ecological Classification & Nomenclature. *Proc. Linn. Soc. N.S.W.* 80, 62-70.
- Biddiscombe, E. F. (1963). A. Vegetation Survey in the Macquarie Region, N.S.W. C.S.I.R.O., Div. Plant Ind. Tech. Pap. No. 18.
- Costin, A. B. (1954). "A Study of the Ecosystems of the Monaro Region of N.S.W.". Govt. Printer, Sydney.
- Davis, C. (1936). Plant Ecology of the Bulli District. *Proc. Linn. Soc. N.S.W.* 61, 285-297.
- Forestry Commission of N.S.W. (1963). "Forest Species of N.S.W." (Form F.C. 88). Govt. Printer, Sydney.
- Fraser, L. and Vickery, J. W. (1939). Ecology of the Upper Williams River and Barrington Tops District, iii. *Proc. Linn. Soc. N.S.W.* 64, 1-33.
- Jessup, R. W. (1953). Ecological Survey of the New England Region. *Ann. Rep. (1952-53). C.S.I.R.O. Reg. Past. Lab., Armidale*, pp. 114-127.
- Moore, C. W. E. (1953). Vegetation of the South-eastern Riverina, N.S.W. *Aust. J. Bot.* 1 (3), 485-547.
- Morland, R. T. (1949). Preliminary Investigations in Hume Catchment Area. *J. Soil Cons. Serv. N.S.W.* 5, 44-58.
- Newman, J. C. (1955). Tumut Catchment Area - Survey of Vegetation and Erosion. *J. Soil Cons. Serv. N.S.W.* 11, 95-111; 146-162.
- Osborn, T. G. B. and Robertson, R. N. (1939). Reconnaissance Survey of the Vegetation of the Myall Lakes. *Proc. Linn. Soc. N.S.W.* 64, 279-296.
- Pidgeon, I. M. (1937). Ecology of the Central Coastal Area of New South Wales, i. *Proc. Linn. Soc. N.S.W.* 62, 315-340.
- (1942). Ecological Studies in New South Wales. D. Sc. Thesis, Univ. of Sydney.
- Pryor, L. D. (1954). Plant Communities, being Chap. 8 in "Canberra, A Nation's Capital" (ed. H. L. White). A.N.Z.A.A.S., Canberra.
- Society of American Foresters (1962). "Forest Cover Types of North America". Soc. Am. Foresters, Washington.

# FOREST TYPES IN NEW SOUTH WALES

## Part II

### CLASSIFICATION OF FOREST TYPES

#### A. RAINFOREST GROUP

- (a) SUBTROPICAL RAINFOREST LEAGUE
  - 1. Booyong
  - 2. Yellow Carabeen
  - 3. Crabapple-Sassafras-Corkwood-Silver Sycamore
  - 4. Black Bean
  - 5. Booyong-Coachwood
  - 6. Sassafras-Giant Stinger
  - 7. Palm
- (b) WARM TEMPERATE RAINFOREST LEAGUE
  - 11. Coachwood-Crabapple
  - 12. Coachwood-Sassafras
  - 13. Coachwood-Water Gum
- (c) COOL TEMPERATE RAINFOREST LEAGUE
  - 16. Negrohead Beech
  - 17. Negrohead Beech-Coachwood
  - 18. Pinkwood
- (d) DRY AND DEPAUPERATE RAINFOREST LEAGUE
  - 21. Hoop Pine
  - 22. Brush Kurrajong
  - 23. Myrtle
  - 24. Cupaniopsis
  - 25. Headland Brush Box
  - 26. Viney Scrub

#### B. EUCALYPT AND RELATED GROUP

- (a) MARITIME LEAGUE
  - 30. Swamp Mahogany
  - 31. Paperbark
  - 32. Swamp Oak
  - 33. Mangrove
  - 34. Coast Cypress Pine
- (b) BLACKBUTT LEAGUE
  - 36. Moist Blackbutt
  - 37. Dry Blackbutt
  - 38. Largefruited Blackbutt
  - 39. Blackbutt-Spotted Gum
  - 40. Blackbutt-Scribbly Gum
  - 41. Blackbutt-Blood wood/Apple
  - 42. Blackbutt-Sydney Peppermint-Smooth-barked Apple
- (c) SYDNEY BLUE GUM/BANGALAY LEAGUE
  - 46. Sydney Blue Gum
  - 47. Tallowwood-Sydney Blue Gum
  - 48. Flooded Gum
- (d) GREY GUM-GREY IRON-BARK LEAGUE
  - 49. Turpentine
  - 50. Bangalay
  - 51. Dunn's White Gum
  - 52. Roundleaved Gum-Turpentine
  - 53. Inland Brush Box
  - 54. Whitetopped Box
  - 60. Narrowleaved White Mahogany-Red Mahogany-Grey Ironbark-Grey Gum
  - 61. Broadleaved White Mahogany
  - 62. Grey Gum-Grey Ironbark-White Mahogany
  - 63. Grey Ironbark-Woollybutt
  - 64. Grey Gum-Stringybark
  - 65. Forest Red Gum-Grey Gum/Grey Ironbark-Roughbarked Apple
- (e) SPOTTED GUM LEAGUE
  - 70. Spotted Gum

71. Richmond Range  
Spotted Gum
72. Spotted Gum-Grey  
Box
73. Spotted Gum-Sydney  
Blue Gum/Bangalay
74. Spotted Gum-Grey  
Ironbark/Grey Gum
75. Spotted Gum-Yellow  
Stringybark
76. Spotted Gum-Black-  
butt
- (f) GREY BOX-IRONBARK  
LEAGUE
80. Grey Ironbark-Grey  
Box
81. Grey Box-Northern  
Grey Gum
82. Grey Box
83. Grey Box-Ironbark  
(not Grey)
84. Narrowleaved/Broad-  
leaved Ironbark
85. Grey Box-Forest Red  
Gum
86. Coastal Grey Box-  
Woollybutt
87. Steel Box
- (g) RED GUM LEAGUE
92. Forest Red Gum
93. Cabbage Gum
94. River Oak
- (h) SCRIBBLY GUM-STRINGY-  
BARK-SILVERTOP ASH  
LEAGUE
97. Needlebark Stringybark
98. Dorrigo White Gum
99. Red Box
100. Yellow Bloodwood
101. Blue Mountain Ash
102. Yertchuk
103. Apple Box
104. Longleaved Box
105. Smoothbarked Apple
106. Smoothbarked Apple-  
Sydney Peppermint-  
Stringybark
107. Smoothbarked Apple-  
Banksia
108. Bangalay-Banksia
109. Brittle Gum
110. Brittle Gum-Pepper-  
mint
111. Peppermint
112. Silvertop Ash
113. Silvertop Ash-Pepper-  
mint
114. Silvertop Ash-Stringy-  
bark
115. Sydney Peppermint-  
Stringybark
116. Sydney Peppermint-  
Turpentine-Blood-  
wood
117. Scribbly Gum
118. Scribbly Gum-Silver-  
top Ash
119. Scribbly Gum-Blood-  
wood
120. Scribbly Gum/Brittle  
Gum-Snow Gum
121. Blueleaved Stringybark
122. New England Stringy-  
bark
123. Southern Stringybark
124. Red Stringybark
125. Red Stringybark-  
Brittle Gum-Scribbly  
Gum
126. Stringybark-Blood-  
wood
127. Stringybark-Smooth-  
barked Apple
- (i) SNOW GUM LEAGUE
136. Snow Gum-Black  
Sallee
137. Black Sallee
138. Snow Gum
139. Alpine Snow Gum
140. Snow Gum-Mountain/  
Manna Gum
141. Candlebark
142. New England Pepper-  
mint
143. Swamp Gum/Black  
Gum
- (j) ALPINE ASH LEAGUE
147. Alpine Ash
148. Alpine Ash-Mountain/  
Manna Gum
- (k) MESSMATE-BROWN  
BARREL LEAGUE
151. Brown Barrel-Mess-  
mate
152. Messmate-Gum
153. Messmate-Silvertop  
Stringybark

- 154. Brown Barrel
  - 155. Brown Barrel-Gum
  - 156. Brown Barrel/Messmate Silvertop Ash
  - 157. Yellow Stringybark-Gum
  - 158. Southern Blue Gum
  - 159. Mountain/Manna Gum
  - 160. Manna Gum-Stringybark
  - 161. Roundleaved Gum
  - 162. White Ash
  - 163. New England Blackbutt
  - 164. Eurabbie
  - 165. Gully Peppermint
  - 166. River Peppermint
  - 167. Silvertop Stringybark
- (l) YELLOW BOX-WHITE BOX-RED GUM LEAGUE
- 172. Yellow Box-Blakely's Red Gum
  - 173. Yellow Box-White Box
  - 174. White Box-Western Boxes
  - 175. White Box
  - 176. White Box-Stringybark
  - 177. Red Gum-Stringybark
- (m) BLACK CYPRESS PINE LEAGUE
- 180. Black Cypress Pine
  - 181. Black Cypress Pine-Ironbark
  - 182. Black Cypress Pine-Box
  - 183. Black Cypress Pine-Red Gum
- 184. Black Cypress Pine-Scribbly Gum
  - 185. Black Cypress Pine-White Cypress Pine
- (n) WHITE CYPRESS PINE LEAGUE
- 188. White Cypress Pine
  - 189. White Cypress Pine-Narrowleaved Ironbark
  - 190. White Cypress Pine-Brown Bloodwood
  - 191. White Cypress Pine-Western Ironbarks
  - 192. White Cypress Pine-Red Gum
  - 193. White Cypress Pine-Box
  - 194. White Cypress Pine-Black Cypress Pine
- (o) RIVER RED GUM LEAGUE
- 199. River Red Gum
  - 200. River Red Gum-Box/Coolabah
- (p) WESTERN BOX-IRONBARK LEAGUE
- 202. Black Box/Coolabah
  - 203. Western Boxes
  - 204. Ironbark-Western Boxes
  - 205. Ironbark-Red Gum
  - 206. Red Ironbark
  - 207. Silverleaved Ironbark
  - 208. Narrowleaved Ironbark-Bull Oak
  - 209. Ironbark-Red Gum-Bloodwood
  - 210. Red Ironbark-Stringybark

### C. NON-FOREST AND ARTIFICIAL COMMUNITIES

- (a) ARTIFICIAL COMMUNITIES
- 216. Agricultural Pasture and Cropland
  - 217. Agricultural Plantations, Orchards and Vineyards
  - 218. Forestry Plantations
  - 219. Settlements, Roads, etc.
- (b) SHRUB-DOMINANT COMMUNITIES
- 223. Heath
  - 224. Scrub
  - 225. Mallee
  - 226. Saltbush
- (c) HERB-DOMINANT COMMUNITIES
- 230. Natural Grassland
  - 231. Bog and Fen
  - 232. Herbfield and Fjaeldmark
  - 233. Sand Ridge
  - 234. Rock

## OCCURRENCE OF SPECIES IN FOREST TYPES

NOTE:—

1. With the exceptions previously mentioned in the text, species' names are as listed by Forestry Commission of N.S.W. (1963).
2. The occurrences shown below are not intended to be exhaustive, and cover only species included in individual type descriptions. They should nonetheless cover the types in which the major species most commonly occur.
3. Bold types are those in which the relevant species occurs as an indicator species, referred to in the type name.
4. A few minor species mentioned in the type descriptions are omitted from this list.

Common Name	Botanical Name	Type Numbers where Mentioned
<b>Apple,</b>		
Argyle .. ..	<i>Eucalyptus cinerea</i> ..	109.
Black .. ..	<i>Planchonella australis</i> ..	1.
Broadleaved ..	<i>Angophora subvelutina</i>	80, 85, 92, 94.
Narrowleaved ..	A. <i>bakeri</i> ..	100.
Roughbarked ..	A. <i>floribunda</i> ..	36, 37, <b>41</b> , 61, 63, 64, <b>65</b> , 85, 94, 102, 112, 114, 118, 119, 121, 123, 166, 172, 173, 177, 185, 189, 191, 192, 194, 204, 205, 206, 207, 210.
Smoothbarked ..	A. <i>costata</i> ..	36, 37, <b>41</b> , 42, 61, 62, 63, 64, 100, <b>105</b> , <b>106</b> , <b>107</b> , 112, 113, 114, 116, 118, 119, 123, 126, <b>127</b> , 181, 182, 183, 185, 191, 192, 194, 204.
<b>Ash,</b>		
Alpine .. ..	<i>Eucalyptus delegatensis</i>	140, <b>147</b> , <b>148</b> .
Bennett's .. ..	<i>Flindersia bennettiana</i> ..	1.
Blue Mountain ..	<i>Eucalyptus oreades</i> ..	<b>101</b> , 163.
Crow's .. ..	<i>Flindersia australia</i> ..	1, 21, 81, 87.
Gully .. ..	<i>Eucalyptus badjensis</i> ..	151.
Pigeonberry ..	<i>Cryptocarya erythroxylon</i> ..	1.
Prickly .. ..	<i>Orites excelsa</i> ..	1, 2, 3, 5, 11, 12, 16, 17.
Red .. ..	<i>Alphitonia excelsa</i> ..	207.
Silky .. ..	<i>Ehretia acuminata</i> ..	3.
Silver .. ..	<i>Flindersia schottiana</i> ..	1, 21.
Silvertop .. ..	<i>Eucalyptus sieberiana</i> ..	63, 70, 101, 106, 109, 111, <b>112</b> , <b>113</b> , <b>114</b> , 115, 116, <b>118</b> , 119, 120, 123, 127, 151, 152, 155, <b>156</b> , 157, 158, 162.

Common Name	Botanical Name	Type Numbers where Mentioned
White .. ..	<i>E. fraxinoides</i> .. ..	112, 151, 162.
Bangalay .. ..	<i>E. botryoides</i> .. ..	39, 76, 49, 50, 54, 73, 108, 157, 166.
Banksia .. ..	<i>Banksia</i> spp. .. ..	24, 34, 41, 107, 108.
Barrel, Brown .. ..	<i>Eucalyptus fastigata</i> .. ..	114, 140, 151, 154, 155, 156, 157, 158, 159, 162, 163, 166.
Basswood .. ..	<i>Tieghemopanax</i> spp. .. ..	6.
Bean, Black .. ..	<i>Castanospermum australe</i> .. ..	4.
Beech,		
Brown .. ..	<i>Penantia cunninghamii</i> .. ..	3.
Negrohead .. ..	<i>Nothofagus moorei</i> .. ..	16, 17, 155.
White .. ..	<i>Gmelina leichhardtii</i> .. ..	1, 5.
Belah .. ..	<i>Casuarina cristata</i> .. ..	189, 203, 224.
Blackbutt .. ..	<i>Eucalyptus pilularis</i> .. ..	36, 37, 39, 40, 41, 42, 48, 54, 60, 62, 73, 74, 76, 107, 108, 112, 157, 163.
Largefruited .. ..	<i>E. pilularis</i> var. <i>pyriformis</i> .. ..	38.
New England .. ..	<i>E. campanulata</i> .. ..	46, 54, 62, 64, 98, 111, 122, 151, 152, 153, 160, 161, 163, 167.
Western New England .. ..	<i>E. andrewsii</i> .. ..	122, 176, 177.
Bloodwood, including: .. ..	<i>Eucalyptus</i> (certain related spp). .. ..	30, 31, 36, 37, 38, 39, 39, 40, 41, 74, 76, 97, 117, 119, 126.
Brown .. ..	<i>E. trachyphloia</i> .. ..	119, 181, 183, 184, 190, 207, 209.
Pink .. ..	<i>E. intermedia</i> .. ..	41, 119, 126.
Red .. ..	<i>E. gummifera</i> .. ..	41, 42, 49, 50, 60, 61, 62, 64, 70, 72, 80, 83, 100, 102, 105, 106, 107, 108, 112, 113, 114, 115, 116, 119, 121, 123, 126, 127.
Yellow .. ..	<i>E. eximia</i> .. ..	100, 119.
Blush, Maiden's .. ..	<i>Sloanea australis</i> .. ..	5.
Booyong, including: .. ..	<i>Tarrietia</i> spp. .. ..	2, 3.
Black .. ..	<i>T. actinophylla</i> .. ..	1, 5.
White .. ..	<i>T. trifoliolata</i> .. ..	1, 5.
Bottlebrush .. ..	<i>Callistemon</i> spp. .. ..	31.
Box,		
Apple .. ..	<i>Eucalyptus bridgesiana</i> .. ..	99, 103, 104, 111, 138, 159, 160, 172, 184.
Apple topped .. ..	<i>E. angophoroides</i> .. ..	166.
Bimble .. ..	<i>E. populnea</i> .. ..	182, 193, 203.

Common Name	Botanical Name	Type Numbers where Mentioned
Black .. ..	<i>E. largiflorens</i> .. ..	200, 202.
Brush .. ..	<i>Tristania conferta</i> .. ..	25, 47, 48, 49, 51, 53, 60, 70, 71, 81.
Coastal Grey ..	<i>Eucalyptus bosistoana</i> ..	86, 157.
Fuzzy .. ..	<i>E. conica</i> and <i>bauerana</i>	161, 166, 174, 193, 203.
Grey .. ..	<i>E. moluccana</i> .. ..	21, 60, 61, 65, 72, 80, 81, 82, 83, 84, 85, 86, 92, 167, 182.
Longleaved ..	<i>E. elaeophora</i> .. ..	99, 103, 104, 124, 125, 167.
Box,		
Narrowleaved ..	<i>E. woollsiana</i> .. ..	174, 193, 203, 204, 206.
Pilliga .. ..	<i>E. pilligaensis</i> .. ..	174, 193, 203.
Red .. ..	<i>E. polyanthemus</i> .. ..	99, 103, 104, 124, 125, 172, 182, 184.
Steel .. ..	<i>E. rummeryi</i> .. ..	21, 87.
Swamp .. ..	<i>Tristania suaveolens</i> ..	92.
Western .. ..	Group Name, covering Bimble, Black, Fuzzy, Narrowleaved, Pilliga, Western Grey and Western Red .. ..	174, 181, 182, 191, 193, 199, 203, 204, 208.
Western Grey ..	<i>Eucalyptus microcarpa</i> ..	174, 182, 193, 200, 203, 204.
Western Red ..	<i>E. intertexta</i> .. ..	193.
White .. ..	<i>E. albens</i> .. ..	82, 124, 172, 173, 174, 175, 176, 177, 180, 182, 193, 203, 204, 206, 210.
Whitetopped ..	<i>E. quadrangulata</i> .. ..	46, 54, 163.
Yellow .. ..	<i>E. melliodora</i> .. ..	65, 80, 103, 124, 160, 161, 172, 173, 174, 175, 177, 182, 193, 200, 203, 204.
Boxwood, Yellow ..	<i>Planchonella pohlmani-ana</i> .. ..	21.
Brigalow .. ..	<i>Acacia harpophylla</i> .. ..	224.
Broombush ...	<i>Melaleuca uncinata</i> .. ..	224.
Budda .. ..	<i>Eremophila mitchellii</i> ..	189, 203, 224.
Burrawang .. ..	<i>Macrozamia</i> spp. .. ..	70.
Candlebark ...	<i>Eucalyptus rubida</i> .. ..	109, 136, 140, 141, 142, 160.
Carabeen,		
Red .. ..	<i>Geissois benthamii</i> .. ..	1.
Yellow .. ..	<i>Sloanea woollsii</i> .. ..	1, 2, 3, 5.
Carbeen .. ..	<i>Eucalyptus tessellaris</i> ..	200.
Cedar, Red .. ..	<i>Toona australis</i> .. ..	1, 2, 3.
Coachwood .. ..	<i>Ceratopetalum apetalum</i>	3, 5, 11, 12, 13, 16, 17, 155.
Coolabah .. ..	<i>Eucalyptus microtheca</i> ..	200, 202.
Corkwood .. ..	<i>Ackama paniculata</i> .. ..	3, 5.

Common Name	Botanical Name	Type Numbers where Mentioned
Crabapple .. ..	<i>Schizomeria ovata</i> .. ..	3, 11, 12.
Cupaniopsis .. ..	<i>Cupaniopsis anacardiodes</i> .. ..	24, 25.
Cypress Pine, Black .. ..	<i>Callitris endlicheri</i> .. ..	82, 83, 103, 105, 122 124, 138, 176, 177, 180, 181, 182, 183, 184, 185, 191, 194, 204, 205, 206, 207, 209, 210.
Brush .. ..	<i>C. macleayana</i> .. ..	47
Coast .. ..	<i>C. columellaris</i> .. ..	34, 41.
Port Jackson White .. ..	<i>C. cupressiformis</i> .. ..	98.
	<i>C. hugelii</i> .. ..	105, 173, 180, 183, 185, 188, 189, 190, 191, 192, 193, 194, 203, 204, 205, 207, 208, 209.
Deadfinish .. ..	<i>Acacia tetragonophylla</i> .. ..	224.
Emubush .. ..	<i>Eremophila longifolia</i> .. ..	224.
Eugenia .. ..	<i>Eugenia</i> spp. .. ..	1, 3, 6, 23, 24, 25.
Eurabbie .. ..	<i>Eucalyptus bicostata</i> .. ..	164.
Evodia .. ..	<i>Euodia</i> spp. .. ..	11, 12.
Fig .. ..	<i>Ficus</i> spp. .. ..	1, 3, 5, 6.
Flametree .. ..	<i>Brachychiton acerifolium</i> .. ..	1, 3.
Gidgee .. ..	<i>Acacia cambagei</i> .. ..	224.
Gum,		
Alpine Snow .. ..	<i>Eucalyptus niphophila</i> .. ..	139.
Black .. ..	<i>E. aggregata</i> .. ..	136, 137, 138, 143.
Blakely's Red .. ..	<i>E. blakelyi</i> .. ..	172, 173, 175, 177, 183, 189, 192, 205.
Brittle .. ..	<i>E. maculosa</i> .. ..	101, 104, 109, 110, 111, 117, 120, 124, 125.
Cabbage .. ..	<i>E. amplifolia</i> .. ..	92, 93.
Dorrigo White .. ..	<i>E. benthamii</i> var. <i>dorrigoensis</i> .. ..	98.
Dunn's White .. ..	<i>E. dunnii</i> .. ..	51.
Dwyer's Red .. ..	<i>E. dwyeri</i> .. ..	192.
Flooded .. ..	<i>E. grandis</i> .. ..	46, 47, 48, 51, 53, 218.
Forest Red .. ..	<i>E. teretidornis</i> .. ..	30, 31, 32, 64, 65, 70, 72, 80, 82, 85, 92, 107, 166.
Grey .. ..	<i>E. propinqua, punctata</i> and <i>canaliculata</i> .. ..	36, 37, 38, 39, 42, 54, 60, 61, 62, 64, 65, 74, 76, 80, 82, 87, 92, 100, 106, 108, 114, 115, 119, 121, 123, 127, 163.
Maiden's .. ..	<i>E. maidenii</i> .. ..	151, 155, 157, 158.

Common Name	Botanical Name	Type Numbers where Mentioned
Manna .. ..	<i>E. viminalis</i> .. ..	110, 111, 113, 136, 138, 140, 141, 147, 148, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 163, 164, 166, 167, 172, 184.
Mountain .. ..	<i>E. dalrympleana</i> .. ..	111, 112, 136, 138, 140, 147, 148, 155, 159.
Mountain Grey .. ..	<i>E. goniocalyx</i> .. ..	36, 37, 46, 50, 70, 75, 86, 112, 113, 114, 147, 148, 151, 152, 154, 155, 156, 157, 158, 159, 162, 166.
Northern Grey .. ..	<i>E. major</i> .. ..	21, 81.
Red	Group Name, covering Blakely's Red, Cabbage, Dwyer's Red, Forest Red, River Red and Tumbledown .. ..	83, 84, 97, 122, 175, 176, 177, 181, 182, 183, 185, 190, 191, 192, 193, 194, 203, 205, 207, 208, 209, 210.
River Red .. ..	<i>E. camaldulensis</i> .. ..	199, 200.
Roundleaved .. ..	<i>E. deanei</i> .. ..	46, 52, 122, 153, 160, 161, 163.
Scribbly .. ..	<i>E. haemastoma, racemosa</i> and <i>rossii</i> .. ..	40, 97, 99, 100, 101, 102, 109, 110, 113, 114, 116, 117, 118, 119, 120, 124, 125, 126, 184, 209.
Shining .. ..	<i>E. nitens</i> .. ..	151, 154, 155, 158.
Snow .. ..	<i>E. pauciflora</i> .. ..	110, 114, 120, 136, 137, 138, 139, 140, 141, 142, 143, 148, 159, 160, 163, 184.
Spotted .. ..	<i>E. maculata</i> .. ..	39, 60, 62, 70, 71, 72, 73, 74, 75, 76, 83, 84, 87, 157.
Swamp .. ..	<i>E. camphora</i> and <i>ovata</i>	137, 138, 141, 143, 159.
Sydney Blue .. ..	<i>E. saligna</i> .. ..	36, 37, 39, 46, 47, 48, 49, 50, 51, 52, 53, 54, 60, 62, 70, 71, 73, 76, 92, 151, 153, 154, 155.
Tumbledown .. ..	<i>E. dealbata</i> .. ..	105, 177, 183, 190, 192, 205, 206.
Water .. ..	<i>Tristania laurina</i> .. ..	13.
Handlewood, Grey .. ..	<i>Apananthe philippinensis</i>	4.

Common Name	Botanical Name	Type Numbers where Mentioned
Ironbark, including:	Eucalyptus (certain related spp.)	21, 70, 82, 83, 85, 92, 112, 123, 127, 174, 180, 181, 182, 183, 185, 191, 192, 194, 203, 204, 205, 209.
Blueleaved	E. nubila	181, 189, 190, 191, 205, 209.
Broadleaved Grey	E. siderophloia E. decepta and paniculata	72, 83, 84. 36, 37, 39, 60, 61, 62, 63, 65, 72, 74, 76, 80, 81, 86, 87, 108, 116.
Narrowleaved	E. crebra	65, 72, 80, 83, 84, 173, 181, 189, 190, 204, 205, 207, 208, 209.
Red	E. sideroxylon	83, 173, 176, 177, 181, 191, 204, 205, 206, 210.
Silverleaved	E. melanophloia	84, 173, 176, 181, 188, 191, 204, 207, 208.
Ironwood	Acacia excelsa	188, 224.
Ivorywood	Siphonodon australe	21.
Kurrajong	Brachychiton populneum	174, 175, 185, 194, 203, 206.
Brush	B. discolor	21, 22.
Leopardwood	Flindersia maculosa	224.
Lignum	Muehlenbeckia cunninghamii	224.
Lilly Pilly	Acmena smithii	23, 50.
Mahogany, Broadleaved White Narrowleaved White Red	Eucalyptus carnea E. acmenioides E. resinifera and pellita	61, 62. 46, 47, 52, 60, 62. 30, 36, 37, 40, 60, 62, 73, 97, 115, 116.
Swamp White	E. robusta Group Name, covering Broadleaved White and Narrowleaved White	30, 31, 92, 105. 36, 37, 38, 62, 64, 65, 70, 74, 80, 82, 84, 105, 106, 126, 163.
Mallee, Blue Blue Mountains Port Jackson Red White	Eucalyptus fruticetorum E. stricta E. virgata E. oleosa E. dumosa	225. 225. 225. 225. 225.
Mangrove, Black Grey	Aegiceras corniculatum Avicennia marina	33. 33.

Common Name	Botanical Name	Type Numbers where Mentioned
Messmate .. ..	<i>Eucalyptus obliqua</i> .. ..	46, 112, 113, 114, <b>151</b> , <b>152</b> , <b>153</b> , 154, 155, <b>156</b> , 157, 158, 159, 160, 162, 163, 166.
Mulga .. ..	<i>Acacia aneura</i> .. ..	188, 224.
Myall .. ..	<i>A. pendula</i> .. ..	224.
Napunyah .. ..	<i>Eucalyptus ochrophloia</i>	202.
Oak, (including She- Oak):		
Black .. ..	<i>Casuarina littoralis</i> .. ..	40, 98.
Bull .. ..	<i>C. luehmannii</i> .. ..	174, 181, 189, 191, 193, 203, 207, <b>208</b> .
Drooping .. ..	<i>C. stricta</i> .. ..	124.
Forest .. ..	<i>C. torulosa</i> .. ..	36, 37, 49, 60, 62.
Hairy .. ..	<i>C. inophloia</i> .. ..	207.
River .. ..	<i>C. cunninghamiana</i> .. ..	<b>94</b> , 166.
Silky .. ..	<i>Grevillea robusta</i> .. ..	4.
Swamp .. ..	<i>Casuarina glauca</i> .. ..	30, 31, <b>32</b> .
Palm,		
Bangalow .. ..	<i>Archontophoenix cun- ninghamiana</i> .. ..	7.
Cabbage Tree .. ..	<i>Livistona australis</i> .. ..	7.
Lawyer Cane .. ..	<i>Calamus muelleri</i> .. ..	1, 7.
Paperbark .. ..	<i>Melaleuca</i> spp. .. ..	30, <b>31</b> , 32, 97, 105, 107.
Broadleaved .. ..	<i>M. quinquenervia</i> .. ..	<b>31</b> .
Narrowleaved .. ..	<i>M. alternifolia</i> and <i>linarii- folia</i>	31.
Pricklyleaved .. ..	<i>M. styphelioides</i> .. ..	31.
Peppermint, including:	<i>Eucalyptus</i> (certain spp).	<b>110</b> , <b>111</b> , 112, <b>113</b> , 114, 118, 120, 121, 123, 136, 138, 140, 141, 142, 151, 152, 154, 155, 156, 157, 158, 159, 160, 161, 163, 164, 172.
Broadleaved .. ..	<i>E. dives</i> .. ..	99, 103, 104, <b>110</b> , <b>111</b> , <b>113</b> , 115, 124, 125, 180.
Gully .. ..	<i>E. smithii</i> .. ..	157, <b>165</b> .
Narrowleaved .. ..	<i>E. radiata</i> and <i>robert- sonii</i> .. ..	64, 102, 103, <b>110</b> , <b>111</b> , <b>113</b> , 115, 122, 147, 148, 152, 159, 162.
New England .. ..	<i>E. nova-anglica</i> . . . .	136, 137, <b>142</b> .
River .. ..	<i>E. andreana</i> .. ..	94, 157, <b>166</b> .
Sydney .. ..	<i>E. piperita</i> .. ..	42, 49, 100, 101, <b>106</b> , <b>113</b> , <b>115</b> , <b>116</b> , 119, 126.
Wattleleaved .. ..	<i>E. acaciiformis</i> .. ..	<b>111</b> , 122.
Pine,		
Brown .. ..	<i>Podocarpus elatus</i> .. ..	4.
Hoop .. ..	<i>Araucaria cunninghamii</i>	1, 11, <b>21</b> , 81, 87, 218.
Pinkwood .. ..	<i>Eucryphia moorei</i> .. ..	<b>18</b> .
Plum, Red .. ..	<i>Endiandra introrsa</i> .. ..	11.

Common Name	Botanical Name	Type Numbers where Mentioned
Quandong, Silver .. ..	<i>Elaeocarpus grandis</i> ..	1.
Mountain .. ..	<i>E. holopetalus</i> ..	16, 17.
Rosewood .. ..	<i>Dysoxylum fraserianum</i> ..	1, 2, 3.
Western .. ..	<i>Heterodendron oleifolium</i> .. ..	224.
Sallee, Black .. ..	<i>Eucalyptus stellulata</i> ..	136, 137, 138, 139, 140, 142, 143.
Salt Bush .. ..	<i>Atriplex</i> spp. .. ..	226.
Old Man .. ..	<i>A. nummularium</i> ..	226.
Sassafras .. ..	<i>Doryphora sassafras</i> ..	3, 5, 6, 11, 12, 16, 17, 18, 155.
Southern .. ..	<i>Atherosperma moschatum</i> .. ..	18.
Socketwood .. ..	<i>Daphnandra micrantha</i> ..	3, 6.
Stinger, Giant .. ..	<i>Laportea gigas</i> .. ..	1, 2, 6, 26.
Stringybark:	Group Name, covering the related species shown below, except for Bailey's and Needlebark, which are unrelated .. ..	36, 37, 40, 42, 46, 49, 60, 61, 63, 64, 65, 70, 74, 75, 81, 83, 84, 85, 86, 97, 98, 100, 101, 102, 105, 106, 109, 110, 111, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 126, 127, 141, 152, 153, 155, 156, 157, 159, 160, 161, 163, 164, 167, 172, 173, 176, 177, 180, 183, 184, 185, 194, 210.
Bailey's .. ..	<i>Eucalyptus baileyana</i> ..	97.
Blueleaved .. ..	<i>E. agglomerata</i> .. ..	114, 121.
Broadleaved .. ..	<i>E. caliginosa</i> .. ..	64, 122, 160, 177, 210.
Brown .. ..	<i>E. blaxlandii</i> and <i>capitulata</i> .. ..	106, 114, 123, 126.
Diehard .. ..	<i>E. cameronii</i> .. ..	64, 122, 152, 160.
Needlebark .. ..	<i>E. planchoniana</i> ..	40, 97.
Red .. ..	<i>E. macrorhyncha</i> ..	99, 104, 124, 125, 160, 172, 176, 177, 205, 206, 210.
Silvertop .. ..	<i>E. laevopinea</i> .. ..	47, 54, 151, 152, 153, 159, 160, 163, 167.
Thinleaved .. ..	<i>E. eugenioides</i> .. ..	114, 123.
Tindale's .. ..	<i>E. tindaliae</i> .. ..	126.
White .. ..	<i>E. globoidea</i> .. ..	64, 106, 114, 123, 126, 152.
Wilkinson's .. ..	<i>E. wilkinsoniana</i> ..	123.
Yellow .. ..	<i>E. muelleriana</i> .. ..	70, 75, 112, 114, 151, 152, 155, 157.
Youman's .. ..	<i>E. youmanii</i> .. ..	122.

Common Name	Botanical Name	Type Numbers where Mentioned
Sugarwood .. ..	<i>Myoporum platycarpum</i>	224.
Sycamore, Silver .. ..	<i>Cryptocarya glaucescens</i>	3, 11, 12.
Tallowwood .. ..	<i>Eucalyptus microcorys</i> ..	36, 37, 39, 46, 47, 48, 49, 50, 53, 54, 60, 62, 65, 70, 71, 74, 76, 81, 151, 154, 163.
Tamarind .. ..	<i>Diploglottis australis</i> ..	1, 3, 5.
Teatree .. ..	<i>Leptospermum</i> spp. ..	31, 97, 223, 224.
Turpentine .. ..	<i>Syncarpia glomulifera</i> ..	36, 37, 42, 46, 47, 48, 49, 50, 52, 53, 60, 70, 73, 116, 119.
Wattle .. ..	<i>Acacia</i> spp. .. ..	50, 73, 86, 205.
Wilga .. ..	<i>Geijera parviflora</i> ..	203, 224.
Woollybutt .. ..	<i>Eucalyptus longifolia</i> ..	36, 37, 63, 70, 73, 75, 86, 112, 123, 157.
Yarran .. ..	<i>Acacia homalophylla</i> ..	224.
Yellowwood .. ..	<i>Flindersia xanthoxyla</i> ..	21.
Yertchuk .. ..	<i>Eucalyptus consideniana</i>	102, 119, 127.

# FOREST TYPES IN NEW SOUTH WALES

## Part III

### DESCRIPTION OF GROUPS, LEAGUES AND TYPES

#### A. RAINFOREST GROUP

The Rainforest Group of types includes some 19 forest types which have the following features:—

1. A generally rather complex structure and luxuriant appearance.
2. An absence of eucalypts and the more typical associates of eucalypts, except occasionally as relics from an earlier community which has been invaded by the rainforest. In such cases the eucalypts usually stand as an overmature overstorey and their regeneration is rare or completely lacking.
3. A mixed composition of typically moisture-loving trees whose floristic affinities lie with the Indo-Malaysian and Antarctic elements.
4. Presence of unusual life-forms, including buttressed and fluted stems, lianes, stranglers and vascular epiphytes.

The types would not all be classed as "rainforest" in any comprehensive, worldwide classification of vegetation, but all show close affinities with undoubted rainforest communities and their features are such as to set them apart as a very distinctive and well-marked group.

Four leagues are recognised within the group, these being distinguished primarily on the structure of the communities, though species composition tends to parallel this structural classification rather closely.

It is estimated that the group occupies some 320,000 acres of State Forest in the coastal and escarpment districts of New South Wales.

#### A(a) SUBTROPICAL RAINFOREST LEAGUE

This league contains tall rainforest communities of mixed composition and very luxuriant appearance. These are closely allied to the tropical rainforests of the equatorial zones, and they are marked by the prevalence of buttressed trees, vascular epiphytes and lianes. The league occurs in coastal and escarpment sites on soils of high fertility (commonly derived from basalt or alluvium) in areas with ample moisture. It is found as far south as the central South Coast, but reaches its best development in the northern parts of the State, where it is often marked by a partial dominance of Booyongs.

Seven types are recognised, one of these (Palm type) being rather atypical in structure, though clearly derived from certain of the other types in the league.

## 1. *Booyong*

*Composition:* Subtropical rainforest of very mixed and complex composition, but with Black Booyong, White Booyong or both usually being the most plentiful species. Among many other associates, the following species commonly occur: Pigeonberry Ash, Silver Quandong (particularly bordering water courses), Giant Stinger (in former clearings), White Beech, Red Cedar, Yellow Carabeen, Crow's Ash, Bennett's Ash, Silver Ash, Prickly Ash, Rosewood, Red Carabeen, Flame Tree, Tamarind, various Figs (stranglers), Black Apple and various Eugenias. Occasional large Hoop Pines may be present. On the average 30 or more different species of tree size occur on an acre. Heavy vines and Lawyer Cane Palm are frequent.

*Nature:* Typically occurs on red loam soils derived from basalt in northern N.S.W. in areas with a rainfall exceeding 60 inches per annum. Stand height usually exceeds 120 feet and in particularly favoured sites may approach 200 ft. Despite extensive clearing for agriculture this remains the most widespread rainforest type in the State, occupying some of the finest forest sites. Various sub-types occur, but are unlikely to warrant separate mapping or management techniques; these include stands dominated by Silver Quandong along watercourses (e.g. along Rocky Creek in Wiangarie S.F.), and by Rosewood in some higher altitude locations (e.g. Tooloom Scrub, near Urbenville; League Scrub, behind Macksville). Of the two most characteristic species, White Booyong tends to be more common at low altitudes in the north, while Booyong becomes more frequent at higher altitudes (up to 3000 ft) and to the south.

*Occurrence:* Originally very widespread in the Richmond and Tweed River systems, where vast areas at lower altitude (the "Big Scrub") have been destroyed to provide land for dairying. It still occurs widely in this region in areas of more rugged topography (Whian Whian S.F.; Wiangarie S.F.; Roseberry S.F.; Toonumbar S.F.) and extends discontinuously southwards to the Dorrigo Plateau (Clouds Creek S.F.; Dorrigo N.P.) and hence in similar suitable sites to the Comboyne Plateau.

## 2. *Yellow Carabeen*

*Composition:* Similar to the Booyong type, but with a marked tendency for dominance by Yellow Carabeen, with Booyong occurring as only a subordinate species in the stand. Other common associates include Rosewood, Giant Stinger, Prickly Ash and Red Cedar, the last now frequently lacking due to past exploitation.

*Nature:* Found in generally higher and more exposed localities than the Booyong type, under otherwise similar conditions. Structure and composition tend to be simpler than the Booyong type, with a lower stand height (100 ft or over) and with a characteristic appearance provided by the large wide-crowned trees of Yellow Carabeen.

*Occurrence:* Scattered through higher elevations in the general region of the Booyong type. Typical locations include Acacia Plateau, and Carrai S.F. in the vicinity of Daisy Plain.

### 3. *Crabapple-Sassafras-Corkwood-Silver Sycamore*

*Composition:* A rainforest community of mixed composition in which at least three of the type species, Crabapple, Sassafras, Corkwood and Silver Sycamore, are among the most prominent trees present. Booyong towards the north of the range of this type, and Coachwood in more southern areas, may both be present, but only as a very subordinate constituent of the stand. Other species commonly present include Prickly Ash, Tamarind, Brown Beech, Yellow Carabeen, Rosewood, Red Cedar, Figs, Flame Tree, Eugenia, Socketwood and Silky Ash.

*Nature:* Similar to the Booyong type, which it replaces in more southern parts of coastal N.S.W., below the region of optimum development of Booyong. In particular localities the name can be shortened by referring only to those of the type species which are locally of significance.

*Occurrence:* Found distributed in favourable sites from the Hastings River Catchment in the north to the vicinity of Milton on the South Coast. Very common in the general Barrington Tops area below the range of the Negrohead Beech type, and formerly widespread in the Illawarra district where, however, it has been mostly destroyed.

### 4. *Black Bean*

*Composition:* Normally a typical subtropical rainforest in which Black Bean is clearly dominant, with Silky Oak and Brown Pine present as common associates, and with other rainforest species. Grey Handlewood and *Pseudomorus brunoniana* occur commonly in the lower tree storey.

*Nature:* Characteristically occurs on alluvial soil fringing watercourses, and less commonly on shelves within the Booyong type. A depauperate form is found extending along creeks into generally low-quality eucalypt forest beyond the main rainforest zones.

*Occurrence:* Originally widespread in the northeastern corner of the State, but to a large extent destroyed by clearing and very restricted within existing State Forests. Examples occur in the Moore Park Reserve near Grevillea; along Fawcett Creek in Kyogle; and on Wiangarie S.F. The depauperate form can be seen near Leeville.

### 5. *Booyong-Coachwood*

*Composition:* A type combining the composition of the Booyong and Coachwood-Crabapple types and often occurring in intimate mixture with stands of the Flooded Gum and Inland Brush Box types. Strangling Figs are often most conspicuous. Common species include Black Booyong, White Booyong, White Beech, Yellow Carabeen, Tamarind, Coachwood, Sassafras, Prickly Ash, Corkwood and various Laurels. Maiden's Blush and *Polyosma cunninghamii* are common in the understorey, with patches of Palms.

*Nature:* Common in northeastern N.S.W. in gully bottom sites throughout the better quality eucalypt forests at altitudes up to about 1200 ft.

Such sites have been extensively used for conversion to Flooded Gum in forests under intensive management. The sheltered localities with moist soils enriched by alluvium are generally sub-optimal for the development of more typical Subtropical Rainforest, but somewhat better than those where Warm Temperate Rainforest normally occurs in the region, resulting in a merging of species from both leagues.

*Occurrence:* Widespread in northern coastal areas, particularly between Woolgoolga and Wauchope. The Bruxner Park Flora Reserve, Pine Creek S.F. and Nambucca S.F. provide typical examples.

#### 6. *Sassafras-Giant Stinger*

*Composition:* A usually rather depauperate form of Subtropical Rainforest containing Giant Stinger, Sassafras and/or Socketwood, with Basswood, various Laurels (Lauraceae), Eugenias, Figs and other species.

*Nature:* Structure poorly developed, partly due to unfavourable growing conditions but frequently as a result of past exploitation. Occupies generally rather sheltered sites on fertile soils beyond the general limits of the Subtropical Rainforest league.

*Occurrence:* Most common in the lower south coast area (e.g. vicinity of Bermagui), but found also at the western limits of the league (e.g. gullies in the Liverpool Ranges, west of Murrurundi).

#### 7. *Palm*

*Composition:* A clear dominance of Palms (often both Cabbage Tree and Bangalow, with Lawyer Cane Palm also common), with occasional other rainforest species of low stature.

*Nature:* Though distinct in appearance from other rainforest types, this type is derived from the Subtropical Rainforest league, apparently under the influence of excessive soil moisture. It can occur throughout the general zone of occurrence of this league.

*Occurrence:* Usually in small stands of limited extent found throughout the moister parts of eastern N.S.W. In most cases such stands probably do not warrant separation from the surrounding rainforest in mapping, but occasional larger stands (e.g. Stott's Is. in the Tweed River near Murwillumbah) justify the recognition of a separate type.

### A(b) WARM TEMPERATE RAINFOREST LEAGUE

This league is distinguished from the Subtropical Rainforest league by its generally simpler structure and composition. There are usually only two tree storeys, buttressing and lianes are less common, and there is a strong tendency for a single species, Coachwood, to dominate the communities. Unlike the Subtropical Rainforest league, its floristic affinities lie more with the Antarctic than the Indo-Malaysian element. The league

occurs in coastal and escarpment sites as far south on the central South Coast, but typically occupies sites which are either cooler or located on less fertile soils than the Subtropical Rainforest league.

Three types have been recognised, all with Coachwood as the most prevalent species. Whilst these appear to be ecologically distinct, for most practical purposes they can probably best be regarded as forming a single Coachwood type.

### 11. *Coachwood-Crabapple*

*Composition:* This appears to be the most common and best developed type in the Warm Temperate Rainforest league. Coachwood is usually clearly dominant and makes up over 50 per cent of stand basal area, with Crabapple as the most common associate. Other associated species include Sassafras, Prickly Ash, Red Plum and Silver Sycamore, while north of the Bellinger River Hoop Pine was originally often a widespread constituent of the type, forming a tall overstorey. *Polyosma*, *Eupomatia* and *Evodia* are common in the understorey.

*Nature:* The type normally occurs under similar climatic conditions to the Booyong type, but on soils of lower fertility, such as soils derived from shales and acid igneous rocks. Excluding the former Hoop Pine overstorey, which occurred with the type in some areas and reached a height of 170 ft; the stand normally ranges up to 130 ft in height. It is probably the most valuable rainforest type in New South Wales, but its sites have proved generally unsuitable for agriculture.

*Occurrence:* The type occurs on the North Coast and is most extensively developed on the eastern Dorrigo Plateau (e.g. Wild Cattle Creek S.F., Moonpar S.F., Orara West S.F.), but extends north to near the Queensland border (Whian Whian S.F., Ewingar S.F.) and south beyond the Hastings River Catchment (Doyles River S.F.) to parts of the Barrington area.

### 12. *Coachwood-Sassafras*

*Composition:* Generally similar to the Coachwood-Crabapple type, but with Sassafras as the most common associate. Coachwood frequently is less predominant than in the previous type.

*Nature:* A typical Warm Temperate Rainforest which tends to replace the Coachwood-Crabapple type under conditions of lower temperatures. Unlike the former type it may appear on soils derived from basalt. Stand height reaches 120 ft to 130 ft.

*Occurrence:* Usually at higher altitudes from the North Coast down to the central South Coast, occurring also at low altitudes in sheltered gully sites towards its southern limits. Typical localities include Styx River S.F., Mt. Coricudgy, Mt. Wilson, and gullies in the Brooman Group of State Forests.

### 13. Coachwood-Water Gum

*Composition:* A type of limited extent in which Coachwood and Water Gum, in about equal proportions, clearly dominate the stand. Various Laurels are among the more common associates.

*Nature:* This type is of generally lower height than the other types in this league (usually under 90 ft), and it typically consists of a dense stocking of trees of individually small diameter. It is found on exposed but perhumid sites in the general vicinity of the Coachwood-Crabapple type. It is of little or no commercial value, but probably is valuable for protection purposes.

*Occurrence:* Scattered through parts of the North Coast in stands of limited extent. Typical examples occur in parts of Whian Whian S.F. and on the southern edge of the Dorrigo Plateau.

#### A(c) COOL TEMPERATE RAINFOREST LEAGUE

This league is closely allied to the Warm Temperate Rainforest league, but differs in the following ways:—

1. A significant proportion of the stand is made up of trees, mostly of a single species, of large individual diameter. In the previous league this size class segregation is unusual.
2. Leaf-sizes tend to be smaller.
3. Non-vascular epiphytes (e.g. mosses and lichens) are very common.
4. Lianes and buttressing are usually rare.

The league occurs in cool to cold, misty, perhumid sites, and is marked by the dominance of Negrohead Beech in northern localities and of Pinkwood in southern localities. Three types are recognised within the league.

### 16. Negrohead Beech

*Composition:* This type is marked by a clear dominance of Negrohead Beech, usually occurring as large trees with associated smaller stems of Sassafras, Prickly Ash, Mountain Quandong, small quantities of Coachwood, and other species. Where there is only a single associate present in any quantity, the relevant sub-type may be recognised.

*Nature:* In favoured and somewhat sheltered sites the type may reach a height of 120 ft, but in exposed positions it can be reduced to a low, dense scrub of under 40 ft. Occurs both over extensive areas and in small stands in mesic sites above about 2500 ft to 3000 ft, and extending up to 5000 ft. In well-developed stands the basal area may extend 300 sq ft per acre.

*Occurrence:* In the escarpment regions of the North Coast. Typical examples occur in the New England N.P. near Point Lookout and in the Barrington Tops area.

### 17. Negrohead Beech-Coachwood

*Composition:* Similar to the previous type, except that Coachwood is the most common associate, usually as abundant small trees whose total basal area equals that of the fewer, but larger, Negrohead Beech trees.

*Nature:* Similar generally to the previous type, though usually found at somewhat lower altitudes adjacent to areas where the Coachwood types also occur. The type is found both over extensive areas and in small stands, including creekside belts within the Coachwood-Crabapple type. On the Eastern Dorrigo Plateau creekside belts descend to an altitude of 1500 ft, though the type is mostly restricted to moist sites over 2500 ft.

*Occurrence:* Escarpment areas of the North Coast from the Hastings River Catchment to the McPherson Ranges. Typical localities include Mt. Boss S.F., Never Never S.F., Wild Cattle Creek S.F. (along Bo Bo Creek), Styx River S.F. and in the Lamington N.P. of Southern Queensland.

### 18. Pinkwood

*Composition:* This type is marked by a dominance of Pinkwood, which usually occurs as a large tree surrounded by clumps of basal sucker growth. Associated species include Sassafras and Southern Sassafras.

*Nature:* The type normally reaches a height of 100 ft to 120 ft in moist, somewhat sheltered sites in cool localities. Its structure is similar to the other types in this league.

*Occurrence:* Confined to somewhat elevated areas on the South Coast. Typical localities include Brown Mountain, Clyde Mountain and Mt. Dromedary.

## A(d) DRY AND DEPAUPERATE RAINFOREST LEAGUE

This league contains a number of types, some of which are only remotely allied to each other. However all are dominated by species with clear affinities to the rainforest flora, and they are usually marked by a relatively low (frequently under 40 ft) closed canopy, above which taller emergent trees may protrude. The stems making up this low canopy are of individually small stature, but tend to be numerous and to produce at times almost impenetrable thickets.

Only the Hoop Pine type is of commercial importance, but several of the other types serve important protection functions, notably the Cupaniopsis and Headland Brush Box types. Other types can provide a serious regeneration problem in some sites.

Environmentally the league is found under a wide range of conditions. The Hoop Pine and Brush Kurrajong types tend to replace the Subtropical Rainforest league on fertile soils under a lower and generally more seasonal rainfall régime, and under still drier conditions link the rainforest communities with some of the scrub communities of western New South Wales (No. 224). Similarly certain phases of the Myrtle type in northern

areas replace the Black Bean type as conditions become more adverse. Viney Scrub occurs under varying conditions, often as useless regrowth in sites where the original rainforest had been destroyed to make way for agriculture, while the Cupaniopsis and Headland Brush Box types occur in rather exposed maritime situations.

### 21. *Hoop Pine*

*Composition:* The dense understorey is typically composed of many species of Sapindaceae and Euphorbiaceae, though more valuable species such as Ivorywood and Yellow Boxwood may also be present. Above the understorey there is a scattered emergent storey containing Hoop Pine, together with Crow's Ash, Yellowwood, Silver Ash, Brush Kurrajong and other species. The emergents are typically xerophytic, deciduous or semi-deciduous. Past exploitation has removed much of the Hoop Pine and other larger species in many stands, though their regeneration is usually common in the understorey. In immature stands eucalypts may also be commonly represented in the overstorey by such species as Grey Box, Northern Grey Gum, Steel Box and Ironbarks.

*Nature:* The type normally occurs on fairly fertile soils under a rainfall of less than 50 inches, but it is also present as a seral stage in the invasion of the Booyong type into eucalypt forest and as such commonly forms a fringing belt to the Booyong type. The Hoop Pine may exceed 150 ft in height, and the broadleaved emergents may exceed 120 ft, while the dense understorey ranges from about 25 ft up to 100 ft in height. Lianes tend to be numerous.

*Occurrence:* Confined to the Clarence River Basin and areas further north, at altitudes below about 1200 ft. Typical localities include Mt. Pikapene S.F., Unungar S.F., Mebbin S.F. and the northern end of Wild Cattle Creek S.F.

### 22. *Brush Kurrajong*

*Composition:* Similar to the Hoop Pine type for the understorey, but the emergent overstorey is usually confined to scattered individuals of Brush Kurrajong or may be lacking.

*Nature:* Occurs under more exposed or otherwise adverse sites than the previous type, and also in more southern localities, and the dense canopy is usually of lower height (20 ft to 40 ft). Usually occupies rather limited areas.

*Occurrence:* Found throughout the North Coast at altitudes below about 1000 ft, from the Bulahdelah and Dungog district north into Queensland. Typical occurrences include Glenugie Peak and small patches in the Koreelah district.

### 23. *Myrtle*

This type includes a number of communities which are dominated by various myrtles (Myrtaceae), particularly species of *Eugenia* (s.l.) and *Backhousia*. Depending upon the dominant species, so various sub-types

can be distinguished, including the *Eugenia ventenatii* sub-type found fringing streams in relatively dry forest areas of the North Coast (e.g. Myrtle and Glenugie S.F.s) and the *Backhousia myrtifolia* and Lilly Pilly sub-types found in moist gullies on the South and Central Coasts (e.g. Bodalla S.F.). Similarly the narrow creekside fringes of *Tristania neriifolia* could also be recognised as a sub-type, should ever their separate recognition be required. All these communities are marked by low height development (commonly under 30 ft to 40 ft).

#### 24. *Cupaniopsis*

*Composition:* This type is usually clearly dominated by *Cupaniopsis*, with which are associated *Cryptocarya triplinervis*, *Elaeodendron australe*, various *Eugenia* spp., and other species. White Banksia is also commonly associated.

*Nature:* The type occurs on old coastal dunes and estuarine sites close to the sea, and appears to serve a valuable protective function in both stabilising the dunes and protecting the commercially more valuable types further inland from salt-laden winds. It is usually of low height (under 30 ft), though in protected sites it may attain greater height and contain a wider range of species; such stands (e.g. at Hungry Head and in the Iluka Reserves) should be regarded as a separate sub-type.

*Occurrence:* The type is known from littoral sites on the North Coast, at least as far south as the Myall Lakes. Well-developed examples extend along the coast between Coff's Harbour and Urunga. Rutile mining operations in recent years have destroyed many other similar stands.

#### 25. *Headland Brush Box*

*Composition:* Dominated by Brush Box, but otherwise generally similar to the previous type with *Cupaniopsis*, *Elaeodendron*, *Eugenia* spp. and *Cryptocarya triplinervis* as common associates.

*Nature:* This type is usually closely associated with the *Cupaniopsis* type, but avoids the deep sands and tends to occur on exposed headlands. Because of its position it is usually markedly windshorn and tends to vary in height in a single stand from a low scrub of 5 or 6 ft to over 40 ft.

*Occurrence:* Throughout the North Coast in exposed littoral sites. Typical examples occur on headlands between Coff's Harbour and Woolgoolga.

#### 26. *Viney Scrub*

This type occupies appreciable areas in coastal districts, consisting of a low (usually from 10 ft to 25 ft high), dense scrub interlaced with vines to form virtually impenetrable thickets. In most cases the type results from past destruction of the natural rainforest, and it thus tends to represent an early stage in the secondary succession back to rainforest. Most of the constituent species are both useless and formidable, e.g. Lantana, Cockspur (*Cudrania*), Burny Vine (*Malaisia*), Stinger (*Laportea* spp.). Economic species are usually rare or absent, even as regeneration. The type is

particularly common on abandoned farmland, where *Lantana* tends to be the most prevalent species. It is found throughout the Central and North Coast districts, and is particularly widespread in the Richmond and Tweed River Valleys and between the Hunter and Manning Valleys, but will be found in all the major coastal valleys, particularly towards the upper reaches.

## B. EUCALYPT AND RELATED GROUP

This second group covers the majority of forest types recognised in New South Wales, and includes those types which occupy over 90 per cent of the State Forest area. Most of these types contain one or more species of *Eucalyptus* as the indicator species, but this is not true for all the types included in this group. However with only one or two exceptions (e.g. Mangrove type) the indicator species can be regarded as belonging to the essentially autochthonous Australian floristic element, as opposed to the Rainforest Group whose floristic affinities generally lie outside Australia.

The communities included in this group range from tall, moist forests of the coast and ranges to subalpine woodlands and the open woodlands of the western districts. Sixteen leagues are recognised, partly on the basis of structure or habitat and partly on species composition. These points are discussed more fully in the individual league descriptions. The leagues are further divided into about 140 separate types, many of which can be still further split into sub-types for more detailed work, or grouped in various ways where a less intensive classification is required.

### B(a) MARITIME LEAGUE

Five types are included in this league, all normally being located in close proximity to the coastline though several of the types occasionally are encountered well inland. The first four types form a widely recognised series occurring in poorly drained sites under the influence of increasing waterlogging and brackishness. The fifth type (Coast Cypress Pine type) is less closely allied to the previous four, and is included in this league largely as a matter of convenience. Like the other four, it usually occurs close to the coast, but on deep, well-drained sands. The types generally have rather limited commercial value.

#### 30. *Swamp Mahogany*

*Composition:* Swamp Mahogany makes up at least 50 per cent, and commonly 100 per cent, of the trees in the stand. Associates may include Paperbarks, Swamp Oak, Forest Red Gum, Red Mahogany, Bloodwood and other eucalypts. The understorey contains herbs and shrubs which will tolerate conditions of impeded drainage. Certain hybrids with Swamp Mahogany as one parent may occur, e.g. *xE. grandis* var. *grandiflora* and *xE. patentinervis*.

*Nature:* A closed eucalypt forest (swamp sclerophyll forest) which rarely exceeds 100 ft in height. Typically occurs on heavy, poorly drained soils near the coast, and gives way to Paperbark type as drainage becomes

further impeded. Under natural conditions the type is rarely of commercial importance.

*Occurrence:* Along most of the N.S.W. coast, usually in low sites within a mile of the sea, though occasionally found further inland (e.g. near Halfway Creek, between Woolgoola and Grafton). Typical localities include Narooma, Mona Vale and Coff's Harbour.

### 31. Paperbark

*Composition:* Normally Broadleaved Paperbark is the dominant species in this type, frequently being the only tree species present. However this may be associated with other Paperbarks (Narrowleaved and Prickly-leaved) and in certain sites one of these other species may be dominant. Other associates may include Swamp Oak, Swamp Mahogany, Forest Red Gum, Bloodwood and other eucalypts. There is usually a ground layer of sedges, and less commonly a shrub layer of Teatree, Bottlebrush, etc.

*Nature:* A closed forest (swamp sclerophyll forest) usually between 50 ft and 80 ft in height, occasionally exceeding 100 ft. The type is generally of limited commercial importance. It occurs on poorly drained sites where water may cover the surface for appreciable periods.

*Occurrence:* Largely confined to seaboard locations along the coast of N.S.W., though sometimes encountered in poorly drained sites inland from the coast. Typical localities include Coff's Harbour and the Myall Lakes areas.

### 32. Swamp Oak

*Composition:* Usually consists of almost pure stands of Swamp Oak, with Paperbark and Forest Red Gum as occasional associates. There is typically a ground layer of sedges.

*Nature:* An open (less commonly closed) stand usually about 50 ft high, but occasionally reaching 100 ft. Occurs on very poorly drained sites, probably under the influence of greater soil salinity than the Paperbark type.

*Occurrence:* Along the coastal areas of N.S.W., usually close to estuaries and saltwater lakes. Localities include Coff's Harbour and the Myall Lakes.

### 33. Mangrove

This is a very distinct type occurring in tidal estuaries and similar sites along most of the N.S.W. Coast. The most common species is the Grey Mangrove, which usually occurs in pure stands up to 50 ft in height (though normally less high). In the far north this may be associated with *Hibiscus tiliaceus* and other mangrove species (*Rhizophora mucronata*, *Bruguiera gymnorhiza*). The smaller Black Mangrove tends to occur as a narrow band of scrub farther up tidal, brackish waterways than the Grey

Mangrove. All species normally grow on mud banks between the tide levels. The type is of limited commercial importance in N.S.W. Examples of the Mangrove type can be seen at the mouths of most coastal rivers, and are particularly well developed near Hexham, on the Hunter River.

#### 34. *Coast Cypress Pine*

This is a type of limited extent in far northern N.S.W., where it typically occurs on coastal sand deposits slightly inland from the littoral. It is particularly well developed as a closed community up to about 70 ft high in the vicinity of Brunswick Heads, while a more inland occurrence is found near Bungawalbin S.F. White *Banksia* is a common associate. The type occurs south to the Clarence River, and is of limited commercial importance. The type is placed in this league as a matter of convenience: ecologically it appears related to the Blackbutt-Bloodwood/Apple (No. 41) and the Bangalay-Banksia (No. 108) types.

#### B(b) BLACKBUTT LEAGUE

This is undoubtedly the most valuable and important league occurring in N.S.W., and it consists of a number of types in all of which Blackbutt (or its variety, Largefruited Blackbutt) is present and comprises 20 per cent or more of the stand. The league occurs throughout the coastal districts of the State, usually at relatively low altitudes though it ascends in northern areas commonly to 2500 ft and rarely to over 3000 ft (Washpool S.F.). It requires a moderate rainfall, ranging from over about 35 inches on the South Coast to over about 45 inches on the North Coast, and it shows a preference for rather siliceous soils. The ecological relationships of the indicator species have been intensively studied by Florence (1961, 1963)\*.

Blackbutt can be associated with a very large number of the other eucalypts found in eastern N.S.W. On this basis very many separate types could be recognised. However in this list it has been felt better to recognise only a few of the more widespread and characteristic types, and to lump the remainder into two moisture phases of a broad Blackbutt type, which may vary from pure Blackbutt to stands in which Blackbutt makes up a relatively small proportion of the stand. Within this broad type, additional sub-types can if necessary be recognised. However, such splitting is usually unnecessary for management purposes.

The league is not an ecological alliance, but in a purely ecological classification would be found to belong to several alliances. Over much of its range, the league appears to be perpetuated by repeated fires.

#### 36. *Moist Blackbutt*

#### 37. *Dry Blackbutt*

*Composition:* These two types include most of the commercially most important Blackbutt stands, particularly in northern N.S.W. In both types

\*Florence, R. G. (1961). Studies in the Ecology of Blackbutt. Ph.D. Thesis, Univ. of Sydney.

— (1963) Vegetational Pattern in East Coast Forest. Proc. Linn. Soc. N.S.W. 88 (2), 164-179.

Blackbutt makes up at least 20 per cent of the stand, but usually over 50 per cent and not infrequently up to 100 per cent. Associated species include Tallowwood, White Mahogany, Red Mahogany, Grey Gum, Turpentine, Sydney Blue Gum, Bloodwood, Grey Ironbark, Stringybarks, Roughbarked and Smoothbarked Apples, Woollybutt, Mountain Grey Gum and others. Forest Oak is a common understorey associate. The distinction between the two types is based chiefly on the nature of the understorey. The Moist Blackbutt type carries an understorey of typically mesophytic shrubs and herbs, which may be converted to dense ferns by burning, whilst the Dry Blackbutt type has a more xeric and open understorey which is converted to grasses by burning. The Moist Blackbutt type usually represents the higher site quality, but the dense and lush understorey frequently provides a serious obstruction to obtaining regeneration.

*Nature:* The two types grade into each other, but at one extreme the Moist Blackbutt type forms a wet sclerophyll forest up to 200 ft in height, while at the other the Dry Blackbutt type forms a dry sclerophyll forest of from 100 ft to 140 ft in height. The Moist type usually occurs in relatively sheltered sites (south-facing slopes, lower slopes), while the Dry type, which is the more widespread, occupies the ridges and more exposed slopes.

*Occurrence:* Found from the central South Coast northwards into Queensland, and constituting most of the important North Coast Blackbutt stands. In most forest areas both types occur together, and typical examples include Whian Whian S.F., Wild Cattle Creek S.F., Orara East S.F., Pine Creek S.F., Bellangry M.A., Kendall M.A., and Cooperbrook S.F.

### 38. *Largefruited Blackbutt*

*Composition:* The variety of Blackbutt, marked by larger, more pyriform fruits, glaucous twigs, and narrower, more pendulous leaves, normally occurs adjacent to the more widespread Blackbutt types but distinct from these, with little mixture of the species and the variety. Largefruited Blackbutt usually constitutes over 50 per cent of the stand, with Grey Gum, White Mahogany, Bloodwood and other species as associates.

*Nature:* Resembles the Dry Blackbutt type in structure, forming a closed forest stand up to 120 ft with a rather xeric understorey. Though limited in extent, the type is valuable as a source of high-quality saw-logs. Normally it occurs in rather exposed sites (ridgetops etc.) on shallow soils which tend to be excessively drained.

*Occurrence:* Found in scattered localities on the North Coast, usually in areas of rather broken topography. Typical examples are in Broken Bago S.F., Orara West S.F., Conglomerate S.F. and Tabbimoble S.F.

### 39. *Blackbutt-Spotted Gum*

*Composition:* Blackbutt and Spotted Gum both constitute over 20 per cent of the stand and can be associated with a wide range of other eucalypts, including Sydney Blue Gum, Bangalay, Tallowwood, Grey Gum, Grey Ironbark and Bloodwood. The type can be regarded as representing a broad ecotone between the Blackbutt and Spotted Gum leagues.

*Nature:* The type normally resembles the Dry Blackbutt type, though particularly on the South Coast it may occur in a moister phase. It is included in the Blackbutt league since Blackbutt is normally the more important of the two indicator species. However in some localities where Spotted Gum is the more important species it may be desirable to include this type in the Spotted Gum league (see type No. 76.)

*Occurrence:* Found throughout the coastal areas of N.S.W., usually where conditions become marginal (through limiting moisture) for the development of Blackbutt. Typical localities include Benandra S.F., Wyong M.A., Newry S.F. and Whiporie S.F.

#### 40. *Blackbutt-Scribbly Gum*

*Composition:* Blackbutt has Scribbly Gum as its most common associate, while Needlebark Stringybark, Bloodwood, Red Mahogany and various Stringybarks also frequently occur. Black Oak is common in the understorey, along with various xeromorphic shrubs.

*Nature:* Typically a dry sclerophyll forest up to about 100 ft in height, occurring on soils of generally low fertility. The type is one link between the Blackbutt league and the Scribbly Gum-Stringybark-Silvertop Ash league.

*Occurrence:* Found scattered through the coastal areas where the Blackbutt league approaches land of lower fertility. Examples occur on Conjola S.F., in parts of the Sydney district, Nambucca S.F. and Newfoundland S.F.

#### 41. *Blackbutt-Bloodwood|Apple*

*Composition:* This is a characteristic type, frequently known as "Sand-hill Blackbutt" type, in which the Blackbutt is associated with Bloodwood (usually Red, more rarely Pink) and Roughbarked Apple, either together or separately. Smoothbarked Apple may also commonly occur, sometimes replacing the Roughbarked Apple. White Banksia is another frequent associate, and in the far north Coast Cypress Pine may occur, linking this type to the Coast Cypress Pine type.

*Nature:* The type can vary from a somewhat open woodland with an understorey of bladey grass to a closed dry sclerophyll forest with an open understorey of sclerophyllous shrubs. Height growth is often restricted, but may reach 120 ft. The type is most widespread on deep sand deposits, either littoral or alluvial, though it is not confined to such sites.

*Occurrence:* Found in coastal areas northwards from the central South Coast, frequently though not invariably on coastal sand deposits near the seaboard. Examples include Bodalla S.F., Seal Rocks, between Pine Creek S.F. and the coast, and Myrtle S.F.

#### 42. *Blackbutt-Sydney Peppermint-Smoothbarked Apple*

*Composition:* Blackbutt occurs with Sydney Peppermint and Smoothbarked Apple (locally one or other may be absent), with Red Bloodwood, Grey Gum, Turpentine, Stringybarks and other species as less common associates.

*Nature:* This type characteristically occupies lower gully slopes and bottoms in sandstone areas, varying from dry sclerophyll forest of 70 ft in height to wet sclerophyll forest up to 140 ft high in a single gully transect. On the higher slopes it grades into the Scribbly Gum-Stringybark-Silvertop Ash league

*Occurrence:* Found in the Central Coast areas from about Port Stephens in the north to near Batemans Bay in the south, and particularly common in the Sydney area.

### B(c) SYDNEY BLUE GUM/BANGALAY LEAGUE

This league, together with Moist Blackbutt type, appears to form a good ecological alliance. It occurs as a wet sclerophyll forest in which the trees exceed 130 ft in height, and occasionally are over 200 ft in height, with a usually dense understorey of mesophytic shrubs. Over much of its range, and in the absence of repeated fires, the understorey tends to develop into rainforest which ultimately replaces the eucalypt types.

The most characteristic species in the league are members of the Eastern Blue Gum group (Sydney Blue Gum, Bangalay, Flooded Gum, Round-leaved Gum), though these are not necessarily present in all types. The league occurs in moist, sheltered sites along the coast and escarpment, and in northern districts may ascend to an elevation of 4000 ft, though usually confined to areas under 3000 ft in altitude. At higher altitudes in similar favoured sites it is replaced by the Messmate-Brown Barrel league. The league is usually perpetuated by fire or other catastrophe, and the dense understorey normally presents a severe regeneration problem. Nine separate types are recognised in the league.

#### 46. Sydney Blue Gum

*Composition:* Sydney Blue Gum makes up over 50 per cent of the stand, and may constitute the entire stand. Associated species include Turpentine, Narrowleaved White Mahogany, Flooded Gum, New England Blackbutt, Mountain Grey Gum, Messmate, Whitetopped Box, Roundleaved Gum, Stringybark and occasional Tallowwood, along with other species. Frequent fires produce a grassy understorey, while in the absence of fire an understorey of rainforest species develops.

*Nature:* Tall wet sclerophyll forest, usually from 120 ft to 170 ft in height, found on clayey soils of moderate to high fertility in sites receiving ample moisture.

*Occurrence:* Found along the coastal and escarpment zones northwards from the central South Coast. Examples include Brooman North S.F., Sydney area (on Wianamata shale), Wyong M.A., and Clouds Creek S.F. Where natural grassland "plains" are found on basaltic soils on the northern escarpment (e.g. Carrai S.F., Clouds Creek S.F.), this type typically forms a narrow band between the grassland and the surrounding rainforest.

#### 47. *Tallowwood-Sydney Blue Gum*

*Composition:* This is one of the most valuable types in this league, and consists of Tallowwood and Sydney Blue Gum together making up over 50 per cent of the stand, with Brush Box, Turpentine, Narrowleaved White Mahogany, Flooded Gum, Silvertop Stringybark and other species as associates. Brush Cypress Pine may occur as a subordinate species, and there is usually a rainforest understorey.

*Nature:* A tall wet sclerophyll forest, occasionally exceeding 200 ft in height, found usually in the escarpment regions but descending to the coastal strip on basaltic soils in the far north. A particularly valuable type which is, however, very difficult to regenerate satisfactorily. In places the Sydney Blue Gum may be rare, so that Tallowwood clearly dominates the stand; in this case a separate sub-type can be recognised.

*Occurrence:* Confined to the North Coast and reaching its best development in the escarpment zone at elevations of from 1500 ft to 3000 ft. Typical sites include Bulga S.F., Mt. Boss S.F., Moonpar S.F., Ewingar S.F. and remnants on the "Big Scrub" country northeast of Lismore.

#### 48. *Flooded Gum*

*Composition:* Clearly dominated by Flooded Gum, usually as a pure stand but with occasional species such as Blackbutt, Tallowwood, Brush Box, Sydney Blue Gum and Turpentine. Develops an understorey of rainforest species which, in the absence of further disturbance, tend to replace the Flooded Gum type (frequently as the Booyong-Coachwood type).

*Nature:* Tall wet sclerophyll forest, commonly up to 150 ft and occasionally exceeding 200 ft. Occupies moist gully sites on the North Coast, usually at lower elevations but ascending to 2500 ft in a few localities. The type relies on catastrophic site disturbance (e.g. fire, cyclone) to regenerate, and normally occurs in the gullies in small, even-aged stands intimately mixed with stands of rainforest and Inland Brush Box types.

*Occurrence:* Confined to the North Coast, northwards from Port Stephens, but very widespread in suitable sites through this region. Examples include Wallingat S.F., Lansdowne S.F., Nambucca S.F., Pine Creek S.F., Wild Cattle Creek S.F. and Mebbin S.F.

#### 49. *Turpentine*

*Composition:* Turpentine constitutes 50 per cent or more of the stand, with a wide range of other species, including Sydney Blue Gum, Bangalay, Sydney Peppermint, Red Bloodwood, Stringybarks, Brush Box and Tallowwood, as associates. Forest Oak commonly occurs in the understorey.

*Nature:* Usually a wet sclerophyll forest between 70 ft and 140 ft in height occupying a wide range of sites but found particularly in sheltered gullies. Appears to be an aggressive type actively extending into adjoining stands.

*Occurrence:* Found throughout the coastal and escarpment zones northwards from about Ulladulla, and particularly common in parts of the upper South Coast and Central Coast. Examples include Yerriyong S.F., gullies in the Blue Mountains and Wyong M.A.

#### 50. *Bangalay*

*Composition:* In this type Bangalay occurs as a tall tree making up over 50 per cent of the stand, with Sydney Blue Gum, Turpentine, Red Bloodwood, Mountain Grey Gum and other species as associates and with usually a fairly dense understorey of wattles, Lilly Pilly and similar species.

*Nature:* Wet sclerophyll forest up to 130 ft in height. This type replaces Sydney Blue Gum type in moist, sheltered gullies on the South Coast, where the two species tend to merge together, the Bangalay type being the more common south of Batemans Bay.

*Occurrence:* Found on the South Coast between the Tuross and Shoalhaven River Catchments. Typical examples occur in Mogo S.F. and Yerriyong S.F.

*Note:* Bangalay may also dominate certain other communities in situations near the coastline, where it occurs as a small to medium-sized, frequently rather gnarled tree. These communities are described under the Bangalay-Banksia type (No. 108), below.

#### 51. *Dunn's White Gum*

A type very similar in appearance to the Flooded Gum type, but with Dunn's White Gum constituting over 50 per cent of the stand. Common associates include Flooded Gum, Sydney Blue Gum, Tallowwood and Brush Box. There is usually a developing rainforest understorey to the type, while the overstorey may attain a height of up to 180 ft. It occupies areas of moist, fertile soil, usually though not invariably in gully and creekside locations (in the Tooloom Scrub Flora Reserve on Mandle and Beaury S.F. the type occurs near the top of the range). The type is restricted to the northeastern section of the State, usually in somewhat elevated situations between 1000 ft and 2500 ft. Typical examples are on Kangaroo Creek S.F., near Nymboida, on Donaldson S.F., Yabbra S.F. and Mandle and Beaury S.F.

#### 52. *Roundleaved Gum-Turpentine*

*Composition:* Roundleaved Gum normally dominates the stand and is associated with Turpentine, Sydney Blue Gum, Narrowleaved White Mahogany and other species.

*Nature:* A tall wet sclerophyll forest, sometimes exceeding 200 ft in height. Usually occupies moist, sheltered sites with fertile soils over an altitude range of from near sea level to 2000 ft.

*Occurrence:* Restricted to the Central Coast regions, both near the coast and in the escarpment zone. Typical examples occur at Springwood,

Blue Gum Valley in the Grose Valley (where Roundleaved Gum is the "Blue Gum" referred to), and Wyong M.A.

### 53. *Inland Brush Box*

*Composition:* Contains over 50 per cent or more of Brush Box, associated with Sydney Blue Gum, Flooded Gum, Tallowwood, Turpentine and other species of the eucalypt types, together with various rainforest species in the understorey.

*Nature:* A tall wet sclerophyll forest up to 180 ft in height which appears to form an intermediate stage in the replacement of certain eucalypt types (e.g. Flooded Gum and Tallowwood-Sydney Blue Gum types) by rainforest. Most characteristically occurs in sheltered gullies, but in favoured localities it may ascend to ridgetops. In some areas where the dominant vegetation is of rainforest, this Brush Box type forms a distinct community along the periodically burnt ridges.

*Occurrence:* Widespread in suitable sites on the North Coast and adjacent escarpment. Examples occur on Mt. Boss S.F., Bielsdown S.F., Pine Creek S.F., Whian Whian S.F. and Wiangarie S.F.

*Note:* This type should be distinguished from the other Brush Box-dominated type (No. 25), which is restricted to exposed littoral sites.

### 54. *Whitetopped Box*

*Composition:* Whitetopped Box dominates the stand, occurring with a variety of other eucalypts including Sydney Blue Gum, Tallowwood, Blackbutt, New England Blackbutt, Silvertop Stringybark, Bangalay and Grey Gum.

*Nature:* Wet sclerophyll forest ranging from about 80 ft to over 140 ft in height. The type is commonly associated with other types of this league, and shows a preference for steep, south- or east-facing slopes in moist areas at altitudes up to 3000 ft. In such situations it frequently occurs as strips or bands following along a contour belt around the slope.

*Occurrence:* Occurs from the upper South Coast to the North Coast, in the escarpment region. Typical localities include Kangaroo Valley, Mt. Boss S.F., Styx River S.F. and Dorrigo N.P.

## B(d) GREY GUM-GREY IRONBARK LEAGUE

This league is fairly closely related to the following two leagues by a number of mutually occurring species. Thus although the presence of one of the Grey Gums, one of the Grey Ironbarks, or both Grey Gum and Grey Ironbark typifies this league, these species also characterise certain types in the following leagues. In general, however, this league is distinguished from the Spotted Gum league by the absence of Spotted Gum (except as an occasional stem), whilst the absence of the coastal Boxes and the Ironbarks other than Grey Ironbark distinguishes it from the Grey Box-Ironbark league.

The league occurs mostly on rather excessively drained sites in otherwise high-quality forest, and is common on steep slopes (particularly those facing north and west) and on the ridgetops in areas where the more favoured sites support types from the Blackbutt or Sydney Blue Gum/Bangalay leagues. The first of the types is rather atypical in this regard, developing on deep, moist soils which are apparently unsuitable in some way for the growth of Blackbutt. Six types are recognised in the league.

60. *Narrowleaved White Mahogany-Red Mahogany-Grey Ironbark-Grey Gum*

*Composition:* In the past this type has often been known by such names as "Mixed Hardwood", "Moist Pole" or "Semi-moist Hardwood" type. As the first of these names infers, the type is of mixed composition. In addition to the four species which give it its name, the type may also include Tallowwood, Turpentine, Red Bloodwood, Stringybarks, Brush Box and Sydney Blue Gum, and occasional stems of Blackbutt, Spotted Gum, Grey Box and other species. Forest Oak also commonly occurs and there is frequently a dense understorey of rainforest plants. In some localities one or other of the indicator species may be absent, in which case the type name may be shortened by referring only to those species which are present.

*Nature:* Wet sclerophyll forest between 100 ft and 140 ft in height, rarely somewhat taller. The type commonly forms a zone between Blackbutt types (on the slopes) and Flooded Gum type (in the gully bottoms) in forests on the North Coast, and may be prevalent in areas where Blackbutt is absent, possibly due to soil conditions which are unfavourable for Blackbutt.

*Occurrence:* Found at altitudes up to above 1000 ft in the North Coast and Central Coast regions. Localities include Wyong M.A., Wang Wauk S.F., Ingaiba S.F., Newry S.F., and Mebbin S.F.

61. *Broadleaved White Mahogany*

*Composition:* Broadleaved White Mahogany clearly predominates, and may constitute the entire tree stand. Associates include Grey Gum, Grey Ironbark, Smoothbarked and Roughbarked Apple, Stringybarks, Red Bloodwood and Grey Box. The undergrowth is usually of grass or sparse xeric shrubs.

*Nature:* Usually a rather stunted and gnarled dry sclerophyll forest from 50 ft to 90 ft in height. Occurs on very steep, heavily drained slopes and ridges, particularly with a westerly aspect. Of very limited commercial value.

*Occurrence:* Occurs in the Central and North Coast regions at altitudes up to about 2000 ft. Localities include the approach to Carrai S.F. and on Conglomerate S.F.

62. *Grey Gum-Grey Ironbark-White Mahogany*

*Composition:* This type has frequently been confused with the Narrowleaved White Mahogany-Red Mahogany-Grey Ironbark-Grey Gum type

and to some extent represents a drier phase of this. Besides the three indicator species, associates include Smoothbarked Apple, Red Bloodwood, Tallowwood, Spotted Gum, Blackbutt, New England Blackbutt, Red Mahogany, Sydney Blue Gum and other species. Forest Oak occurs commonly as a smaller tree, and the undergrowth is usually sparse. In northern districts the White Mahogany present is most commonly the broadleaved species, but in more southern localities the narrowleaved species is more usual.

*Nature:* Whilst the earlier type is a mesic wet sclerophyll forest, this type is a dry sclerophyll forest up to 120 ft high, usually found occupying the shallow soiled ridges in forests where the more favourable sites carry Blackbutt types.

*Occurrence:* Found from the upper South Coast to the far North Coast, usually in association with Blackbutt types, at altitudes up to about 2000 ft. Typical localities include Bellangry S.F., Tanban S.F., Pine Creek S.F. and Barcoongere S.F.

#### 63. *Grey Ironbark-Woollybutt*

This type appears to occupy a somewhat similar position to the previous one in parts of the South Coast, occurring on ridges in parts of the moister forest areas. Forms a dry sclerophyll forest up to 100 ft high, with Stringybarks, Roughbarked and Smoothbarked Apples and Silvertop Ash among the more common associates. Typical examples occur on Bodalla S.F.

#### 64. *Grey Gum-Stringybark*

This is a rather widespread type found on fairly steep and exposed slopes in the drier parts of the coastal regions. It forms a dry sclerophyll forest or tall woodland stand, rarely exceeding 100 ft in height. Besides Grey Gum and one or more species of Stringybark (Broadleaved, Diehard, White, etc.), the type may include Forest Red Gum, Smoothbarked and Roughbarked Apple, Red Bloodwood, White Mahogany and certain tableland species such as Narrowleaved Peppermint and New England Blackbutt as associates. The type is not common on State Forests, but is found in the Picton district and in parts of the Central Hunter and Upper Macleay and Clarence Valleys.

#### 65. *Forest Red Gum-Grey Gum|Grey Ironbark-Roughbarked Apple*

This type is common in the Richmond and parts of the Upper Clarence Valleys on the steep slopes leading up to the basalt-capped, rainforest-covered plateaux, e.g. on the approach to Wiangarie S.F. Forest Red Gum, Roughbarked Apple, and Grey Gum, Grey Ironbark or both, dominate the stands which form a closed community up to 120 ft in height, usually with a grassy understorey. Other associates include Narrowleaved Ironbark, Yellow Box, Grey Box, Stringybark, White Mahogany and Tallowwood.

### B(e) SPOTTED GUM LEAGUE

This is probably the second most important league in N.S.W. as a supplier of logs. It occurs throughout the coastal districts, and recurs to

the west of the Divide near Mudgee. It is characterised by the presence of Spotted Gum which makes up 20 per cent or more of the stand, and which frequently completely dominates the stand. In structure the types in this league range from tall wet sclerophyll forest to open dry sclerophyll forest and tall woodland.

As in the case of the Blackbutt league, the indicator species can occur in association with a very large number of species. Some of the more widespread of these combinations are recognised here as distinct types, but the first type (Spotted Gum, No. 70) is intended to cover the remaining miscellaneous combinations. Where necessary specific combinations within this type can be separated out as distinct sub-types, and in addition this type (or, for that matter, other types) can be further subdivided on the basis of site quality or site height.

The league as a whole generally occurs in drier localities than the Blackbutt league, but the two leagues do merge in many places in a Blackbutt-Spotted Gum type. This type is described under No. 39, but is also included in the Spotted Gum league (type No. 76, Spotted Gum-Blackbutt), since in certain localities there are decided management advantages in regarding the type as part of the surrounding other Spotted Gum types, rather than as an isolated Blackbutt type. Altogether, seven types are recognised in this league.

#### 70. *Spotted Gum*

*Composition:* As discussed above, this is a variable type in which Spotted Gum dominates the stand and may occur in pure stands or with a wide range of other eucalypts as associates. These associates may include Yellow Stringybark and various other Stringybarks, Woollybutt, Silvertop Ash, Red Bloodwood, Mountain Grey Gum, White Mahogany, Ironbarks, Tallowwood, Sydney Blue Gum, Brush Box, Turpentine, Forest Red Gum and others. The understorey is variable; in parts of the South and Central Coast there is commonly a dense understorey of Burrawang, while elsewhere the understorey may contain grasses or xerophytic (rarely mesophytic) shrubs. Where necessary, various specific sub-types can be recognised.

*Nature:* The type ranges from dry sclerophyll forest to wet sclerophyll forest, and the height can range from about 60 ft to 150 ft. It occurs on a variety of soils, which are however usually rather heavy in texture, under a rainfall of about 30 to 50 inches.

*Occurrence:* Widespread throughout the coastal districts, usually at elevations of below 1000 ft. Typical localities include Bodalla S.F., Benandra S.F., Shoalhaven S.F., Newport Plateau, Wyong M.A., Wallaroo M.A., Yarrat S.F., Tabbimoble S.F.

#### 71. *Richmond Range Spotted Gum*

*Composition:* This type is distinguished from the previous one by the presence of a distinct strain of Spotted Gum, with narrower leaves and smaller fruits than the usual. This tree is associated with such moisture-loving species as Tallowwood, Sydney Blue Gum and Brush Box, and there is an understorey of rainforest species.

*Nature:* A tall wet sclerophyll forest, often exceeding 150 ft in height, found on basaltic soils, often adjacent to the Booyong rainforest type.

*Occurrence:* The type is fairly common along parts of the Richmond and adjacent ranges, e.g. Richmond Range S.F.

#### 72. *Spotted Gum-Grey Box*

*Composition:* Spotted Gum and Grey Box clearly dominate the stand, in which various Ironbarks (Broadleaved, Narrowleaved, Grey), Red Bloodwood, Forest Red Gum and other species occur as associates. There is usually a sparse or grassy understorey.

*Nature:* A tall woodland, reaching to about 140 ft in height. Found on somewhat heavy clay soils in areas with a rainfall of under about 45 inches.

*Occurrence:* Common in parts of the North Coast, and particularly in the Clarence Basin. Localities include Wallaroo M.A., parts of the Macleay Valley, Glenugie S.F. and Braemar S.F.

#### 73. *Spotted Gum-Sydney Blue Gum|Bangalay*

*Composition:* Spotted Gum and either Sydney Blue Gum or Bangalay (or some merging form between these two species) dominate the stand, with such species as Blackbutt, Woollybutt, Turpentine and Red Mahogany as associates. There is usually a dense understorey of wattle and rainforest species.

*Nature:* Forms a wet sclerophyll forest up to 150 ft high, occurring in the more favoured sites in forests dominated generally by Spotted Gum.

*Occurrence:* Best developed on the South Coast, where it commonly forms a fairly typical gully stand, e.g. Benandra S.F. However the type is also recorded from more northern localities, e.g. Bagawa S.F. and in the vicinity of Dalmorton.

#### 74. *Spotted Gum-Grey Ironbark|Grey Gum*

This type bears much the same relation to the better-quality Spotted Gum types as the Grey Gum-Grey Ironbark-White Mahogany type does to the Blackbutt types, occupying the excessively drained and shallow soiled ridges in areas where the slopes carry the Spotted Gum type. It is widespread on the South Coast, but extends up into the northern parts of the State. Spotted Gum occurs with Grey Gum, Grey Ironbark or both species, with Blackbutt, Stringybarks, Bloodwood, White Mahogany and Tallowwood among the other associates. It forms a dry sclerophyll forest up to 120 ft high. Typical localities include Bodalla S.F., Kioloa S.F., Yarrat S.F. and Cairncross S.F.

#### 75. *Spotted Gum-Yellow Stringybark*

*Composition:* Spotted Gum is associated with Yellow Stringybark and certain other species, including Mountain Grey Gum, Woollybutt and various Stringybarks, usually with a fairly dense understorey.

*Nature:* A wet sclerophyll forest of high site quality, found occurring on southeasterly aspects towards the inland limit of Spotted Gum on the central and lower South Coast. It serves to link the Spotted Gum league with the Messmate-Brown Barrel league.

*Occurrence:* Found south of Batemans Bay in favoured sites, e.g. in the western parts of Bodalla S.F.

#### 76. *Spotted Gum-Blackbutt*

See type No. 39 for description. Whilst normally this type will be included in the Blackbutt league, in certain circumstances it may be included in the Spotted Gum league, e.g. where the Blackbutt is distinctly subordinate to the Spotted Gum in the stand, and where the type is intimately associated with other Spotted Gum types.

### B(f) GREY BOX-IRONBARK LEAGUE

As indicated earlier, this league is related fairly closely to the previous two leagues, and it also is related to the succeeding league (Red Gum). Possibly more importantly, it also provides a direct link with the Western Box-Ironbark league with which it is in physical contact through the Hunter Valley gap. The type is marked by the dominance of various coastal Boxes (Grey, Coastal Grey and Steel) and Ironbarks (Narrowleaved and Broadleaved). Spotted Gum is absent except as a very subordinate species, and Grey Ironbark is similarly rare or absent except in one type. The league most commonly occurs as a tall woodland, but may in certain types appear as wet sclerophyll forest. It typically occurs on rather heavy soils in the drier coastal districts of the State. Eight separate types are recognised in the league.

#### 80. *Grey Ironbark-Grey Box*

*Composition:* Grey Ironbark and Grey Box dominate the stand, and are associated with a number of species including Narrowleaved Ironbark, Forest Red Gum, Yellow Box, Red Bloodwood, White Mahogany, Broadleaved Apple and Grey Gum. There is usually a grassy understorey.

*Nature:* Normally occurs as a tall woodland up to 100 ft high, though at times it verges towards wet sclerophyll forest. It occurs on well-drained basaltic soils with rainfall between 40 and 50 inches. With lengthy protection from fire it tends to be replaced by the Brush Kurrajong dry rain-forest type (No. 22).

*Occurrence:* Largely confined to the far north of the State, at altitudes under about 1000 ft. Typical examples occur around Glenugie Peak and on Toonumbar S.F. and Unumgar S.F.

#### 81. *Grey Box-Northern Grey Gum*

*Composition:* Grey Box and Northern Grey Gum are the most common species, with Grey Ironbark, Stringybark, Tallowwood, Brush Box and other species as associates. Commonly contains an understorey of rain-

forest species which, with lengthy protection from fire, tend to develop into a dry rainforest of the Hoop Pine type. Thus this type may be intimately mixed with Hoop Pine, Crow's Ash and other species of the rainforest type, and with mature patches of the Hoop Pine type (No. 21).

*Nature:* Wet sclerophyll forest up to 140 ft high. It replaces the Grey Ironbark-Grey Box type under the influence of increased rainfall, and in turn is replaced by the Tallwood-Sydney Blue Gum type as rainfall increases further. It occurs on fertile, well-drained soils, usually in association with the Hoop Pine type.

*Occurrence:* Confined to the Upper Richmond and Clarence Valleys in the far north of the State, where typical examples can be seen on Unumgar S.F. and Donaldson S.F.

### 82. *Grey Box*

Grey Box occurs as a single dominant in stands scattered fairly widely through the State, both in the drier coastal districts and in parts of the Western Slopes. It forms a tall woodland community from 60 ft to 120 ft in height, with a number of subordinate associates, including various Ironbarks, Grey Gum, White Mahogany, Forest Red Gum and, in the western districts, White Box and Black Cypress Pine. In coastal areas it commonly occurs on the drier, ridgetop sites in localities where more favourable sites carry Spotted Gum-Grey Box or Grey Box-Forest Red Gum types, and in the western areas it often occupies the slope position, between a ridgetop community of Red Ironbark type and a valley-floor community of Yellow Box-Blakely's Red Gum type. Localities include Tinpot Creek M.A., Penrith-Windsor district, Dungog district, Bom Bom S.F., Abington-Toryburn district.

### 83. *Grey Box-Ironbark*

In this type, Grey Box is associated with one or more species of Ironbark (other than Grey Ironbark, see type 80) as the dominants in a tall woodland community up to about 100 ft high. The Ironbarks include Broadleaved, Narrowleaved and Red, and other associates may include Red Bloodwood, Spotted Gum, various Red Gums and Stringybarks, and Black Cypress Pine. Various sub-types can be recognised based on the species of Ironbark associated with Grey Box. The type occurs on both sides of the Divide, frequently on somewhat heavy soils with a tendency for periodic water-logging. Localities generally are as for the previous type.

### 84. *Narrowleaved/Broadleaved Ironbark*

These two Ironbarks, either separately or jointly, dominate tall woodland communities in various coastal sites under conditions of relatively low rainfall (normally under 30 inches) and on moderately fertile, well-drained soils. They also occur to the west of the Divide. Three sub-types may be recognised, based on the species of Ironbark present. Frequently the Ironbarks occur in virtually pure stands, but associates which may be present include White Mahogany, Stringybarks, Silverleaved Ironbark, Spotted Gum, Grey Box and various Red Gums. The stands seldom exceed 100 ft in height. The type is well developed in the Upper Hunter

Valley (e.g. Wingen district) and in parts of the Upper Clarence Valley (e.g. Jackadgerry district).

#### 85. *Grey Box-Forest Red Gum*

*Composition:* Grey Box and Forest Red Gum are closely associated in this type, with various Ironbarks, Stringybarks and Roughbarked and Broadleaved Apples commonly occurring as subordinate species.

*Nature:* A tall woodland, up to 100 ft in height, widely distributed in the drier coastal areas on rather heavy and periodically waterlogged soils.

*Occurrence:* Occurs over much of the coastal regions, but particularly widely distributed in the low rainfall belts of the Central Coast, e.g. in the Penrith-Windsor district and the Central Hunter Valley.

#### 86. *Coastal Grey Box-Woollybutt*

This type is confined to the South Coast where it forms a wet sclerophyll forest (sometimes dry sclerophyll forest) up to 130 ft in height. Coastal Grey Box and Woollybutt are the two dominant species, while associates may include Grey Box (which locally can replace Coastal Grey Box as the main dominant), various Stringybarks, Grey Ironbark and Mountain Grey Gum. There is frequently a dense understorey of wattles and rainforest species. It commonly occurs associated with the Yellow Stringybark-Gum and Southern Stringybark types. Examples occur in the Tinpot Creek M.A.

#### 87. *Steel Box*

The Steel Box type is confined to the far North Coast, normally occurring close to rainforest margins on basaltic soils where the rainfall is below 55 inches. Associated eucalypts may include Spotted Gum, Grey Gum and Grey Ironbark, while such rainforest species as Hoop Pine and Crow's Ash may also be present. It forms a tall stand up to 140 ft high, and in the absence of fire there is normally an understorey of rainforest species. Typical localities include Kangaroo Creek S.F. and Mt. Pikapene S.F.

### B(g) RED GUM LEAGUE

This is a characteristic league widely distributed through the coastal districts, and extending to the Tablelands and, in one type, to the Western Slopes. Three types are recognised, usually occurring in situations of low topographic relief and often subjected to flooding or waterlogging. The River Oak type is rather anomalous in this league, but is included for convenience because it so frequently is associated closely with the other types. In the other two types, one or other of two closely related Red Gums clearly dominates the community, which is typically of tall woodland formation.

#### 92. *Forest Red Gum*

*Composition:* Forest Red Gum is normally the sole dominant, though Broadleaved Apple and Swamp Box are common as a lower tree strata.

A wide variety of other eucalypts may occur as occasional associates, including Swamp Mahogany, Sydney Blue Gum, Grey Gum, various Ironbarks, Grey Box and Cabbage Gum.

*Nature:* The type normally occurs as a tall woodland which may vary in height from under 60 ft to over 150 ft. It normally occurs on heavy soils which are subject to waterlogging, and typically occupies alluvial flats throughout most of the coastal districts. However it also occurs in a stunted form close to the coastline (often just inland from the Headland Brush Box type), on certain elevated basaltic soils, and on some steep slopes where the soil is heavy and moisture ample.

*Occurrence:* One of the most ubiquitous types occurring on the coast. Typical examples include depressions in the Penrith-Windsor district, basalt cappings on Wild Cattle Creek S.F., somewhat sheltered headlands at Coff's Harbour, the steep slopes of the Richmond River Gorge (Grevillia), alluvial flats in the Upper Richmond River Valley (e.g. Roseberry Nursery, Busby Flat), and low-lying and poorly drained sites in such areas as Tinpot Creek M.A., Wallaroo M.A., Newry S.F., Barcoongere S.F. and Bom Bom S.F.

#### 93. *Cabbage Gum*

This is very similar to the previous type, but Cabbage Gum replaces Forest Red Gum as the dominant species. It appears to occur in generally similar sites, but usually at altitudes of over 2000 ft, e.g. at Tyringham and Jeogla. However in certain localities it can occur at much lower altitudes, e.g. Craven S.F. It rarely exceeds 100 ft in height.

#### 94. *River Oak*

Another extremely widespread type occurring as a ribbon alongside creeks and rivers, usually on stony or sandy soils. It occurs throughout the eastern part of the State, extending west of the Divide down to an altitude of about 1000 ft. It avoids the higher elevations, rarely occurring above 2000 ft in the south of the State or above 3000 ft in the north. In the coastal districts it commonly adjoins the Forest Red Gum type on the alluvial flats away from the immediate creek bank. Normally there are no tall tree associates, though certain rainforest species, Roughbarked and Broadleaved Apples, River Peppermint and other moisture-loving species may occur as a lower tree strata. It frequently exceeds 100 ft in height. Typical examples occur along the Tumut River (Tumut), Peel River (Tamworth), Tuross River (Bodalla S.F.), Hawkesbury River (Ebenezor), Nymboida River (Moonpar S.F.) and Richmond River (Roseberry Nursery).

#### B(h) SCRIBBLY GUM-STRINGYBARK-SILVERTOP ASH LEAGUE

Excluding certain western leagues, this league undoubtedly occupies a greater area of forested country in the eastern half of N.S.W. than any other. Various ecologists (e.g. Pidgeon, 1942) working in the State have recognised at least three separate alliances which here are included in this league, but these alliances intergrade so completely that it seems reasonable to regard them as a single complex group.

Despite its wide occurrence, the types within this league are generally of limited interest for production forestry, though there are several notable exceptions, particularly the Silvertop Ash types. However the league commonly yields firewood and in several areas is managed for pulpwood production, and it is likely to be used increasingly in the future for conifer plantation establishment.

The types within the league typically occur as dry sclerophyll forest or heath woodland, a few of the types only approaching wet sclerophyll forest structure in certain sites. The types occupy sites of generally very low nutrient status, typified by the Hawkesbury and Clarence sandstone series. They extend from coastal areas with a rainfall in excess of 60 inches, across the Tablelands and out into western districts with a rainfall down to 20 inches, commonly occurring in areas of broken topography. They are more prevalent on ridgetops and dry northerly and westerly slopes than on more favoured aspects, though some types (e.g. Scribbly Gum) often occur where soil drainage is impeded.

A large number of eucalypts and other species enter into the composition of these types, including in the order of 80 different *Eucalyptus* spp. many of which can occur alone or with one or more other species. Thus an almost infinite number of types could be recognised: Costin (1954) recognised 29 separate types from the Red Stringybark-Scribbly Gum (*E. macrorhyncha*-*E. rossii*) Alliance in the Monaro district alone. In this classification some 31 types are recognised, covering the most usual combinations of species encountered, and it is felt that these should be sufficient for most purposes. However, where necessary these can be further sub-divided into additional sub-types.

Conversely, for many purposes forestry typing needs will be satisfied by lumping similar types into super-types, some of which may then be sub-divided on the basis of site height. Thus in the Wyong M.A., the 13 listed types that occur can be conveniently grouped into four super-types: Yellow Bloodwood, Stringybark, Sydney Peppermint-Smoothbarked Apple-Bloodwood (with two site height categories), and Scribbly Gum-Silvertop Ash.

#### 97. *Needlebark Stringybark*

Needlebark Stringybark dominates stand, occurring pure or with varying amounts of Scribbly Gum, Stringybarks, Red Mahogany, Bloodwood, Red Gums and, in drier areas (e.g. Glenreagh), Bailey's Stringybark. Understorey sparse or with Teatrees, Paperbarks and xeromorphic shrubs. Height commonly about 70 ft, rarely to 100 ft. Occurs on extremely infertile soils on the North Coast, e.g. Camden Haven, Newfoundland S.F., Evan's Head.

#### 98. *Dorrigo White Gum*

Occurs in gullies on the Dorrigo Plateau, usually on shallow sandy soils derived from granite. Black Oak and Pt. Jackson Cypress Pine are commonly present as an understorey, with xeromorphic shrubs. Stringybarks, New England Blackbutt and other eucalypts may be associated. Examples at Clouds Creek S.F. and Killungoondie S.F.

#### 99. *Red Box*

Occurs in fairly dry sites west of the Divide on the Southern and Central Slopes and adjoining areas of the Tablelands. Associates include Scribbly Gum, Broadleaved Peppermint, Apple Box, Longleaved Box and Red Stringybark, but Red Box dominates the stands which are of low height (rarely over 60 ft). Examples of the type occur in the A.C.T. and the drier aspects of the Tumut Catchment (e.g. adjoining Red Hill S.F.).

#### 100. *Yellow Bloodwood*

A type occupying shallow sandstone soils in the Central Coast region, sometimes in pure stands but usually with various associates including Narrowleaved and Smoothbarked Apple, Red Bloodwood, Stringybarks, Grey Gum, Scribbly Gum and Sydney Peppermint. Stand height normally under 60 ft. Examples occur at Springwood Lookout, near Calga and along the Mellong Range.

#### 101. *Blue Mountain Ash*

Common in the more sheltered or favoured sites on sandstone soils in the Upper Blue Mountains, e.g. Newnes S.F. and Katoomba, where it may reach 120 ft in height. Occasionally occurs in pure stands, but more commonly with such associates as Sydney Peppermint, Silvertop Ash, Brittle Gum, Scribbly Gum and Stringybarks.

#### 102. *Yertchuk*

Found on the South Coast and the southern parts of the Central Coast, extending into the escarpment zones and occurring on dry, shallow soils of low fertility, particularly on ridgetops and exposed slopes. The type is of low height (rarely over 60 ft) and may contain a wide range of associates, including Roughbarked Apple, various Stringybarks, Narrowleaved Peppermint, Scribbly Gum and Red Bloodwood. Typical examples occur on Bodalla S.F.

#### 103. *Apple Box*

This type occurs at lower elevations on the west of the Tableland regions, extending into the eastern parts of the Western Slopes. It is one of several types which connect this league with the Yellow Box-White Box-Red Gum league, and like this latter league it may approach the savanna woodland type of structure. It commonly occupies broad valley-floors and gentle slopes. Associated species include Broadleaved Peppermint, Narrowleaved Peppermint, Black Cypress Pine, Red and Yellow Box, and Longleaved Box.

#### 104. *Longleaved Box*

Similar to the previous type, but occurring on generally shallower and drier soils, usually above 2000 ft. Common associates include Broadleaved Peppermint, Red Stringybark, Red Box, Brittle Gum and Apple Box.

### 105. *Smoothbarked Apple*

As a species, Smoothbarked Apple usually occurs as one of a number of dominant species in a stand, but in certain localities it may occur as a clear single dominant. This type is found scattered through the coastal districts, and occupies more extensive areas in the far Northwestern Slopes (e.g. Warialda and Yetman districts). Associates in the western areas include various Cypress Pine and Tumbledown Gum, and in the coastal areas they include Stringybarks, Red Bloodwood, White Mahogany and in poorly drained, low sites, Swamp Mahogany and Paperbark.

### 106. *Smoothbarked Apple-Sydney Peppermint-Stringybark*

This is one of the more common types on the sandstone formations of the Central Coast, but it appears also both north and south from here. Depending on site it varies from 40 ft. to about 110 ft in height. Smoothbarked Apple, Sydney Peppermint and Stringybark (usually White or, less commonly, Brown) occur together as the dominant species, with a range of associates including Red Bloodwood, White Mahogany, Silvertop Ash and Grey Gum. Occasionally the Stringybark may be absent, leaving a two-species dominance, usually with Red Bloodwood becoming more frequent. Very common in the Sydney district.

### 107. *Smoothbarked Apple-Banksia*

This type occurs in positions near the coastline, mostly in the lower North Coast. It occupies stabilised sand dunes, probably where conditions are not sufficiently favourable for the development of the Blackbutt-Bloodwood/Apple type (No. 41). Smoothbarked Apple and Banksia (one or more species) dominate the stand which is normally under 50 ft in height. Associated species may include Red Bloodwood, Forest Red Gum, Paperbark and occasional Blackbutt. Examples occur in the Myall Lakes area.

### 108. *Bangalay-Banksia*

This type is a more southern form of the preceding type and of the Blackbutt-Bloodwood/Apple type, occupying stabilised coastal sand dunes on the South and Central Coast (e.g. Bulli District, Burrill Inlet). Associated species may include Red Bloodwood and Blackbutt, and the stand height varies from about 25 ft to 90 ft. A variant of this type is common in foreshore situations in the Central Coast, occurring not only on sand dunes but on sandstone terraces, where Bangalay dominates with Banksia, Grey Gum, Grey Ironbark and other species as associates, (e.g. Taronga Zoological Gardens, Avalon Beach); this can where necessary be recognised as a sub-type.

### 109. *Brittle Gum*

This is a common type in the Tableland regions, extending north to the southern part of the New England. It is of generally low height (usually under 50 ft), occurring on poor, shallow-soiled slopes and ridges. Brittle Gum may occur pure, or associated with such species as various Stringybarks, Scribbly Gum, Candlebark, Argyle Apple and Silvertop Ash. Common in parts of the Blue Mountains and in the Monaro district.

### 110. *Brittle Gum-Peppermint*

This is another common Tableland type, similar to the preceding one but with a Peppermint (Narrowleaved or, less commonly, Broadleaved) sharing dominance with Brittle Gum. Associates include Stringybarks, Snow Gum, Scribbly Gum and Manna Gum. It usually occupies somewhat more favourable sites than the Brittle Gum type.

### 111. *Peppermint*

Stands dominated by a Peppermint (Narrowleaved, Broadleaved or Wattleleaved; sometimes two of these together) occur commonly throughout the Tableland region on poor, dry, shallow slopes and ridges, producing stands of low height (often under 70 ft). Associated species may include Stringybarks, Brittle Gum, Apple Box, Silvertop Ash, New England Blackbutt, Manna Gum and Mountain Gum. In the south, this type extends on to the South Coast region (e.g. Tinpot Creek M.A.).

### 112. *Silvertop Ash*

*Composition:* Silvertop Ash dominates these stands, constituting from 50 per cent to commonly 100 per cent of the stems. Associated species are varied and include Messmate, Mountain Grey Gum, White Ash, Mountain Gum, Blackbutt, Yellow Stringybark, Peppermints, Woollybutt, Ironbarks, Red Bloodwood and Roughbarked and Smoothbarked Apples.

*Nature:* Whilst typically forming a dry sclerophyll forest, usually under 100 ft in height, this type in certain areas approaches wet sclerophyll forest in structure and 130 ft in height; in such cases it can provide a valuable commercial type. It characteristically occupies ridgetop positions.

*Occurrence:* Found widely through the Southern and Central Tablelands and Coast districts, and reaching its best development on the far South Coast. Typical examples occur in the Eden district, in crown lands west of Moruya and on the Blue Mountains.

### 113. *Silvertop Ash-Peppermint*

In this type Silvertop Ash is associated with one or more Peppermints (Narrowleaved, Broadleaved and Sydney), with subordinate associates including Stringybarks, Smoothbarked Apple, Scribbly Gum, Red Bloodwood, Mountain Grey Gum, Manna Gum and Messmate. It has the same general distribution as the previous type, but is rarely so well developed, seldom exceeding 100 ft in height.

### 114. *Silvertop Ash-Stringybark*

*Composition:* Silvertop Ash and one or more species of Stringybark (including Yellow, White, Brown, Blueleaved and Thinleaved) dominate the stand, occurring with such associates as Messmate, Brown Barrel, Mountain Grey Gum, Peppermints, Red Bloodwood, Apples, Grey Gum, Scribbly Gum and Snow Gum.

*Nature:* Like the Silvertop Ash type, this is a widespread type in the Central and South Coast and Tablelands, usually occurring as dry sclero-

phyll forest but occasionally forming a wet sclerophyll forest up to 130 ft in height in the South Coast and escarpment areas.

*Occurrence:* The type occurs generally in the same localities as the Silvertop Ash type.

#### 115. *Sydney Peppermint-Stringybark*

This type is closely related to the Smoothbarked Apple-Sydney Peppermint type (No. 106) but lacks the Apple as a dominant. It occurs from the Central South Coast up to the Pt. Stephens area, and is common in the Sydney district on the upper slopes of sandstone gorges. It usually has a height less than 70 ft, but in favourable sites may exceed 100 ft. Red Bloodwood is a common associate, and other species present include Red Mahogany, Grey Gum, Silvertop Ash and Narrowleaved and Broadleaved Peppermints.

#### 116. *Sydney Peppermint-Bloodwood|Turpentine*

This is another common type occurring in the same general area as the previous type. Sydney Peppermint and Red Bloodwood are the dominant species, usually with Turpentine as a third co-dominant, particularly in the more sheltered sites. Other associates include Stringybarks, Silvertop Ash, Red Mahogany, Smoothbarked Apple, Scribbly Gum and Grey Ironbark.

#### 117. *Scribbly Gum*

This type is widely distributed from the coastal districts, across the Tablelands, into the Western Slopes, though the species of Scribbly Gum present differs over this range. Various associates may be present (e.g. Brittle Gum, Stringybarks, Bloodwoods), though frequently the one species occurs in pure stands, often as a heath woodland of low stature (under 50 ft). The type shows a preference for poorly drained soils of very low fertility. Examples can be seen at Conjola S.F., Newfoundland S.F., on the Blue Mountains and in the Bathurst area.

#### 118. *Scribbly Gum-Silvertop Ash*

This type is largely confined to the Central Coast and Tablelands districts, attaining a height of up to 70 ft. Associated with the dominants are such species as various Peppermints, Stringybarks and Apples.

#### 119. *Scribbly Gum-Bloodwood*

A type found in the coastal districts and adjoining escarpment from the central South Coast northwards, and particularly common on the poorer soils around Sydney. With Brown Bloodwood, the type is also found into the western districts (e.g. Coonabarrabran). In the more southern coastal areas Red Bloodwood is usually the co-dominant with Scribbly Gum (rarely Yellow Bloodwood), while on the North Coast Pink Bloodwood is more common. The type occupies infertile soils which are, however, better drained than in the Scribbly Gum type. Other associates include Yertchuk, Stringybark, Silvertop Ash, Grey Gum, Turpentine, Sydney Peppermint and various Apples.

### 120. *Scribbly Gum|Brittle Gum-Snow Gum*

In this type Scribbly Gum, or more rarely Brittle Gum or both species, are associated with Snow Gum as the dominant species, with Stringybarks, Peppermints and Silvertop Ash among the more common associates. The type is found at fairly high altitudes in the Central and Southern Tablelands, on soils of low fertility. Stand height is normally under 70 ft. Examples can be seen in the Ben Bullen and Berrima districts. The type forms a connection between this league and the Snow Gum league.

### 121. *Blueleaved Stringybark*

This type is recognised from the more generalised Southern Stringybark type (No. 123) because of its distinctive appearance and its regular occurrence on poor, dry ridges where, nonetheless, it may attain a height of 100 ft, though usually much lower. It is common on the South Coast and extends up into the Central Tablelands. Associates may include other Stringybarks, Roughbarked Apple, Peppermint, Red Bloodwood and Grey Gum.

### 122. *New England Stringybark*

This is a broad type dominated by one or more of the Stringybarks occurring in the Northern Tablelands (i.e. New England district) and including Broadleaved, Diehard, Youman's, etc. Other associates include Narrowleaved and Wattleleaved Peppermints, New England Blackbutt, Western New England Blackbutt, Red Gums, Roundleaved Gum and Black Cypress Pine. It is widely distributed in the drier parts of the New England, particularly on shallow-soiled ridges, where it forms a stand of from 50 ft to 100 ft high.

### 123. *Southern Stringybark*

This is a similar type to the previous one, but it occurs in the Southern and Central Tablelands and Coast and is comprised of one or more of such Stringybarks as White, Wilkinson's, Thinleaved and Brown. Other species may be associated with these, including Peppermints, Apples, Red Bloodwood, Ironbarks, Silvertop Ash, Woollybutt and Grey Gum. It is particularly widespread in the South Coast districts (mainly towards the escarpment), where it occurs on ridges and the drier slopes.

### 124. *Red Stringybark*

This is a more western form of the previous three types, occurring on parts of the Tablelands and into the Western Slopes, and again tending to occupy ridges and dry slopes. Red Stringybark is the dominant species, and its associates may include Scribbly Gum, Yellow, Red, White and Longleaved Boxes, Brittle Gum, Broadleaved Peppermint and Black Cypress Pine. Drooping She-Oak may occur in the understorey in more southern localities. Stand height usually varies between 40 ft and 80 ft.

### 125. *Red Stringybark-Scribbly Gum|Brittle Gum*

This is a widespread type in the Southern and Central Tablelands and the adjoining Slopes. Red Stringybark is associated with Scribbly Gum,

Brittle Gum, or both, on sites of low fertility. Common associates include Longleaved Box, Red Box and Broadleaved Peppermint. Common on the more broken ridges in the Bathurst district and in the Queanbeyan-Canberra district. Height is usually under 60 ft.

#### 126. *Stringybark-Bloodwood*

This is mainly a coastal type in which one or more Stringybarks (White, Tindale's, Brown, etc.) is associated with Red or Pink Bloodwood as dominants. In its various forms the type occurs from the Central South Coast to the North Coast. Subordinate associates include White Mahogany, Sydney Peppermint, Smoothbarked Apple, and Scribbly Gum. Height is commonly under 80 ft.

#### 127. *Stringybark-Smoothbarked Apple*

This type is related to the Smoothbarked Apple-Sydney Peppermint-Stringybark type (No. 106), but lacks the Peppermint except as an occasional stem. The type is most widespread on the South Coast, but extends into the southern part of the North Coast. Associated species include Silvertop Ash, Grey Gum, Red Bloodwood, Yertchuk and Ironbarks. It usually occurs on ridgetops, where it has a low stand height (commonly about 50 ft).

### B(i) SNOW GUM LEAGUE

This is a small league occurring in the highest and coldest parts of the State, and thus being widely distributed throughout the Tableland regions. Snow Gum or the closely related species, Black Sallee, can occur in all the eight types recognised, though they are not invariably present in all of these. The types are usually of limited value for commercial forestry, but they frequently serve a most important protective function in the high altitude catchment areas, and they also provide useful stock shelter in areas used for pastoral purposes. In the future they are also likely to receive wide use for conifer plantation establishment.

The types vary in structure from subalpine and savanna woodland through dry sclerophyll forest to wet sclerophyll forest, though most commonly they occur in a woodland form. Whilst the types occupy a wide range of sites in the colder parts of the State, they particularly favour areas of heavy soil which may be waterlogged for considerable periods.

#### 136. *Snow Gum-Black Sallee*

This is a common type, occurring as a savanna woodland. Snow Gum and Black Sallee are the dominants in the stand, usually occurring alone though associates such as New England Peppermint, other Peppermints, Candlebark, Mountain and Manna Gum and Black Gum may be present. The type usually occurs in very cold, frosty sites with impeded soil drainage. Localities include Guyra and Ebor districts, Collector district and Bago S.F.

#### 137. *Black Sallee*

The Black Sallee type forms a savanna woodland stand in low, frosty sites subject to waterlogging, often along the edges of creeks in broad,

high altitude valleys (e.g. Sunny Corner S.F.) or as outliers of woodland in grassland, bog and fen communities (e.g. Barrington Tops area, Bago S.F.). Stand height is usually under 40 ft. Associated species may include Swamp Gum, Black Gum, Snow Gum and New England Peppermint.

### 138. *Snow Gum*

*Composition:* Snow Gum is dominant, but may occur with a wide range of associates, including various Peppermints, Swamp Gum, Black Gum, Black Sallee, Mountain and Manna Gums, Apple Box and Black Cypress Pine, as well as certain more localised species such as *Eucalyptus periniana*.

*Nature:* The stand varies from low savanna woodland under 40 ft high to wet sclerophyll forest over 100 ft in height, occurring on a wide range of soil types under conditions of low temperature. As wet sclerophyll forest it may occur in the more exposed and elevated situations associated with the Alpine Ash league (e.g. Brindabella Range), while in the woodland form it commonly replaces the Yellow Box-White Box-Red Gum league in the colder sites (e.g. Canberra district).

*Occurrence:* Widespread throughout the colder parts of the Tableland region. Typical examples can be seen near Ebor, on the Barrington Tops, Vulcan S.F., Monaro district and Bago S.F.

### 139. *Alpine Snow Gum*

This type provides the most elevated tree-dominated community to occur in N.S.W., forming the treeline at elevations of about 6000 ft to 6500 ft in the Southern Tablelands. It forms a subalpine woodland of from 10 to about 40 ft in height, the trees frequently being windswept. Alpine Snow Gum usually is the sole dominant, but may be associated with Black Sallee, Snow Gum and certain more localised eucalypts. It is restricted to the southern parts of the Southern Tablelands at elevations over about 5000 ft, from the Brindabella Range (e.g. Mt. Franklin) to the Kosciusko Massif.

### 140. *Snow Gum-Mountain/Manna Gum*

*Composition:* Snow Gum is associated with one or more of three closely related Gums: Mountain Gum, Manna Gum or Candlebark. These form the stand dominants, whilst other associated species can come from a wide range of highland species, including Peppermints, Brown Barrel, Alpine Ash and Black Sallee.

*Nature:* This type varies from savanna woodland to wet sclerophyll forest, and from about 30 ft to 100 ft in height. It most commonly occurs as a forest formation and is probably the most widespread type in this league, occupying extensive areas throughout the Tableland districts in cold sites with a rainfall in excess of about 30 inches. It is most common on soils of heavy texture. Where necessary sub-types can be recognised on the basis of the actual species which is co-dominant with Snow Gum.

*Occurrence:* Widespread in the moister and colder parts of the Tablelands, at elevations of from about 2000 ft to 5000 ft. Typical occurrences include the Ebor-Guyra district, Mt. Canobolas and Bago S.F.

#### 141. *Candlebark*

Candlebark dominates this type, and may be associated with such species as Snow Gum, Swamp Gum, Manna Gum, Peppermints and Stringybarks. It occurs in sites which are generally slightly warmer and have more favourable soil conditions than the Snow Gum type, and thus serves to connect this league to the Yellow Box-White Box-Red Gum league. It forms a savanna woodland, usually up to about 60 ft in height, and is found throughout the Tableland districts, e.g. Jeogla and Berridale districts.

#### 142. *New England Peppermint*

This type is widespread in the colder and more poorly drained parts of the New England, where it typically occupies the bottoms of broad valleys on heavy-textured, poorly drained soils, giving way to Snow Gum-Black Sallee or Manna Gum types on the higher topographic positions. It forms a savanna woodland (sometimes closed forest) community up to about 60 ft in height, and usually occurs in fairly pure stands. The occasional associates include Snow Gum, Black Sallee, Candlebark and various Peppermints. Patches of this type have been commonly left for stock shelter in the course of pastoral development, and in recent years these stands have been severely damaged by annual defoliation by scarab beetles. Typical examples occur near Armidale and Glen Innes.

#### 143. *Swamp Gum/Black Gum*

This rather variable type takes the place of the previous type in the Central and Southern Tablelands, occurring in cold, somewhat swampy situations, frequently in the bottom of broad valleys and along creek banks. The stand varies from about 30 ft to 70 ft in height, and has Swamp Gum, Black Gum or both as the dominant species. Common associates include Snow Gum and Black Sallee. Stands dominated by Black Gum are common in Vulcan S.F., while stream-bank ribbons of Swamp Gum are a feature of parts of Bago S.F. Although a characteristic Tableland type, the Swamp Gum type occasionally occurs on the South Coast (e.g. Bodalla S.F.), where its associates are from the coastal flora.

### B(j) ALPINE ASH LEAGUE

This is a small league confined to the Southern Tablelands on moist, favoured sites at altitudes between about 3500 ft and 5000 ft. The league is dominated by Alpine Ash, alone or in association with other species, forming a wet sclerophyll forest up to about 180 ft in height. The understorey usually consists of a low shrubby layer, but Narrowleaved Peppermint may often form a second tree storey. The league is valuable for the production of commercial timber, though over the last decade or so most stands have been severely damaged by repeated phasmatid attack.

At higher altitudes this league gives way to the Snow Gum league, and at lower altitudes it passes into the Messmate-Brown Barrel league. It is most widely developed on the western parts of the Tablelands.

#### 147. *Alpine Ash*

*Composition:* Alpine Ash is the clear dominant, but may be associated with scattered stems of Manna, Mountain and Mountain Grey Gums, and commonly has an understorey of Narrowleaved Peppermint.

*Nature:* Wet sclerophyll forest, commonly over 150 ft in height, forming one of the most valuable types on the Tablelands. Usually occurs in sheltered sites, sometimes with an understorey of Tree Ferns.

*Occurrence:* Found in favoured sites south from the Brindabella Range. Localities include Bago S.F. and the eastern slopes of the Kosciusko Massif.

#### 148. *Alpine Ash-Mountain/Manna Gum*

*Composition:* Alpine Ash is associated with Mountain Gum, or less commonly with Manna Gum, as dominants in the stand. Other associated species may include Narrowleaved Peppermint, Snow Gum and Mountain Grey Gum.

*Nature:* Similar to the previous type, though usually occupying somewhat less favoured sites. (However when Manna Gum is the associate, the type may occupy the best gully sites in stands up to 180 ft in height.)

*Occurrence:* As for the Alpine Ash type.

### B(k) MESSMATE-BROWN BARREL LEAGUE

This league is essentially the higher altitude or latitude extension of the Sydney Blue Gum/Bangalay league, and like that league it produces a usually high-quality forest stand on well-watered sites with good soils. It is most widespread in the Tableland districts, but certain of the types descend to low altitudes on the South Coast, where they occupy extensive areas and form valuable forest stands.

The types within this league characteristically occur as wet sclerophyll forest, though on certain more adverse sites they may approach dry sclerophyll forest structure. Some 17 different types are recognised within the league, a number of these being capable of further division into sub-types if required. The types are rather variable in composition, but most of them commonly contain one or more species of two closely related groups of Gums, the Southern Blue Gum group (Mountain Grey Gum, Maiden's Gum, Shining Gum, Eurabbie) and the Mountain Gum group (Mountain Gum, Manna Gum, Candlebark). However these Gums are by no means invariably present.

Under conditions of increasing cold, the league gives way to the Snow Gum league or, in favoured sites in the Southern Tablelands, to the

Alpine Ash league. The league represents the source of most of the mill-logs produced in the Tableland regions, and it also represents the sites which are most suitable for conversion to plantations of *Pinus radiata*.

#### 151. *Brown Barrel-Messmate*

*Composition:* These stands are dominated by both Brown Barrel and Messmate, while other associated species may include Silvertop Ash, Mountain Grey Gum, Manna Gum, Shining Gum, Maiden's Gum, Peppermints, Gully Ash, White Ash, Yellow Stringybark, Silvertop Stringybark, New England Blackbutt, Tallowwood and Sydney Blue Gum.

*Nature:* A wet sclerophyll forest stand, rarely under 100 ft in height and occasionally up to 170 ft high. It is a valuable timber-producing type found particularly in the escarpment zones where it occupies the somewhat drier aspects on areas with fertile soils and adequate moisture.

*Occurrence:* Found throughout the Tableland districts, usually at altitudes above from 2000 ft in the south to 3000 ft in the north. Typical sites include Nalbaugh S.F., Tomalla S.F. and Styx River S.F.

#### 152. *Messmate-Gum*

*Composition:* Messmate occurs with either Manna Gum or Mountain Grey Gum (rarely other related Gums) as the dominant species while other associates may include Silvertop Stringybark, Yellow Stringybark, certain other Stringybarks (e.g. White and Diehard), Silvertop Ash, New England Blackbutt and very characteristically certain Peppermints (especially Narrowleaved).

*Nature:* This type can occur as both dry and wet sclerophyll forest, with a height range of about 80 ft to 120 ft. It occupies generally drier sites than the previous type, particularly where soil is shallower, in the same general area.

*Occurrence:* Found in all Tableland districts. Examples include Bondi S.F., Monga S.F., Carrai S.F. and Styx River S.F.

#### 153. *Messmate-Silvertop Stringybark*

*Composition:* Messmate and Silvertop Stringybark dominate this type with associated species including Manna Gum, New England Blackbutt, various other Stringybarks, Sydney Blue Gum and Roundleaved Gum.

*Nature:* A wet sclerophyll forest stand, commonly between 100 ft and 160 ft in height and forming a valuable commercial type. It occupies good quality soils in generally favoured sites.

*Occurrence:* Confined to the New England Tablelands, and reaching its best development in the southernmost parts of this region (e.g. Tomalla and Tuggolo S.F.), but extending north to around Washpool S.F.

### 154. *Brown Barrel*

*Composition:* Brown Barrel is the clear dominant, and may occur in pure stands, usually of very high quality. Where subordinate associates are present, these may include Messmate, Shining Gum, Mountain Grey Gum, Manna Gum, Sydney Blue Gum, Tallowwood and Peppermints.

*Nature:* This type occupies the most favoured sites, occurring in sheltered situations on deep, moist, fertile soils where it forms a wet sclerophyll forest up to 200 ft in height. There is usually a fairly dense understorey, commonly consisting of rainforest species. At least in the northern areas, this type tends to be replaced by rainforest in the absence of repeated fire.

*Occurrence:* Found chiefly in the eastern parts of the Tableland regions, in the same general location as the previous types in this league but usually occupying the most favoured sites. Examples occur on Bondi S.F., Badja S.F., Monga S.F., Oberon area, Barrington Tops area, Styx River S.F.

### 155. *Brown Barrel-Gum*

*Composition:* In this type Messmate is co-dominant with one or more species of Gum, including Mountain Grey Gum, Shining Gum, Maiden's Gum, Manna Gum and Mountain Gum. Other associated species include Messmate, Yellow Stringybark, Silvertop Ash, various Peppermints and other Stringybarks, and Sydney Blue Gum. Rainforest species including Coachwood, Sassafras and Negrohead Beech may occur in the understorey.

*Nature:* Similar to the previous type, though commonly tending to occur on the slightly drier and less favoured sites. Forms a wet sclerophyll forest up to 170 ft in height.

*Occurrence:* Generally as for the previous type, but occurring further westward as far as the Brindabella Range in the A.C.T. Localities include Coolangubra S.F., Bondi S.F., Monga S.F., Oberon area, Ebor area.

### 156. *Brown Barrel|Messmate-Silvertop Ash*

*Composition:* Silvertop Ash occurs with Brown Barrel, Messmate or, commonly, both species as the dominants in a stand, with other associates including various Stringybarks and Peppermints, Manna Gum and Mountain Grey Gum.

*Nature:* This type varies from dry to wet sclerophyll forest, with a height range of from about 60 ft to 120 ft, rarely higher. It occurs on ridge-top situations, in areas where more favoured sites support one or more of the other Brown Barrel and Messmate types.

*Occurrence:* Confined to the eastern parts of the Southern Tablelands, where it is fairly common in such areas as Bondi S.F. and Monga S.F.

### 157. *Yellow Stringybark-Gum*

*Composition:* This type has Yellow Stringybark and usually Mountain Grey Gum as the dominants, though Maiden's Gum and less commonly Manna Gum may replace Mountain Grey Gum or be associated with it. Other associated species can include Silvertop Ash, Messmate, Brown Barrel, Coast Grey Box, other Stringybarks, various Peppermints (including Gully and River), Bangalay, Blackbutt, Spotted Gum and Woollybutt.

*Nature:* Normally a wet sclerophyll forest ranging from about 80 to 150 ft in height, and occurring in favoured sites at generally lower altitudes than the previous types in this league.

*Occurrence:* This type is well developed on the central and lower South Coast, and extends thence up on to the escarpment of the Southern Tablelands and parts of the Central Tablelands. Localities include Bodalla S.F. and Currowan S.F.

### 158. *Southern Blue Gum*

*Composition:* This type is dominated by one (rarely by two) of the Southern Blue Gum group - Mountain Grey Gum, Maiden's Gum and Shining Gum (but not Eurabbie, see type No. 164). Associated species include Messmate, Brown Barrel, Silvertop Ash, Peppermints, Snow Gum and Manna Gum. Sub-types can be recognised on the basis of the dominant species of Gum.

*Nature:* These stands normally occur as wet sclerophyll forest up to 160 ft in height. Though variable in occurrence, they commonly occupy deep, fertile soils in favoured aspects.

*Occurrence:* These stands are found mostly along the escarpment of the Southern and Central Tablelands, with occasional scattered occurrences on the New England Tablelands (e.g. Point Lookout, Wollomombi Falls). In the south they extend also into the coastal areas. Localities include Mogila area, Mt. Dromedary, Monga S.F. and Victoria Pass (Blue Mountains).

### 159. *Mountain/Manna Gum*

*Composition:* Either Mountain or Manna Gum forms the dominant in this type, frequently with a Peppermint (especially Narrowleaved) as a common associate. Other associates may include Snow Gum, Brown Barrel, Messmate, Silvertop Stringybark, Swamp Gum, Mountain Grey Gum, other Stringybarks, Apple Box and others.

*Nature:* One of the most widespread types in this league, and occurring over a very wide range of environmental conditions, though usually where moisture conditions are locally favourable. Whilst most commonly appearing as wet sclerophyll forest from 80-140 ft in height (rarely up to nearly 200 ft), the type can also occur as dry sclerophyll forest or savanna woodland.

*Occurrence:* Found throughout the Tableland districts, and extending to the coast in the far south, and westwards into parts of the Slopes

districts. One closely related community, dominated by Camden White Gum, occurs on the alluvial flats bordering the Nepean River and its tributaries in the Camden-Burratorang district, and can be regarded as a separate sub-type. Localities include Green Hills S.F., Mogila area, Monga S.F., Oberon area, Hanging Rock S.F. and Styx River S.F.

#### 160. *Manna Gum-Stringybark*

This type is most widespread in the drier parts of the Tableland areas where Messmate-Brown Barrel league is dominant. Manna Gum occurs as co-dominant with one or more species of Stringybark (including Broadleaved, Diehard, Red and Silvertop), often as a dry sclerophyll forest from 60 ft to 100 ft in height on soils that are of generally lower fertility than is usual for this league. Other associated species may include Roundleaved Gum, Yellow Box, Apple Box, Candlebark, New England Blackbutt, Messmate, Snow Gum and Peppermints. The type is found in all Tableland zones, usually towards the western edge of the zone and extending into the Slopes. Localities include Batlow district, Gibraltar Range S.F.

#### 161. *Roundleaved Gum*

This type occurs through the Northern Tablelands, usually on rather poor soils. The stand is dominated by Roundleaved Gum, often with Manna Gum as a common associate, and with other associates including various Stringybarks, New England Blackbutt, Peppermints, Yellow Box and Fuzzy Box. Whilst it may form a wet sclerophyll forest stand up to 120 ft high, it more usually appears as a low-quality dry sclerophyll forest, often less than 60 ft in height. Localities include Wilson's Downfall, Gibraltar Range S.F., Jeogla district.

#### 162. *White Ash*

This type occurs commonly in the moist escarpment zone between the South Coast and Southern Tablelands, occurring on steep slopes (usually with southerly or easterly aspect) and fringing elevated peaks. White Ash frequently occurs in almost pure stands, though it may be associated with such species as Silvertop Ash, Mountain Grey Gum, Narrowleaved Peppermint, Messmate and Brown Barrel. Stand height may reach to 120 ft, though because of the exposed sites it is commonly much less. Localities include Beljilliga area, Currowan S.F., Kangaroo Valley.

#### 163. *New England Blackbutt*

*Composition:* New England Blackbutt dominates this variable type, occurring with a range wide of associates, including Grey Gum, White Mahogany, Blackbutt, Tallowwood, Messmate, Silvertop Stringybark, various other Stringybarks, Brown Barrel, Whitetopped Box, Snow Gum, Roundleaved Gum, Manna Gum, Blue Mountains Ash and Peppermints. In certain areas one or more of these associates may be present in sufficient number to achieve co-dominance with the New England Blackbutt, and in these cases separate sub-types can, if necessary, be recognised.

*Nature:* The type varies from wet sclerophyll forest up to 180 ft in height to dry sclerophyll forest less than 80 ft high. As a type, it tends to

replace the Grey Gum-Grey Ironbark league as the vegetation of shallow-soiled ridges in generally moist, but higher altitude, sites in northern N.S.W.

*Occurrence:* Extremely widely distributed on the Northern Tablelands, and extending to the North Coast districts on the elevated ridges. Localities include Whian Whian S.F., Girrard S.F., Gibraltar Range S.F., Orara West S.F., Moonpar S.F., Styx River S.F., Mt. Boss S.F., Hanging Rock S.F., Barrington Tops area.

#### 164. *Eurabbie*

This is a type of rather localised and scattered occurrence, found most commonly in the Southern Tablelands, but extending up to the Northern Tablelands (e.g. Carrai S.F.). It varies from dry to wet sclerophyll forest, and from about 50 ft to 120 ft in height. The type is dominated by Eurabbie, with which may be associated such species as Manna Gum and various Stringybarks and Peppermints. Localities include Talbingo Mountain and Burrinjuck Dam.

#### 165. *Gully Peppermint*

This type commonly occurs associated with the Yellow Stringybark-Gum (No. 157) and various of the Brown Barrel and Messmate types (Nos. 151-156) in the escarpment zone of the Southern Tablelands, where it frequently forms a wet sclerophyll forest up to 130 ft high. Localities include Beljilliga area, Robertson district. The type extends north to parts of the Central Tablelands.

#### 166. *River Peppermint*

This is a characteristic creek-bank community, found on the South Coast and extending into the adjoining areas of the Tablelands. River Peppermint commonly occurs in pure stands, or it may be associated with a number of other species, including River Oak, Roughbarked Apple, Fuzzy Box, Appletopped Box, Mountain Grey Gum, Manna Gum, Bangalay, Messmate, Brown Barrel and Forest Red Gum. It normally appears as wet sclerophyll forest up to 140 ft in height, though usually less than 100 ft high, occupying alluvial flats. Localities include the Mogila area and Bodalla S.F.

#### 167. *Silvertop Stringybark*

This type occurs in the Northern Tablelands, typically in the lower rainfall areas but on fertile soils. It is dominated by Silvertop Stringybark, with associated species including Manna Gum, Longleaved Box, Grey Box, other Stringybarks and New England Blackbutt. It forms a dry sclerophyll forest (sometimes wet), usually under 100 ft in height. Typical localities are mostly on the western part of the Northern Tablelands, e.g. Liverpool Ranges north of Merriwa, though stands that can be included in this type also occur in moister areas, often associated with the Messmate-Silvertop Stringybark type (No. 153), e.g. Barrington Tops area, Washpool S.F.

## B(1) YELLOW BOX-WHITE BOX-RED GUM LEAGUE

This league is comprised of a small group of types which occur throughout the Western Slopes districts and the western parts of Tablelands, typically as a savanna woodland community. The types are of very limited forestry interest, but they mostly serve as indicators of good pastoral and agricultural land. Because of this, undisturbed examples of these types are now extremely rare.

The league occurs on fairly deep soil of moderate to high fertility in a broad belt lying roughly between the 30 and 18 inches rainfall isohyets, at elevations extending up to about 3500 ft in the Northern Tablelands. Six types are recognised within the league.

### 172. *Yellow Box-Blakely's Red Gum*

This is probably the most characteristic type within this league, occurring as either tall or savanna woodland on undulating topography with fairly well-drained, deep soils of moderate fertility along the western side of the Tablelands and into the adjoining Slopes, e.g. Tumut district, Canberra district, Bathurst district and Armidale district. The stands are dominated by Yellow Box and Blakely's Red Gum, up to 80 ft in height, and associated species include Apple Box, Red Box, White Box, Roughbarked Apple, Manna Gum, various Peppermints, Red Stringybark and various other northern Stringybarks.

### 173. *Yellow Box-White Box*

This type is similar to the previous one in structure and general environmental requirements, but tends to occur under conditions of lower rainfall or more excessive soil drainage, e.g. Forbes district, Coolah district, Quirindi district and Inverell district. Yellow Box and White Box are the dominants, with associates including Blakely's Red Gum, Red, Narrow-leaved and Silverleaved Ironbark, Roughbarked Apple, various Stringybarks and White Cypress Pine.

### 174. *White Box-Western Boxes*

This type provides a link between the Yellow Box-White Box-Red Gum league and the Western Box-Ironbark league, occurring towards the western limits of this league's occurrence. It forms a savanna woodland in which White Box is associated with one or more species of other Boxes, including Fuzzy, Pilliga, Narrowleaved and Western Grey, as dominants. Other associates may include various Ironbarks, Red Gum, Yellow Box, Kurrajong and Bull Oak. Localities include Coolah district, Namoi Valley, Dubbo district and parts of the Pilliga Scrub.

### 175. *White Box*

In this type White Box clearly dominates the stand, with such species as Blakely's Red Gum, Yellow Box and Kurrajong occurring as relatively occasional associates. It tends to be found in sites that are either climatically or topographically drier than sites required by the Yellow Box-Blakely's Red Gum type. The type is widespread in the Western Slopes,

sometimes being restricted to steep west-facing slopes (e.g. parts of the Tumut Valley) and elsewhere occurring widely over undulating country (e.g. Inverell district).

#### 176. *White Box-Stringybark*

White Box and a Stringybark (commonly Red) dominate these stands, which occur on the more skeletal soils in areas where more favourable sites carry the White Box type. Other associated species include Silver-leaved and Red Ironbarks, Red Gum, Western New England Blackbutt and Black Cypress Pine. Typical localities include the Moonbi and Nandewar Ranges in northern N.S.W.

#### 177. *Red Gum-Stringybark*

In this type a Red Gum and a Stringybark occur as dominants, the Red Gum being represented by either Blakely's Red Gum or Tumbledown Gum, and the Stringybark usually by Red Stringybark or, in the more northern areas, by Broadleaved Stringybark. Other associated species may include Roughbarked Apple, Black Cypress Pine, Red Ironbark, Yellow and White Box and Western New England Blackbutt. The type is found widely distributed through the western edge of the Tablelands and extending into the Western Slopes districts, occurring on shallow, skeletal soils. Examples of the southern form of the type (Tumbledown Gum-Red Stringybark) are common in the eastern Riverina, while the northern form (Blakely's Red Gum-Broadleaved Stringybark) is well developed in the Tingha-Bundarra area

### B(m) BLACK CYPRESS PINE LEAGUE

This league has some forestry value both for productive and protection purposes. It typically contains Black Cypress Pine, usually as a clear dominant in the stand, and it occupies steep slopes and ridges where there is commonly only shallow soil depth. It is most widespread in the Western Slopes districts and at lower altitudes on the western parts of the Tablelands.

Structurally the league shows features of both savanna woodland and dry sclerophyll forest communities, the more open stands resembling the former and more closed stands the latter. Height development is usually poor, rarely exceeding 50 ft, but nonetheless the stands are often logged for the Cypress Pine stems. Six types are recognised in the league, one of these being considered in more detail under the White Cypress Pine league.

#### 180. *Black Cypress Pine*

This type is clearly dominated by Black Cypress Pine alone, though other tree species may be associated, including Ironbarks, White Box, Stringybarks, Broadleaved Peppermint and White Cypress Pine. It is found through the Slopes and Tablelands districts on steep slopes with skeletal soils, though individual stands are usually of limited extent. Localities include parts of the Tumut Valley, the Mudgee district and the Moonbi Ranges.

### 181. *Black Cypress Pine-Ironbark*

This type is found mostly in the drier parts of the league's range of occurrence, with Black Cypress Pine being associated with one or other of the western Ironbarks—Narrowleaved, Red, Blueleaved, or Silverleaved. Other species which may also be present include Smoothbarked Apple, Bull Oak, Brown Bloodwood, Red Gum and various western Boxes. It occurs on areas with shallow, skeletal soils, particularly in the northern half of the state. Sub-types can be recognised, dependent upon the species of Ironbark which shares dominance with the Black Cypress Pine.

### 182. *Black Cypress Pine-Box*

In this type Black Cypress Pine is associated with one of several species of Boxes, including White, Grey, Western Grey and Red, and less commonly Yellow and Bimble Box. Various sub-types can be recognised, dependent upon the associated Box species present. Other species occurring in the type include Ironbarks, Smoothbarked Apple and Red Gum. The type generally occurs in more easterly localities than the previous type.

### 183. *Black Cypress Pine-Red Gum*

Black Cypress Pine shares the dominance of the stand in this type with one of the Red Gums, usually Tumbledown Gum or, less commonly, Blakely's Red Gum. Other associated species may include Smoothbarked Apple, Ironbarks, Brown Bloodwood, Stringybark and White Cypress Pine. This is probably the most widely occurring type in the league.

### 184. *Black Cypress Pine-Scribbly Gum*

This type connects the Black Cypress Pine League with the Scribbly Gum-Stringybark-Silvertop Ash League, and occurs on skeletal soils of low fertility, usually in the somewhat higher altitude sites, including parts of the Monaro district and in the Warrumbungle Ranges. Black Cypress Pine and Scribbly Gum occur as dominants, with other associated species including Brown Bloodwood, Stringybark and Red Box.

Elsewhere at higher elevations, Black Cypress Pine may share stand dominance with Apple Box, Manna Gum and Snow Gum. These are of relatively rare occurrence, though all three combinations have been recorded from the Monaro district. If necessary for forest typing purposes, they can be regarded as sub-types of this Black Cypress Pine-(Scribbly) Gum type.

### 185. *Black Cypress Pine-White Cypress Pine*

See type 194 (White Cypress Pine-Black Cypress Pine type) for notes and description.

## B(n) WHITE CYPRESS PINE LEAGUE

This is the most important league found in the interior of N.S.W., where it originally occupied extensive areas. Because many of the sites that it occupies have proved suitable for pastoral and agricultural purposes

the league has been destroyed over wide areas, and considerably altered by man's activities elsewhere. Even so it still occurs over a greater area of State Forests than any other league, covering an area in the order of one and a half million acres. These forests and other Crown Lands currently yield some 30 million super feet Hoppus of Cypress Pine saw-logs each year while private property sources supply a similar volume.

The league occurs throughout western N.S.W., with the more important and productive stands found on the Slopes and Plains between about the 25-inch and 15-inch isohyets. It shows a general preference for rather light, well-drained soils.

The league is typified by the presence of White Cypress Pine as a dominant or indicator species in the stand. This is associated with a wide variety of other species, and the late A. D. Lindsay recognised no less than 40 different forest types containing White Cypress Pine, while other ecologists have described still more communities. Many of Lindsay's types contain the same species, but are distinguished by the relative dominance of these. Thus he separated the White Cypress Pine-Narrow-leaved Ironbark-Bull Oak type from the Narrowleaved Ironbark-Bull Oak-White Cypress Pine type; these are the "PCO" and "COP" types which occupy a large proportion of the Pilliga Scrub. Similarly, no less than seven types contained White Cypress Pine in association with different Boxes, while an equivalent seven types were recognised with the Box species given predominance. In the classification used here, these combinations have been grouped into a total of only seven broad types, which can where necessary be split into sub-types when the intensity of typing favoured by Lindsay is required.

Most of the White Cypress Pine stands have a woodland structure, varying from tall woodland in the more favoured sites to shrub woodland in the drier areas, and this would appear to have been the original structure of the league, with the eucalypts normally attaining a slightly greater height than the White Cypress Pine, with stand heights of up to about 80 ft. However, in individual sites the structure has been considerably altered by man's activities.

#### 188. *White Cypress Pine*

*Composition:* This type is clearly dominated by White Cypress Pine in almost pure stands, though occasional eucalypts of equal or greater height may be present, and smaller species, including Mulga, Ironwood and Silverleaved Ironbark, may be common in certain areas.

*Nature:* This type was apparently rare under natural conditions, the main occurrences being in the far northern areas, where the Pine is associated with depauperate Silverleaved Ironbark, and in the far West where Mulga and Ironwood are associated. However stands that should be included in this type are becoming widespread as stand improvement treatments and other activities reduce the less valuable eucalypts and favour the dominance of White Cypress Pine. Over an extended period of treatment, a large area of the western forests could be converted to this type.

*Occurrence:* In its natural state this type occurs in the Terry Hie Hie group of forests and in parts of the Western Division, but as a result of man's activities examples now can be found in many managed forests in all western districts.

#### 189. *White Cypress Pine-Narrowleaved Ironbark*

*Composition:* White Cypress Pine, Narrowleaved Ironbark, and Bull Oak occur as the dominants in this type, though the Oak may be absent (often as a result of treatment). Other associated species may include Blakely's Red Gum, Blueleaved Ironbark, Roughbarked Apple, Belah and Budda. Frequently the Oak occurs in very dense clumps which hinder the establishment of the more desirable species.

*Nature:* The most widespread of the White Cypress Pine types occupying nearly 40 per cent of the total area of managed Cypress Pine forests and normally occurring on sandy soils, frequently with an underlying hardpan.

*Occurrence:* Found in the northern half of the State, from about Dubbo to the Queensland border, and particularly widespread in the western parts of the Pilliga Scrub.

#### 190. *White Cypress Pine-Brown Bloodwood*

Brown Bloodwood occurs as a dominant with White Cypress Pine in this type, other common associates including Narrowleaved and Blueleaved Ironbarks and a Red Gum (usually probably Tumbledown Gum). It occupies poor, sandy soils in the more upland areas, including the eastern part of the Pilliga Scrub and the Yetman district. The stands are usually of low quality and little productive capacity.

#### 191. *White Cypress Pine-Western Ironbarks*

*Composition:* In this type White Cypress Pine occurs with one or other of the western Ironbark species (other than Narrowleaved Ironbark, see type 189) as dominants. Thus sub-types can be recognised, based on the presence of Blueleaved, Red or Silverleaved Ironbark in the stand. Other species present may include Bull Oak, a Red Gum, Roughbarked and Smoothbarked Apples, Black Cypress Pine and various Boxes.

*Nature:* This is a variable type, phases containing Silverleaved Ironbark (e.g. Narrabri and Inverell areas) being the most valuable and usually of good quality, whilst the other phases are generally of lower value, though capable of producing Pine logs.

*Occurrence:* Largely confined to the more northern parts of the State, where it is common in the Dubbo, Narrabri and Inverell districts. The sub-type containing Red Ironbark extends throughout the Forbes forestry district, where it is reasonably common on shallow soils in hilly areas.

#### 192. *White Cypress Pine-Red Gum*

*Composition:* Red Gum combines with White Cypress Pine as the dominants in this type. The Red Gum is usually regarded as Blakely's

Red Gum, though this may commonly be a mistaken identification for Tumbledown Gum, while the closely related Dwyer's Red Gum may also occasionally be present as a dominant (Mt. Binya S.F.). Other associated species may include Roughbarked and Smoothbarked Apple.

*Nature:* Except for the typical and restricted stands with Dwyer's Red Gum, which occur on shallow, hilly sites, this type is characteristically found on deep sands, e.g. the "sand monkeys" of the Pilliga Scrub. The stand is commonly a rather open savanna woodland in which the Pine reaches large dimensions.

*Occurrence:* The type is most widespread in the northern parts of the State, but is found south to the eastern part of the Forbes district.

### 193. *White Cypress Pine-Box*

*Composition:* This is another broad type which may frequently need to be split into a number of sub-types, dependent upon the species of Box which shares dominance with White Cypress Pine. Occasionally two or more Box species may occur in the stand together, but usually only a single species is found with the Cypress Pine in any stand. The species occurring as dominants are Yellow, Western Grey, Narrowleaved, White, Pilliga, Fuzzy, Bimble and Western Red Box. Other associates may include Red Gum, Ironbarks and Bull Oak.

*Nature and Occurrence:* As is to be expected by the variety of co-dominants which can occur with the White Cypress Pine, this type occurs over a range of sites and with different productive capacities, site quality being roughly in the order in which the individual Boxes are listed above. The type occurs throughout the western districts. The Yellow Box sub-type is found in the southern parts of the State on rather light, sandy soils; it includes the communities found on sandhills in parts of the River Red Gum forests of the Mathoura area, where the White Cypress Pine appears to be variably distinct from the usual species. Bimble Box occurs in all districts, usually though not invariably on heavy soils. The Pilliga Box sub-type is restricted to sites north of the Warrumbungle Range, occurring on heavy soils; it is common in parts of the Pilliga Scrub. The Narrowleaved and Western Grey Box sub-types replace the Pilliga Box further south, but occur also on lighter, loamy soils, while the Fuzzy Box sub-type has somewhat similar site requirements but occurs more rarely in parts of the central west. By contrast the White Box sub-type shows a preference for rather gravelly soils and is found in most districts, while the Western Red Box sub-type is confined to low rainfall sites in the Western Division, usually on rather sandy soils.

### 194. *White Cypress Pine-Black Cypress Pine*

In this type both major species of Cypress Pine occur as co-dominants, thus serving to connect the two leagues. Where the Black Cypress Pine is clearly the more important constituent of the stand, the type is probably better included in the Black Cypress Pine league (see No. 185). Besides the two pines, other associates may include Roughbarked and Smoothbarked Apple, Red Gum, Stringybark, Kurrajong and certain Ironbarks. The type is encountered fairly commonly in areas of rather broken relief,

particularly in northern districts (e.g. Moonbi Range, Bingara district), but individual stands are usually limited in extent.

### B(o) RIVER RED GUM LEAGUE

This league occurs throughout western N.S.W., forming ribbon-stands along the banks of most inland streams as far east as Tumut and Tamworth. Towards its eastern limits it merges with the River Oak type (No. 94). The league is distinguished by the presence of River Red Gum, which occurs pure in one of the two types recognised and mixed with other species in the other type. Whilst over most of its range this league is of limited forestry importance, along parts of the Murray and Murrumbidgee River flats it occupies extensive areas (totalling some 200,000 acres) and forms a tall forest community with trees up to 180 ft in height. These forests support locally important sawmilling industries. Elsewhere the league appears as a savanna woodland community. It invariably occupies low, riverside sites subject to periodic flooding.

#### 199. *River Red Gum*

*Composition:* This is undoubtedly the most pure forest community occurring in N.S.W., consisting of River Red Gum alone, with an understorey of grasses, sedges, rushes and other herbs. Only as conditions for River Red Gum growth become less favourable do other tree species, typically certain Boxes, start to become associated with the Red Gums, forming a connection with the succeeding type.

*Nature:* Whilst usually a savanna woodland community of trees from 40 ft to 100 ft in height, in the areas of major forestry interest it forms a tall forest up to 180 ft in height. It occupies riverside flats subject to periodic flooding, being found in such sites throughout western N.S.W.; in the less favourable areas it may occur as a single line of trees overhanging the stream.

*Occurrence:* Whilst found throughout the western districts, it is best developed and of greatest forestry importance along parts of the Murray and Murrumbidgee Rivers, the most extensive and valuable stands being located upstream from the Cadell Tilt, in the vicinity of Deniliquin, Mathoura and Echuca, along the Murray and Edwards River waterways. Various site qualities can be recognised in the forests in this area, these being related to the frequency of periodic flooding; these site qualities can be used as the basis for distinguishing sub-types.

#### 200. *River Red Gum-Black Box|Coolabah*

This type commonly adjoins the River Red Gum type on sites subject to less regular flooding. Black Box is associated with River Red Gum over most of the western areas, but towards the north this tends to be replaced by Coolabah, with Carbeen also sometimes associated in the relatively higher rainfall areas of the northwest (e.g. near Narrabri). Other species, including Yellow Box and Western Grey Box, may also occur as associates of River Red Gum in certain areas, and these may at times warrant recognition as separate sub-types.

## B(p) WESTERN BOX-IRONBARK LEAGUE

This league is made up of a somewhat variable group of types which typically are dominated by one or more of the western species of Box and Ironbark, and which lack dominance by either White or Black Cypress Pine. The league is a western form of the Grey Box-Ironbark league (Nos. 80-87), and merges with this in a few localities, notably in the drier parts of the Hunter-Goulburn Valley. It is also ecologically related to the Yellow Box-White Box-Red Gum league and to both the Cypress Pine leagues, with all of which it may intimately occur.

Individual types, of which nine are recognised, occupy a variety of sites through the western districts of the State. The types are frequently useful for the supply of local fuel timber and round and hewn timber, but their general value to production forestry in N.S.W. is slight. Most types normally occur with a woodland structure, though some of the types carrying Ironbarks and Stringybarks may approach dry sclerophyll forest in structure.

### 202. *Black Box|Coolabah*

This type occurs on flat, poorly drained sites subject to periodic but irregular inundation. Soils are usually heavy. Both Black Box and Coolabah may occur together in the stands, though more usually one or the other dominates, Black Box being more prevalent in the southern areas and Coolabah in the north. Sub-types can be recognised on this basis. The type is widespread throughout the far western areas, being found in the vicinity of watercourses. A similar community, dominated by Napunyah, occurs along the Paroo River and Cuttaburra Creek and if encountered can be regarded as a further sub-type.

### 203. *Western Box*

This type closely parallels the White Cypress Pine-Box type (No. 193), from which it is distinguished by the absence of the Pine, except as a very occasional stem. The stands are dominated by one, or rarely more, species of Box, including Bimble, Pilliga, Fuzzy, Western Grey and Narrowleaved Box. Yellow Box and White Box may also sometimes be associated. On this basis at least five sub-types can be recognised, depending upon the predominant species present. Occurrence and site requirements for these are generally as described for the corresponding White Cypress Pine-Box sub-types, and they tend to be found throughout the Western Slopes and Plains districts, the Fuzzy Box sub-type extending into the Northern Tablelands (e.g. in the vicinity of Wollomombi) and occasionally to the coastal districts (e.g. Koreelah area in the Upper Clarence Valley). Besides the Box species, other species may occur as minor associates in this stand, including occasional Ironbarks, Red Gum, Kurrajong, Wilga, Budda, Belah and Bull Oak.

### 204. *Ironbark-Western Box*

This again represents a rather mixed type, in which various western Ironbarks, notably Red, Silverleaved and Narrowleaved, occur as co-dominants with White Box, Narrowleaved Box, Western Grey Box and more rarely Yellow Box. Previous work in western N.S.W. has shown the presence of at least six sub-types: Red Ironbark-Narrowleaved Box,

White Box and Western Grey Box; Silverleaved Ironbark-White Box and Yellow Box; and Narrowleaved Ironbark-White Box. These are found throughout the Western Slopes and extending into the Plains, usually on rather excessively drained, skeletal soils. The Red Ironbark-Western Grey Box sub-type also occurs extensively in parts of Western Victoria, where it has in the past been a valuable production forest type. Other eucalypts, Apples and Cypress Pines may occur as associates in this type, which often has a dry sclerophyll forest structure.

#### 205. *Ironbark-Red Gum*

In this type a Red Gum (most commonly Tumbledown Gum, less commonly Blakely's Red Gum) is associated with an Ironbark as co-dominants. Red Ironbark is probably the most common Ironbark in the type, and the Red Ironbark-Tumbledown Gum sub-type has been widely recognised in the southern parts of the State, where it occurs as a depauperate form of dry sclerophyll forest as far west as Nymagee and Roto, occupying broken country with skeletal soils. In more northern areas (e.g. Pilliga Scrub), Narrowleaved and Blueleaved Ironbarks tend to replace the Red Ironbark in this type. Associated species in the type may include Roughbarked Apple, Red Stringybark, Black and White Cypress Pines and various wattles.

#### 206. *Red Ironbark*

This type, with a dominance of Red Ironbark, is found in the western districts on rather broken topography east of about the 15-inch isohyet. It extends eastward through the Western Slopes to the edge of the Tablelands, and also appears in a few parts of the coastal districts. The type normally occurs as a depauperate dry sclerophyll forest and is usually fairly pure in composition, though a wide range of other trees may occur as occasional associates; these include Tumbledown Gum, White and Narrowleaved Box, Black Cypress Pine, Roughbarked Apple, Red Stringybark and Kurrajong.

#### 207. *Silverleaved Ironbark*

Stands dominated by Silverleaved Ironbark are found in the north-western districts, east of the 18-inch isohyet and extending into the Northwestern Slopes. The type also has an anomalous occurrence in the Upper Clarence Valley on the North Coast. It occurs in well-drained, usually somewhat elevated sites on coarse soils, appearing as a savanna woodland. Associates also present may include occasional White and Black Cypress Pines, Narrowleaved Ironbark, Brown Bloodwood, Roughbarked Apple, Red Ash, Red Gum, Bull Oak and Hairy Oak. The type is common in the Bingara area.

#### 208. *Narrowleaved Ironbark-Bull Oak*

This type is related to the White Cypress Pine-Narrowleaved Ironbark type (No. 189), but is distinguished from it by the absence of Cypress Pine other than as a very occasional stem. It is marked by the dominance of Narrowleaved Ironbark with Bull Oak, the latter being of smaller stature than the Ironbark. Other associates may include Red Gum, Silverleaved Ironbark and certain Boxes. The type occurs in the northern parts of the Western Slopes.

### 209. *Ironbark|Red Gum-Brown Bloodwood*

This type represents a poorer form of the Ironbark-Red Gum type (No. 205), occurring in the northern parts of the Western Slopes on usually shallow and infertile soils. Brown Bloodwood is invariably present, with a Red Gum, Narrowleaved and/or Blueleaved Ironbark occurring as co-dominants. Other associates include Scribbly Gum and occasional Black or White Cypress Pine. The type is common on the slopes of the Warrumbungle Ranges and extends up to the Queensland Border.

### 210. *Red Ironbark-Stringybark*

This type occurs on shallow, skeletal soils in various parts of the Western Slopes, from south to north. Red Ironbark shares dominance with a Stringybark, usually Red Stringybark in the south and Broadleaved Stringybark in the northern districts. Other associates may include Roughbarked Apple, Red Gum, White Box and occasional Black Cypress Pine.

## C. NON-FOREST AND ARTIFICIAL GROUP

This third and final group is made up of those vegetation communities and related features which are either artificially created or else lack a dominance of trees. Three assemblages of such types are recognised: clearly artificial communities, natural communities dominated by shrubs and other small woody plants, and natural communities dominated by herbs and similar low-growing plants. Apart from forestry plantations, these various types are of limited forestry interest, though several provide various minor forest products or serve valuable protective functions.

### C(a) ARTIFICIAL COMMUNITIES

This grouping consists of four types which have been artificially created by man, and which bear little if any relationship to the original vegetation.

#### 216. *Agricultural Pasture and Cropland*

In this type are included those areas which are used for annual agricultural crops (e.g. wheat, maize, potatoes, legumes) or which have been converted to permanent pasture. In a few western districts the distinction between natural grasslands and artificial pastures may be hard to make, but usually this type will be clearly defined.

#### 217. *Agricultural Plantation, Orchards and Vineyards*

By contrast with the previous type, this type includes the perennial and taller-growing agricultural crops, e.g. bananas, oranges, apples, cherries, grapes and passionfruit. Such communities are usually clearly marked.

#### 218. *Forestry Plantations*

This type covers the artificial tree stands deliberately created for forestry purposes, e.g. *Pinus radiata*, *P. elliottii*, Hoop Pine and Flooded

Gum. Such stands are usually clearly defined, though difficulties may arise in sites where enrichment planting has been practised. Where enrichment planting aims merely to inoculate the site with scattered stems of the planted species, while maintaining the native species and the natural forest structure, such plantings are probably best included in the natural forest type. Where, however, the ultimate result is to convert the site by subsequent clearing to virtually pure stands of the planted species (e.g. plantings of Hoop Pine under shelter on Mt. Pikapene State Forest during the 1920's and 1930's), the plantings are best regarded as producing this artificial type.

#### 219. *Settlements, Roads, etc.*

This type is erected to cover other obviously artificial communities which cover extensive areas.

### C(b) SHRUB-DOMINANT COMMUNITIES

This assemblage of types covers those natural communities which lack the presence of trees, but which are dominated by other forms of woody plants reaching a height of at least one foot above the ground. Four separate types are recognised, each being fairly clearly defined.

#### 223. *Heath*

Heath is a closed community of small shrubs, normally from about one foot to four feet in height (occasional stems taller), most of the constituent plants possessing small, xeromorphic and frequently sharp-pointed leaves. Such communities usually occur on shallow soils of very low fertility, and the type is found in various coastal and Tableland areas, e.g. some North Coast sand flats (Evans Head and Coff's Harbour aerodromes), sandstone ridgetops in the Sydney Area (French's Forest), exposed ridgetops on the Blue Mountains (vicinity of Bell, Narrow Neck Peninsula), exposed areas in the Monaro district (Kybean Range, Kosciusko Massif). Epacrids and dwarf myrtaceous plants (e.g. *Kunzea*, *Baeckea*, *Leptospermum*) are commonly well represented in these communities.

#### 224. *Scrub*

Scrub may merge into Heath, but typically consists of taller shrubs with heights of from 4 ft to 25 ft. Leaf-form is variable, and the stands may range from tightly closed communities (e.g. Teatree Scrubs in littoral situations) to the more open communities found in western districts. In coastal and highland areas Scrub is commonly confined to exposed sites or sites with very shallow soils, and it is particularly common in windswept headlands and beach fronts, though by no means confined to such sites. Coastal Scrubs with a predominance of species of rainforest affinities and with vines common should be classed as Viney Scrub (No. 26). In western areas closed Scrub communities may also be found on sites with adverse soil conditions, e.g. Lignum and Broombush communities. More usually however they replace the woodland communities as rainfall becomes increasingly limiting, and they are widespread in western N.S.W., particularly on the lighter-textured soils. These western Scrubs are commonly

dominated by a single species, leading to the recognition of a variety of sub-types. Among the species dominating these stands are Mulga, Ironwood, Myall, Yarran, Brigalow, Gidgee and Deadfinish, Wilga, Western Rosewood, Leopardwood, Budda, Emubush, Sugarwood and Belah.

#### 225. *Mallee*

Mallee is a vegetation type related to dry sclerophyll forest (with which it is frequently closely associated in the field) and dominated by dwarf eucalypts which have numerous slender aerial stems arising from a large underground lignotuber. The aerial portions of the plants commonly form a closed canopy. Mallee is usually found on shallow soils of low fertility, and it can occur throughout the State. Stand heights range from about one foot in the case of some Blue Mountains Mallee communities on exposed ridges near Katoomba, to over 25 feet in some of the Red Mallee-White Mallee stands in the West Wyalong district. Whilst Mallee can be found from coastal areas (e.g. Port Jackson Mallee, near Terrey Hills), on to the Tablelands (stands recorded from the Monaro, Blue Mountains and parts of the New England Tablelands) and so to the far west of the State, the most important stands are those of the western districts where several species, and particularly the Blue Mallee, yield essential oils on which local industries are based.

#### 226. *Saltbush*

Saltbush is a vegetation type confined to the western parts of the State, usually on heavy-textured soils, and composed of an open community of salt-tolerant shrubs (typically of the family Chenopodiaceae). Individual plants range from about a foot in height up to some 10 feet in the case of stands dominated by Old Man Saltbush. The type, which may have a variety of dominant species, occurs over extensive areas in the far west and southwest of N.S.W., where it forms a valuable grazing type.

### C(c) HERB-DOMINANT COMMUNITIES

This final group of types covers those natural communities which are dominated by herbs and dwarf shrubs (less than a foot in height), or which are virtually lacking in a vegetation cover. Five types are recognised.

#### 230. *Natural Grassland*

The Natural Grassland type is a community occurring under natural conditions and dominated by grasses. Various forms of Grassland can be distinguished, based on the habit of growth of the dominant species present, but for forestry purposes the broad type should normally be adequate. Natural Grassland occurs most widely on heavy soils in parts of the Western Slopes and Plains (e.g. the Mitchell Grass plains of the northwest), but smaller occurrences are found elsewhere in the State, including the valley Grasslands common in the Canberra-Monara region; the Snow Grass communities found at high altitudes in the Snowy Mountains; the rainforest-surrounded "plains" found in isolated sites at medium-high altitudes on the North Coast (e.g. Carrai S.F., Clouds Creek S.F.); the rather anomalous sites near Casino where the soil exhibits a

gilgai formation; and certain exposed coastal headlands and islands, such as McCauley's Headland and Muttonbird Is., near Coff's Harbour.

### 231. *Bog and Fen*

Bog and Fen are herb-dominated communities occurring in perpetually moist sites. In Bog, hummock-forming mosses (typically *Sphagnum*) are present, while these are absent in Fen. Sedges, rushes, reeds and similar moisture-loving monocotyledonous plants are usually dominant, though dwarf shrubs may also be present. Bog is virtually confined to high altitude sites along the Tablelands, where it serves a valuable function in controlling streamflow. Fen is also not uncommon at high altitudes, but can occur down to sea level in swampy sites.

### 232. *Herbfield and Fjaeldmark*

These are both alpine types which are probably confined to the highest parts of the Snowy Mountains in N.S.W. Herbfield is a closed community dominated by small perennial herbs, including grasses, while Fjaeldmark is an open community of dwarf flowering plants, mosses and lichens, with dwarf, sprawling shrubs usually being dominant. Herbfield has been utilised for summer-grazing, but both types are undoubtedly of much greater value left undisturbed for erosion control and catchment purposes.

### 233. *Sand Ridge*

This type is typically unvegetated or supports only scattered, pioneering herbs (e.g. *Spinifex*, Pigface). However, both in littoral sites and in some western areas the recognition of unstabilised Sand Ridges may be important for forestry and related purposes.

### 234. *Rock*

Bare Rock seldom occurs over extensive areas, but the recognition of local outcrops may be necessary for forestry purposes. Such outcrops are found in many forest areas. Apart from lichens, mosses and some herbs established in crevasses, they are usually unvegetated.

National Library of Australia card number  
ISBN 0 7240 4757 3  
ISSN 0085-3984