

Alex McHoughlin

MANAGEMENT PLAN FOR

CASINO

MANAGEMENT

AREA

1983



FORESTRY COMMISSION OF N.S.W.

THE JOHN MACKAY
MEMORIAL LIBRARY

FORESTRY COMMISSION OF N.S.W.

MANAGEMENT PLAN

FOR

CASINO MANAGEMENT AREA

Operative from: July, 1983

This plan covers the management under the authority of the Forestry Act, 1916, of Casino Management Area, which consists of the indigenous forest Crown-timber lands within Casino Forestry District.

Approved Forestry Commission operating procedures, including the stumpage appraisal system for sawlogs, prescriptions relating to harvesting and various instructions relating to road construction and design, are integral with the plan.

The prescriptions outlined are within the ambit of the Commission's Statement of Indigenous Forest Policy (October, 1976).

THE JOHN MACKAY
MEMORIAL LIBRARY

3244

CASINO MANAGEMENT PLAN

INDEX

PART I - SUMMARY OF FACTS ON WHICH PROPOSALS ARE BASED

| | <u>Page</u> |
|--|-------------|
| 1.1 <u>Identification of Management Area</u> | 1 |
| 1.1.1 Location and Extent | 1 |
| 1.1.2 Area and Land Tenure | 1 |
| 1.2 <u>Natural Environmental Features</u> | 3 |
| 1.2.1 Configuration | 3 |
| 1.2.2 Climate | 3 |
| 1.2.3 Geology and Soils | 3 |
| 1.2.4 Vegetation | 4 |
| 1.2.5 Fauna | 6 |
| 1.3 <u>Developments</u> | 7 |
| 1.3.1 Capital Improvements | 7 |
| 1.3.2 Management Developments | 7 |
| 1.4 <u>Silvicultural Considerations</u> | 12 |
| 1.4.1 History of Silvicultural Development | 13 |
| 1.4.2 Present Condition and Silvicultural Characteristics of Forest Communities | |
| 1.4.3 Damage Agencies | 15 |
| 1.5 <u>Timber Yield Considerations</u> | 17 |
| 1.5.1 Past Yields | 17 |
| 1.5.2 Basis of Present Yield Determination | 17 |
| 1.5.3 Future Yield Prospects | 21 |
| 1.6 <u>Non-Wood Values</u> | 23 |
| 1.6.1 Catchment | 23 |
| 1.6.2 Aesthetic and Recreational | 23 |
| 1.6.3 Nature Conservation, Scientific and Educational | 23 |
| 1.6.4 Grazing | 24 |
| 1.6.5 Apiculture | 24 |
| 1.6.6 Gravel Resource | 24 |
| 1.7 <u>Social Environment</u> | 25 |
| 1.7.1 General | 25 |
| 1.7.2 Social History | 25 |
| 1.7.3 Forest-Dependent Industries | 27 |
| 1.7.4 Other Forest Uses and Demands | 29 |
| 1.7.5 Employment | 29 |
| 1.8 <u>Economic Considerations</u> | 30 |
| 1.8.1 Timber Sales | 30 |
| 1.8.2 Other Revenue | 31 |
| 1.8.3 Expenditure | 31 |
| 1.8.4 Labour Requirements | 31 |

CASINO MANAGEMENT PLAN

INDEX

PART II - FUTURE PROPOSALS

| | <u>Page</u> |
|--|-------------|
| 2.1 <u>General Basis of Management</u> | 32 |
| 2.1.1 Management Objectives | 32 |
| 2.1.2 Management Strategy | 32 |
| 2.1.3 Division of the Area | 34 |
| 2.1.4 Period of the Plan | 34 |
| 2.2 <u>Plan for the Sawlog Working Circle</u> | 35 |
| 2.2.1 Constitution of the Working Circle | 35 |
| 2.2.2 Yield Regulation | 35 |
| 2.2.3 Commercial Operations | 35 |
| 2.2.4 Cultural Operations | 37 |
| 2.3 <u>Plan for the Pole Working Circle</u> | 39 |
| 2.3.1 Constitution of the Working Circle | 39 |
| 2.3.2 Yield Regulation | 39 |
| 2.3.3 Commercial Operations | 39 |
| 2.3.4 Cultural Operations | 41 |
| 2.4 <u>Plan for the Preserved Areas Working Circle</u> | 42 |
| 2.4.1 Constitution of the Working Circle | 42 |
| 2.4.2 Management Prescriptions | 42 |
| 2.5 <u>Protection Prescriptions</u> | 43 |
| 2.5.1 Fire Protection | 43 |
| 2.5.2 Flora | 43 |
| 2.5.3 Fauna | 43 |
| 2.6 <u>Timber Yield Investigations</u> | 44 |
| 2.6.1 Growth Information | 44 |
| 2.6.2 Monitoring of Actual Against Estimate Yields | 44 |
| 2.7 <u>Miscellaneous Prescriptions</u> | 45 |
| 2.7.1 Capital Improvements | 45 |
| 2.7.2 Recreation | 45 |
| 2.7.3 Research | 45 |
| 2.7.4 Grazing | 45 |
| 2.7.5 Apiculture | 45 |
| 2.7.6 Gravel | 46 |
| 2.7.7 Defence Forces Usage | 46 |
| 2.7.8 Labour Provisions | 46 |
| 2.8 <u>Management Plan Control</u> | 47 |
| 2.8.1 Annual Reports | 47 |
| 2.8.2 Records | 47 |

Appendices

1. Locality Map of Casino Management Area
2. Rainfall and Temperature Statistics for Casino
3. Taxonomic List of Dominant Vegetation Species known to occur within the Management Area.
4. Taxonomic List of Native Fauna known to occur within the Management Area.
5. (a) Area Composition of Sawlog and Pole Working Circles within State Forests by Compartments and by Broad Forest Types.
(b) Distribution of Pole and Sawlog Working Circles.
6. Mapping and Aerial Photography
7. Past Timber Yields - (a) Tabular Statement
(b) Histogram
8. 1972 Inventory Assessment and Yield Calculations
(a) Assessment Method
(b) Assessment Results
(c) Yield Calculations
9. Basis of Sawlog Yield Determination.
10. Basis of Pole Yield Determination.
11. List of Preserved Areas
12. List of Crown Land Consolidation Act Leasehold Tenures Dedicated as State Forests.
13. Location of Gravel pits

PART 1

Summary of Facts on which Proposals are Based

Chapter 1.1 Identification of Management Area

1.1.1 Location and Extent

The Management Area is located generally on the coastal plain between the Clarence and Richmond Rivers in the north-east of New South Wales. The Area is located generally south of the town of Casino, which is the administrative centre. It lies within:

- . Latitudes 28° 40' S and 29° 30' S
- . Longitudes 152° 50' E and 153° 35' E
- . Counties of Richmond, Clarence and Rous
- . Shires of Richmond River, Copmanhurst, Maclean, Kyogle and Ballina, City of Lismore, and Municipality of Casino
- . State Electorates of Clarence and Lismore.

The Pacific Highway, Summerland Way and North Coast Railway Line pass through the Area in a north/south direction.

Appendix 1 is a locality map of the Management Area.

1.1.2 Area and Land Tenure

The Management Area consists of all indigenous forest Crown-timber lands in Casino Forestry District, Casino Forestry Region, except those included in the Whiporie and Grevillia Management Areas. These management areas include areas acquired or demarcated and harvested in preparation for the establishment of exotic pine plantations.

The Crown-timber lands fall into four categories. These categories and their areas in the Management Area are as follows:

| <u>Broad Tenure Category</u> | <u>Area (hectares)</u> |
|--|------------------------|
| State Forests | 56 973 |
| Vacant Crown Lands | 8 389 |
| Leaseholds (includes small area of Travelling Stock Reserves under Pastures Protection Board administration) | 3 024 |
| Purchase-Tenure Lands | <u>1 503</u> |
| Total Management Area | <u>69 889</u> |

The State Forests are:

| State Forest | No. | Gazetted Area (ha) (as at 30/6/83) |
|-------------------|-------|---------------------------------------|
| Banyabba (part) | 737 | 3414* |
| Braemar | 9 | 1968 |
| Bungabee | 171 | 1471 |
| Bungawalbin | 152 | 6356 |
| Camira | 18 | 3852 |
| Carwong | 345 | 582 |
| Devils Pulpit | 16 | 4454 |
| Doubleduke | 15 | 8514 |
| Eden Creek (part) | 1013 | 20* |
| Ellangowan | 7 | 1167 |
| Gibberagee (part) | 19 | 12800* |
| Mororo | 833 | 1659 |
| Myrtle | 559 | 4333 |
| Royal Camp | 794 | 2160 |
| Tabbimoble | 8 | 2503 |
| Whiporie (Part) | 928 | 1720* |
| | | <hr/> |
| | Total | 56973 |

* Excludes areas included in Whiporie and Grevillia Management Areas.

Some of these State Forests comprise the following National Forests:

| National Forest | No. | Gazetted Area (ha) | State Forests Included |
|-----------------|-------|--------------------|------------------------|
| Braemar | 34 | 2828 | S.F. No. 9, Pt. 7 |
| Carwong | 32 | 582 | S.F. No. 345 |
| Myrtle | 36 | 1923 | Pt. S.F. No. 559 |
| | | <hr/> | |
| | Total | 5333 ha | |

Areas for State and National Forests are from the Forestry Commission's schedules of gazetted areas as at 30/6/83.

Areas for other Crown-timber lands are reasonable estimates as at 30/6/83 and will vary with changes in tenure.

Most leasehold lands or Vacant Crown lands currently considered suitable and available for State Forest dedication are in process of State Forest dedication. Other minor areas are being progressively reviewed.

Twelve Crown Land Consolidation Act leasehold tenures have been dedicated as State forest and are included within the State Forest areas. They are listed in Appendix 12 and are summarised as follows:

| | Area (ha) |
|----------------------|--------------|
| Terminating Leases | 1 491 |
| Leases in Perpetuity | <u>2 919</u> |
| | <hr/> |
| Total | <u>4 410</u> |

Chapter 1.2 Natural Environmental Features

1.2.1 Configuration

The northern and most substantial part of the Management Area lies within the lower Richmond River catchment, with the much smaller southern part in the Clarence River catchment. These catchments are separated by the Richmond Range and dissected by numerous waterways. Both catchments contain large areas of flood plains, making flat topography a feature of the Management Area. Some steep slopes are associated with the Richmond Range and the Mackellar Range in the north.

In general the Area is characterised by a high proportion of flat to gently undulating country, as indicated in the following estimates of percentage area by slope categories.

| <u>Percent Slope Classes</u> | |
|------------------------------|--------------------|
| <u>Slope</u> | <u>Forest Area</u> |
| 0 - 5% | 60% |
| 5 - 10% | 30% |
| over 10% | 10% |

The Area covers an altitudinal range of 20 - 250 m ASL, although the forests are generally located at an altitude of 20 - 60 m.

1.2.2 Climate

A warm sub-tropical climate prevails, with high summer rainfall and a dry winter and spring.

Dry periods accompanied by strong, dry westerly winds can lead to periods of very high bush fire danger over the period August to December. Appendix 2 provides detailed statistics of the climate at Casino.

1.2.3 Geology and Soils

The greater part of the area is composed of Jurassic/Cretaceous sedimentary deposits. The major strata are the Kangaroo Creek Sandstones and the Grafton Formation (mainly sandstones, siltstones and claystones). In the far north Tertiary flows of basalt (Lismore Basalt) have overlain the sedimentary deposits. In many areas Recent alluvial deposits occur.

Mines Department Geological Series 1:250 000 Tweed Heads sheet 56-3, Grafton sheet 56-6 and Maclean sheet 56-7 cover the Management Area.

Soil formation in the area has been greatly influenced by the parent rocks. The sedimentary rocks have given rise to a variety of highly-leached podzolic soils. These are low in plant nutrients, particularly phosphorus, and are highly susceptible to erosion.

The basalt has given rise to red krasnozems (or red-loam) soils in the high rainfall regions and chocolate soils in areas of lower rainfall. These soil types are found in and around Bungabee State Forest.

Black earth, prairie and meadow soils have developed from alluvial deposits, the type of development depending mainly upon drainage.

C.S.I.R.O. Atlas of Australian Soils 1:2 000 000 Sydney, Canberra, Bourke, Armidale Area Sheet 3 covers the Management Area.

Logging becomes difficult in wet weather due to the poor structure and drainage of soil types occurring mostly on State Forests.

1.2.4 Vegetation

1.2.4.1 General Occurrence of Forest Types

The forests of the Management Area are almost exclusively eucalypt forest.

Areas of broad species-association forest types by State Forests are presented below, as derived from the 1:25 000 forest type maps. These areas differ slightly from the gazetted areas listed under Section 1.1.2 of this Plan, and from areas derived from the older 1:31 680 and 1:15 840 forest type maps. (Refer Section 1.3.2.3 and Appendix 6).

Forest type descriptions are given in Forestry Commission Research Note No. 17, "Forest Types in N.S.W", except for types 128, 129 and 130 devised specifically for Casino Management Area in conjunction with preparation of the 1983 1:25 000 Forest Type and Stand Condition Maps (Refer Section 1.3.2.3. and Appendix 6.)

Areas of Broad Forest Types by State Forest Groups

| § Broad forest type areas (ha) | | | | | | | |
|--|-----------|--------------------|----------------|-----------------|------------------------------|----------------|-------|
| State Forests | Blackbutt | Moist* Hardwood | Spotted Gum | Dry Hardwood | Non- Commercial Forest | Non- Forest | Total |
| Banyabba | 159 | 22 | 2507 | 782 | 5 | 115 | 3590 |
| Bungabee | | 833 | | 775 | - | - | 1608 |
| Bungawalbin | 974 | 51 | 1472 | 2054 | 2165 | 3 | 6719 |
| Camira | 70 | 15 | 2802 | 856 | 220 | 15 | 3978 |
| Carwong, Braemar, and Ellangowan. | | | 2809 | 638 | 293 | 66 | 3806 |
| Doubleduke, Tabbimoble, and Devils Pulpit. | 6279 | 886 | 2093 | 2264 | 3936 | 319 | 15777 |
| Eden Creek | | | | 20 | - | - | 20 |
| Gibberagee | 2855 | 566 | 4722 | 1506 | 3098 | 159 | 12906 |
| Mororo | 469 | 200 | 239 | 221 | 537 | 10 | 1676 |
| Myrtle and Whiporie. | 49 | | 3170 | 695 | 2007 | 164 | 6085 |
| Royal Camp | 252 | 175 | 1586 | 95 | 37 | 105 | 2250 |
| Total | 11107 | 2748 | 21400 | 9906 | 12298 | 956 | 58415 |
| Percent | 19% | 5% | 36% | 17% | 21% | 2% | 100% |

§Broad Forest Types

Constituent Forest Type numbers as described in Forestry Commission "Forest Types in N.S.W." Research Note No. 17#

| | |
|-----------------------|--|
| Blackbutt | 36 - 41, 218 |
| Spotted Gum | 70, 72 - 74, 76 |
| Other Dry Hardwoods | 61, 62, 65, 80, 82 - 85, 92, 126, 128#, 130# |
| Moist Hardwoods* | 21*, 23*, 26*, 46, 47, 48, 49, 53, 60 |
| Non-commercial Forest | 30, 31, 93, 97, 117, 119, 129#, |
| Non-Forest | 219, 231, 234 |

*36 ha comprising Hoop Pine 17 ha, Myrtle 2ha and Viney Scrub 17 ha has been included within the Moist Hardwood Type.

#Forest types 128, 129 and 130, not included in "Forest Types in N.S.W.", are briefly described as follows:

Type No. 128 - Thinleaved Stringybark/White Stringybark. Site height 20 - 35 m. Capacity for sawlog production.

Type No. 129 - Roughbarked Apple/Narrowleaved Apple. Site height 15 - 30 m. Only occasional sawlog.

Type No. 130 - Red Mahogany/Roughbarked Apple. Site height 20 - 35 m. Only occasional sawlog.

Appendix 3 contains a taxonomic list of dominant vegetation species known to occur within the Management Area.

1.2.4.2 Description of Broad Forest Types

Spotted Gum and Other Dry Hardwood

This is the most widespread forest type group within the Management Area, and is found on every State Forest. It is typified by a generally open understorey.

The only significant areas where these Dry Hardwood types are not dominant are on the dry sandstone ridges of the Richmond Range, where they are replaced by Blackbutt types, and in the moister gullies of some State Forests where they are replaced by Moist Hardwood types.

Spotted Gum is the dominant species, often occurring in almost pure stands within Bungawalbin, Braemar, Carwong, Ellangowan, Myrtle, Camira, Gibberagee and Banyabba State Forests. Characteristically it is found on dry, well-drained, shallow soils with moderately heavy texture.

Other species within these Dry Hardwood types include Ironbarks, Grey Gum, Grey Box, Stringybark, Bloodwood, White Mahogany, Tallowwood and Apple either in association with Spotted Gum or as other mixed associations.

Red Gum, Cabbage Gum, Swamp Mahogany and Swamp Turpentine are found within, or adjacent to, poorly-drained flats and drainage lines. Scribbly Gum types occur on deeper sandier soils, while Needlebark and Bailey's Stringybark types occur on the very dry, exposed, and rocky sandstone ridges.

Blackbutt

The main areas of Blackbutt types occur within Gibberagee, Doubleduke, Devils Pulpit and Mororo State Forests. Smaller areas occur within Bungawalbin and Banyabba State Forests.

Blackbutt is found as pure stands or in association with Dry Hardwood species on well-drained sandy soils. The Dry Blackbutt type with its associated open understorey is the most common, and occurs on middle to upper sandstone ridges often associated with non-commercial Dry Hardwood species. The Moist Blackbutt type, with its associated mesophytic shrubby understorey, is found on well-drained soils on flatter coastal sites.

Moist Hardwood

The total area of Moist Hardwood type is relatively small, occurring as small areas in the moister gullies of Gibberagee, Devils Pulpit, Doubleduke and Bungabee State Forests.

The type is dominated by Tallowwood and/or Turpentine, with Brush Box, White Mahogany, Bloodwood, Flooded Gum and various Stringybarks as associated species and typically with a mesophytic shrubby understorey.

1.2.4.3 Site

Forest types can be related to changes in site. Moist Hardwood and Moist Blackbutt types growing on well-drained, lower slopes represent the most productive sites. Within forest types only minor changes in site quality occur in response to better soil, drainage and aspect conditions.

Generally, low site quality prevails due to poor soils and/or drainage.

1.2.5 Fauna

Appendix 4 is a taxonomic list of fauna known to occur within the Management Area. Significant populations of kangaroos and wallabies and a variety of birdlife are perhaps the most notable to the casual observer. A range of other less-obvious mammals and birds including certain hole-nesting arboreal species such as the gliders and the tree-creepers and other species dependent on the mature forest, and a number of reptile species, are present in the Area.

Chapter 1.3 Developments

1.3.1 Capital Improvements

1.3.1.1 Access

Approximately 296 kms of roads of Class III standard or better have been constructed and are currently maintained. Class III standard roads are specified as single lane, substantially all-weather roads, with a minimum pavement width of 3m and formation width of 4.2m, and 20 km/h design speed. The road network has evolved over many years in response to harvesting, protection and general management requirements, and is considered to be generally adequate for these purposes.

A road maintenance plan has been approved which indicates the permanent road network considered necessary to implement the management strategy for the Area, and the way in which it will be maintained to facilitate this implementation.

1.3.1.2 Buildings and Other Structures and Facilities

The following list details buildings and other structures now located on the Management Area:

| <u>Buildings</u> | <u>Locations</u> | <u>Usage</u> | <u>Approximate Year Built</u> |
|------------------|------------------|-------------------------------|-----------------------------------|
| Cottage (No. 22) | Braemar S.F. | Tenanted by Gang Foreman | 1919 |
| Overnight Hut | Braemar S.F. | Occupied by Marketing Foreman | 1945 |
| Storage Shed | Braemar S.F. | Fire Tanker and Misc. Storage | 1945 |
| Storage Shed | Whiporie S.F. | Fire Tanker and Misc. Storage | 1950 |
| Storage Shed | Tabbimoble S.F. | Marketing Foreman H.Q. | 1945 |
| Hut | Myrtle S.F. | Unused | 1950 |

Other Structures and Facilities

Forestry Commission-owned and maintained

| | | |
|------------|-----------------|------|
| Fire Tower | Braemar S.F. | 1970 |
| Fire Tower | Gibberagee S.F. | 1969 |
| Fire Tower | Doubleduke S.F. | 1946 |
| Rest Area | Braemar S.F. | 1970 |

Owned and maintained by other bodies

| | | |
|---|--|------|
| T.V. Translator (N.R. TV Ltd.) | Gibberagee S.F. | 1970 |
| Tick Quarantine Fence | Tabbimoble, Doubleduke, Devils Pulpit, Gibberagee, Banyabba S.F.s | 1936 |
| Power Line 132Kv (Elect. Comm.) | Braemar, Myrtle, Banyabba S.F. | 1969 |
| Power Line 330Kv (Elect. Comm.) | " " " | 1981 |
| Power Line 66Kv (Northern Rivers C.C.) | Myrtle, Banyabba S.F.s | 1961 |

1.3.2 Management Developments

1.3.2.1 General

Until 1952 when the present "Quota" system was introduced, sawmills drew their supplies from Forests allocated to them, generally on an historical "area of supply" basis. Selection of areas and trees to be

logged was made by the sawmiller within overall constraints, in such matters as the retention of young growing trees, imposed by the Forestry Commission.

Management consisted largely of providing access for logging of allocated areas, supervision of operations, fire protection where possible, and assessment of resource. Quotas based on previous years' cuts were introduced in 1952 and strict "area of supply" allocations have gradually disappeared so that all quotas now have the whole Management Area as their supply zone. Provision of access has remained an important function of management. Better access provided the opportunity for better supervision to achieve maximum economic utilisation of mature, overmature and defective trees, and retention of vigorous immature trees for future harvesting and provided also for better fire protection to protect both retained trees and regeneration resulting from logging. Availability of air photos and forest type maps has increased the efficiency and effectiveness of management.

An accurate estimate of growth and yield of the forest resource remains a prime objective of management, and considerable effort has been made toward this end in recent years.

Prior to 1977, the only management plans which had been produced were brief working plans drawn up for Carwong (1917) Braemar (1918, 1920, 1924) and Bungawalbin (1926) State Forests. Prescriptions adopted involved the disposal of all marketable mature timber followed by cessation of further harvesting operations except for improvement fellings and thinnings.

The first comprehensive management plan for the native forests of Casino District was approved to operate from June, 1977 for a term of five years.

During preparation of this 1977 Plan the suitability of much of the forest area primarily for pole rather than sawlog production, and the strong industry demand for poles, was recognised. Management emphasis was oriented accordingly.

During the period of the 1977 Plan it became increasingly apparent that:

- . Additional measures were required to encourage the harvesting of ex-quota sawlogs, and particularly of small logs (< 40 cm centre diameter under bark), if the overall timber-productive capacity of the forests was to be maximised by harvesting of these trees as thinnings or improvement fellings to concentrate growth on the better potential sawlog and pole stems.

- . The nature of the species generally available from the forest types of the Area, producing generally hard-grown logs, was such as to make industry acceptance and conversion of smaller, previously ex-quota logs reasonably practicable. It was accepted that some investment in technological conversion and market adaptation would be necessary to achieve this.

- . A reduction in yield of quota sawlogs as then defined was necessary for the overall sawlog yield to be sustainable in the long term.

It was therefore determined by the Commission, after consultation with and acceptance by the industry, that:

- . Utilisation of all trees both available for removal under the harvesting prescriptions of the Plan, and which could produce logs

of a minimum 3m length with a minimum small-end diameter of 25 cm and a minimum butt diameter of 30 cm, would be expected in harvesting operations.

. The necessary yield reduction would be implemented by the inclusion, within sawlog quota allocations, of smaller logs of 30 cm c.d.u.b. and larger (other than Minimum Rate logs), while maintaining sawlog quota-volume allocations at their previous level.

This change was implemented as from 1/1/83. It is considered that the success of future timber-production management of the Area will largely depend on the maintenance of these improved standards of utilisation for small sawlogs, in conjunction with maintenance and improvement of utilisation standards for poles.

The prescriptions of the 1977 Plan have continued to apply until replaced by the provisions of this revised 1983 plan.

1.3.2.2 Subdivision

Apart from 20 ha of this Management Area in Eden Creek State Forest, the State Forests of the Area have been divided into 132 Compartments ranging in area from less than 200 ha in Bungabee State Forest to over 800 ha in Whiporie State Forest, and averaging about 450 ha. This subdivision is generally based on definable map features such as roads and creeks, as revised in 1983 and shown on the 1983 1:25 000 forest-type maps. Compartments are numbered sequentially through the whole Management Area, by State Forests and State Forest groups as listed in the Table under Section 1.4.2.1 of this Plan and as revised in 1983, but with provision in the sequential numbering from 1 to 175 to provide for new Compartments as required for each group.

The State Forests have also been broadly stratified into Sawlog and Pole Working Circles, initially in conjunction with the preparation of the 1977 Plan but revised in 1983 consequent upon preparation of the new 1:25 000 forest-type and stand-condition maps. This delineation is shown by Compartments and State Forests, and by broad forest types, in Appendix 5.

1.3.2.3 Mapping and Aerial Photography

The Management Area is adequately covered by maps and aerial photography.

Forestry Commission 1:125 000 Maps (Casino, Coffs Harbour 1975) and Central Mapping Authority 1:25 000 topographic maps (1974 -1980) cover the Management Area. 1:25 000 Forest maps (1983), indicating forest types, stand condition as at the date of most recent aerial photography, and Compartments, cover all State Forests. Forest types conform with those described in "Forest Types in N.S.W.," Forestry Commission Research Note No. 17, but include some additional types as described in Section 1.2.4.1.

Aerial photographs (generally 1977/78 1:25 000) are available for the entire Management Area.

Appendix 6 lists the available Forest maps and aerial photography.

1.3.2.4 Preferred Management Priority (P.M.P.) Classification System

The State Forests of the Area have been classified according to the Commission's Preferred Management Priority (P.M.P) classification system. This classification provides a ready map reference to long-term

planning intent to recognise particular values and to form a basis for applying appropriate management prescriptions designed to maintain and/or enhance such values. Maps showing this classification are held at Casino District and Regional Offices.

1.3.2.5 Management Records

State Forest Compartment history records including yield records have been kept since 1965.

Logging and treatment history maps are regularly maintained, and include records of areas logged for sawlogs from about 1960 and poles from about 1973, and cultural history mapping for the Tabbimoble, Doubleduke and Devils Pulpit State Forests at least from 1962. Annual management reports have been submitted since 1977/78. Yield records are also available from analysis of the Commission's marketing and Annual Report statistics.

1.3.2.6 Forest Inventory

An extensive assessment (0.24% sample) of the Management Area was undertaken in 1972, in conjunction with the adjoining Richmond Range Working Circle of the Casino West Management Area. Thirty nine (39) (including four (4) non-productive) 0.4ha plots were established on a grid system within State Forests and areas expected to be dedicated as State Forest.

As a preliminary to yield calculations the thirty five (35) productive plots were processed using the HARDASS computer program, which gave summaries of numbers of trees, basal areas and volumes per hectare, by diameter, species and merchantability class, for the whole area. The assessment specifications, determination of area and HARDASS results are detailed in Appendix 8.

1.3.2.7 Increment Data Collection

Fourteen Permanent Growth Plots (PGPs) have been established in the State Forests of the Area, as part of the North Coast regional system to obtain representative individual tree growth data. It is intended that the data from periodic remeasurement be applied to stand tables derived from inventory assessment for calculation of available yields. Two plots have been established in Blackbutt type, one in Moist Hardwood, seven in Spotted Gum and four in the Other Dry Hardwood type. The establishment of two further plots, one in Blackbutt and one in Spotted Gum forest type, is required, following logging, to complete establishment of the system in this Area.

The plots have been established in logged stands on a 4.0 km grid in Blackbutt and Moist Hardwood types, and a 6.0 km grid in Spotted Gum and other Dry Hardwood types.

Measurement and recording is on an individual tree basis to enable analysis of growth by species, crown classification, forest type and site factors.

1.3.2.8 Forest Preservation

Three areas totalling 258 ha have been preserved to provide examples of the major forest communities in an undisturbed or little disturbed condition. These have been designated as Forest Preserves initially with a view to their ultimate notification as Flora Reserves.

Areas preserved are listed in Appendix 11.

1.3.2.9 Research

Current research projects in the Area involve the maintenance of the following research plots:

| Project Number | Title | Location | | Plot Numbers |
|-------------------|---|--------------|----------|-----------------|
| | | State Forest | Cpt. No. | |
| E8/3.5 | Silvicultural Treatments - Spotted Gum | Bungawalbin | 51 | A-H (1-10) |
| G1/8.1 | Species Trial - - <u>E. cloeziana</u> | Tabbimoble | 165 | 1, 14 |
| | | Doubleduke | 147 | 2, 15 |
| H8/3.1 | Silvicultural treatment - Mixed Hardwood | Braemar | 25 | 5, 6 |
| | | Ellangowen | 32 | 7 |

Chapter 1.4 Silvicultural Considerations

1.4.1 History of Silvicultural Development

1.4.1.1 Harvesting

The forests of the Area have been selectively logged over many decades for sawlogs, sleepers, poles and girders. The intensity of harvesting has varied but historically has been more intense in the more accessible forests such as Bungawalbin, Braemar, Ellangowan, Myrtle and Carwong. Since the 1950s logging has been concentrated within Banyabba, Doubleduke and Tabbimoble State Forests. More recently, logging has continued in Devils Pulpit S.F. from 1973, Banyabba S.F. from 1976, Gibberagee S.F. from 1977 and Royal Camp S.F. since 1980.

Initial hardwood logging was very selective, utilising only the sound, straight, mature stems. This logging left the forests still dominated by mature, overmature and defective stems with only scattered patches of young trees resulting from gaps in the canopy left from the earlier logging removals.

Improving access and supervision of operations, including the introduction of tree marking in 1960, has culminated in more effective achievement of the maximum economically-available quota-sawlog yield from mature, overmature and defective trees in harvesting operations, with retention of any vigorous trees for harvesting in the next cutting cycle. As a consequence, in most areas complete harvesting of the economically available mature and overmature trees has only been achieved in harvesting operations undertaken within the last two decades.

At least since 1960 and until 1979, logging on State Forests has concentrated on the Blackbutt and associated types of the Sawlog Working Circle. Since 1979 about half of each annual sawlog quota has been drawn from the Sawlog Working Circle and the other half from the Pole Working Circle, to reflect proportionate availability of mature and overmature sawlogs, from the application of harvesting prescriptions designed to improve the silvicultural conditions of the stands, from the broad forest types included in each Working Circle.

During the 1970s, a significant proportion of hardwood logging was concentrated on purchase tenure land, and on leasehold land expected to be converted to purchase tenure. The objective of harvesting on these areas was to recover the Crown's equity in merchantable timber, rather than to stimulate silvicultural development.

The Management Area has been a traditional supplier of hardwood poles from the Dry Hardwood types. Pole operations have expanded from the use of the traditional durable species, e.g. Ironbark and Tallowood, to the use of less-durable species e.g. Spotted Gum. This expansion has resulted from improved pole-treatment technology, and has led to a consequent expansion of operations into Spotted Gum types from the Other Dry Hardwood types. Before 1976 pole harvesting particularly in Spotted Gum types was largely restricted to thinning operations designed to aid sawlog production. Since 1976 operations have removed, as poles, those trees judged to have reached their maximum value potential as poles. In low-site-quality stands capable of growing very satisfactory pole crops but with poor potential for sawlog production, pole harvesting has been undertaken as a separate operation. Pole production from the Area has consequently increased.

Sleeper operations, concentrated on the removal of mature and overmature trees considered to be unmerchantable for sawlogs, were widespread during the 1950s and 1960s, with a significant drop in produc-

tion by 1972. Tree marking for sleeper trees was introduced in 1959, but the large number of sleeper cutters (38 in 1960) presented considerable management problems in reconciling improved utilisation by sawmills and the consequent unavailability of mature and overmature trees suitable for sleeper production but unmerchantable as sawlogs, with the demand for sleepers. Sleeper operations have now all but ceased, with only one cutter operating on State Forest.

1.4.1.2 Silvicultural Treatment

Silvicultural treatments were initiated in the more accessible forests by about 1920, following prior extensive logging operations. In Bungawalbin, Braemar, Camira, Carwong, Ellangowan and Myrtle forests, early harvesting resulted in cut-over stands, described as "scanty, faulty and principally over-mature". (Bungawalbin Working Plan 20/4/1926). Silvicultural prescriptions in these forests were based on ringbarking use-less trees with a view to regeneration and future cutting under the "Australian Group Selection" system.

The combination of heavy culling and grazing in Bungawalbin, Carwong and Ellangowan forests during the 1920s resulted in poor regeneration. However, good regrowth stands were reported in Myrtle, Braemar and Camira forests during the 1930s as a result of ringbarking during the 1920s. Culling and thinning operations carried out in Braemar and Carwong forests during the later 1930s and early 1940s also produced good regeneration in the areas treated.

More recently, large scale Timber Stand Improvement operations were carried out in Braemar (up to 1957), Bungawalbin (up to 1964), Mororo (1961) and the Tabbimoble forests (1950 and intermittent operations up to the present time). In Braemar and Bungawalbin forests the operations concentrated on thinning Spotted Gum - Ironbark regrowth stands. In Mororo, Tabbimoble and parts of Bungawalbin forest, treatment was aimed at obtaining Blackbutt regeneration, particularly in areas where establishment of Blackbutt regeneration had been spasmodic and unreliable. These operations were small scale and ranged from intensive culling (Mororo); ring-barking and burning followed by spot and broadcast sowing (Bungawalbin and Tabbimoble); through to tractor clearing, burning and jiffy-pot planting (Doubleduke/Devils Pulpit). In general, the results have been poor, due mainly to fire damage, but also to seedling desiccation and/or scorching in the dry, sandy soils associated with the Blackbutt types.

1.4.2 Present Condition and Silvicultural Characteristics of Forest Communities

The 1983 1:25 000 State Forest Stand Condition type maps reflect the 1977-79 stand condition from the most recent 1:25 000 photographs. Letter symbols designate pole and sawlog availability and potential.

Spotted Gum and Other Dry Hardwoods

These stands usually have an uneven-aged structure as a result of continued selective logging, an early history of intensive ringbarking and culling treatments, and good regenerating ability.

The more fully-stocked Spotted Gum stands exhibit very slow growth rates, with trees having an increment range of 0.1 - 0.25 cm dbhob/an. The importance of physiological age in Spotted Gum has been recognised as strongly influencing growth rate. Very often the smaller residual trees in a cut over stand do not respond to release - thus permanent suppression of old sub-dominant individuals is an important consideration.

The regeneration potential of Spotted Gum stands is high. Regeneration of logged stands, mainly through development from the existing

lignotuber pool, is usually very satisfactory, although the presence of lignotubers prior to logging is often difficult to detect.

Other Dry Hardwood species such as Grey Box, Grey Gum and Iron-barks are usually faster growing than Spotted Gum, but slower growing than Blackbutt, with diameter increments in the range 0.4 - 0.5 cms dbhob/an. The regeneration pattern of these Other Dry Hardwood species is similar to Spotted Gum with perhaps the seedling component playing a much larger role.

Although not necessarily producing high yields per hectare, the Spotted Gum and Other Dry Hardwood types have supplied a substantial volume of sawlogs and poles. These types have been the traditional suppliers of products other than sawlogs, such as poles, piles, girders and sleepers.

Many of the Other Dry Hardwood species have no value commercially and often occur on broad areas, or associated with commercial species carrying volumes per hectare too low to be commercially available.

Stands generally carry an adequate to abundant stocking of immature trees which will constitute the available sawlog and pole resource for harvesting in the next cutting cycle.

Blackbutt

The small remaining areas of unlogged Blackbutt stands consist predominantly of mature and overmature trees, with immature trees generally only present as a result of canopy openings from fire, cyclone or other natural disturbance.

Logged stands generally are in a degraded state following the removal of much of the overstorey, coupled with the absence of former or subsequent vigorous regrowth. Subsequent culling operations have removed some of the defective overmature trees and retention of Blackbutt seed trees is noticeable within some earlier logged stands. In moister areas, a thick shrubby understorey often exists, whilst dense wattle regeneration has resulted from intense disturbance of some areas.

Fire has had a major impact on the Dry Blackbutt type, as the heavy, dry fuel accumulations characteristic of this type sustain frequent hot fires with subsequent damage to mature stems and destruction of regeneration and younger regrowth.

Blackbutt types comprise mainly the Dry type which represents the poorer end of the Blackbutt range and is characterised by relatively short boles and large heavy crowns with only moderate growth rates.

Blackbutt regrowth generally has good form, and usually exhibits a clean bole. Blackbutt can be a fast grower with increments of up to 0.8 cm dbhob/an and has the ability to produce high increments on large-size stems.

Blackbutt is non-lignotuberous but does have a carrot-like root that may be of significance in survival. Canopy openings are required for successful germination and subsequent rapid growth of seedlings. Infrequent low-intensity fires, including head-disposal burns, and canopy opening and ground disturbance from logging encourage Blackbutt regeneration. Only limited success has been experienced in the establishment of Blackbutt regrowth in this Management Area. The main problem has not been so much to obtain regeneration, but its subsequent survival. The main contributing factors are fire damage and moisture stress due to the dry soil conditions that can occur in the sandy soils of the Blackbutt types. The presence of a regeneration-inhibiting understorey may also be a factor, though of lesser significance. Thus the regeneration potential of this

species in the Management Area can be regarded as low. This feature has created a major deficiency of sapling-size stems of the species in the Blackbutt types.

Moist Hardwood

Unlogged areas carry a mature or overmature stand with very little regrowth of the dominant tree species. In the absence of treatment or logging, these stands are usually perpetuated by fire or other natural catastrophe which disturbs the dense shrubby understorey which otherwise impedes the establishment of regeneration.

Logged stands are characterised by scattered overmature unmerchantable trees, with some regeneration gradually developing through the competing understorey species.

Moist Hardwood types comprise only an estimated 5% of the forest area. Commercially they are not significant as they are generally located in the more inaccessible areas, and are often retained in logging operations because of their proximity to major water courses.

1.4.3 Damage Agencies

1.4.3.1 Fire

Fire has been the most destructive agency to the forests of the Area, killing regeneration and damaging individual trees and causing defect and loss of increment. The most severe fires occur within the Blackbutt types.

The Casino District Fire Plan details the fire protection strategy for Casino District which also includes the Whiporie Plantation Management Area. The Fire Plan also includes detailed records of fire occurrence in the form of annual summaries of individual fire reports.

The fire season usually extends from September to December, with fuel-reduction burning generally being undertaken during the dry autumn and winter months.

Fire protection ranges from intensive in areas adjoining Banyabba, Gibberagee and Whiporie pine plantations and the small blackbutt plantation within Doubleduke and Devils Pulpit State Forests, through to less intensive in silviculturally treated Blackbutt forest, to extensive in the balance of the Management Area.

The main fire problem areas have been:

- 1) Tabbimoble Group of forests
- 2) Extensive area of Nature Reserve and V.C.L. to the west of Banyabba S.F.
- 3) Southern area of Gibberagee S.F. (east of Banyabba S.F.)
- 4) Freehold country to the north of Mororo S.F.
- 5) Northern boundary of Bungawalbin S.F.

The majority of fires have resulted from incendiarism, escapes from burning off on nearby private property, and irresponsible burning off on Leases, and on Occupation Permits held on State Forest.

1.4.3.2 Climatic

Brief but destructive cyclonic winds have occurred from time to time causing isolated damage in windthrow and blowdowns. Heavy rain associated with cyclones has caused flooding, with resultant damage to forest roads.

Isolated stands have been defoliated by severe hailstorms but recovery has been fairly rapid.

1.4.3.3 Insects and Fungi

Damage by insects and fungi of many types has been typical of that experienced in North Coast Forests. Termites, wood eating insects and wood rotting fungi cause considerable damage to standing timber. Control measures are impractical.

Of particular note is the attack by an unidentified species of Longicorn beetle on spotted gum trees. The insect attacks the sapwood with complete girdling eventually leading to death. Seemingly healthy trees can be subject to attack. Trees showing significant damage to their crowns from the effects of this insect often require premature harvesting particularly during routine pole operations.

Chapter 1.5 Timber Yield Considerations

1.5.1 Past Yields

Timber products harvested from the Management Area have been predominantly hardwood sawlogs, poles and sleepers, with incidental production of girders, piles and sawn timber. Miscellaneous timber and forest products such as fencing timber, firewood, tea tree oil and corkwood leaf have also been harvested.

Average annual timber yields for the seven year period 1976 - 1983 are summarised below.

Average Annual Crown-timber Production 7 Year Period 1976 - 1983

| Product | Volume (m ³ net) | | Total |
|------------------|-----------------------------|--------------------------|-------|
| | State Forest | Other Crown-timber Lands | |
| Hardwood Sawlogs | 9643 | 3470 | 13113 |
| Hardwood Poles | 5910 | 558 | 6468 |
| Other* | 3083 | 256 | 3339 |
| Total | 18635 | 4285 | 22919 |

* Sleepers, Piles, Girders, Sawn, Fencing (log volume equivalent)

The average annual yield of 19 581 m³ net hardwood sawlogs and poles from the whole of the Management Area over this 7-year period is equivalent to 0.43m³ net per hectare per annum from the 45 000 ha of productive State Forest.

Details of other Crown-timber-land timber yields over the period 1976-1983, and State Forest wood yields over the period 1965-1983 are given in Appendix 7 (a). Histograms of these yields are given in Appendix 7 (b). Yield data for other Crown-timber lands prior to 1976/77 are not available as previously data for Casino and Casino West Districts were combined. The total annual yield of sawlogs and poles from the Management Area is considered to have remained approximately constant over the period 1965-1977.

Ex-quota sawlogs, which until 1/1/83 included those logs under 40cms c.d.u.b. as well as logs sold at Minimum Rates, have been available in conjunction with quota sawlog operations. Limited operations over recent years have yielded an ex-quota sawlog volume, included in the above statistics of past yields, equivalent to about 30% of the quota sawlog yield, but availability is expected to diminish with implementation of the redefined quota log size to include logs 30 cm c.d.u.b. and larger, except for Minimum Rate logs, as from 1/1/83 (refer Sections 1.3.2.1 and 1.7.3.1 of this Plan).

1.5.2 Basis of Present Yield Determination

1.5.2.1 Hardwood Sawlogs

On the basis of the yield calculations derived from the original 1972 assessment, summarised in Appendix 8(c), (Section B), the following volumes were anticipated to be available from the commencement of the first assumed 25 yr cutting cycle in 1972.

| Cutting Cycle (assumed 25 year periods) | Total Volume (m ³ gross) | Total Volume (m ³ net quota)* | Available Volume (m ³ net quota/yr) |
|---|--|---|---|
| 1 | 509 000 | 280 000 | 11 200 |
| 2 | 281 000 | 154 000 | 6 100 |
| 3 | 477 000 | <u>262 000</u> | <u>10 500</u> |
| | | 696 000 | 9 300 (Average) |

*Net quota volumes were originally calculated on the basis of a 55% conversion factor from gross volume assessed. Quota definition to 1/1/83 excluded logs less than 40 cm c.d.u.b.

Existing yield allocations totalling 8 480 m³ were determined to continue from July, 1977 with the expectation that a surplus at the end of the Cutting Cycle 1 (1997) together with an earlier commencement of the Cutting Cycle 3 would compensate for the expected shortfall in the Cutting Cycle 2.

Review of continued yield monitoring over the period 1977-82 showed a reduced yield/ha from that expected, with a consequent reduction in the anticipated surplus in Cutting Cycle 1 as summarised below and presented in Appendix 9.

| | Volume (m ³ net quota) |
|---|--------------------------------------|
| Actual sawlog yield 1972 - June, 1982 | 63 000 |
| Predicted yield (as at 1/7/82) from unlogged areas and areas logged prior to 1960 | 90 000 |
| Predicted yield from areas logged 1960 - 1972 | <u>42 000</u> |
| | 195 000 |
| Original Prediction based on 1972 Assessment (Appendix 8(c), Section B). | (280 000) |

A conversion factor of 56% calculated over the period 1977-82 [Appendix 9 (Section 4)] was used to convert predicted gross volume yield to net quota volume as defined prior to 1/1/83.

There were clear practical indications, from:

- . Consideration of actual net quota-sawlog volumes/ha obtained and predicted from harvesting of all available stands in Cutting Cycle 1, and
- . Consideration of stands likely to be available for economically practicable harvesting in Cutting Cycles 2 and 3 under the constraints of the then current quota-sawlog utilisation standards, and the volumes/ha likely to be available from the harvesting of these stands;

that:

- . Economically practicable harvesting under these constraints in Cutting Cycles 2 and 3 could not be undertaken any earlier than

assumed in the Cutting Cycle Analysis (Cutting Cycle 2 from 1997, Cutting Cycle 3 from 2022);

- Actual net quota-sawlog yields obtained from such harvesting under the then-current definition of quota (excluding logs of less than 40 cm c.d.u.b.), were likely to continue to be only about the same proportion of those estimated from the Cutting Cycle Analysis as that evidenced in Cutting Cycle 1 (i.e. $\frac{195}{280}$ or about 70%).

280

The indicated yield of quota-sawlogs 40 cm c.d.u.b. and larger was therefore revised as follows:

1982 Indicated Yield of Quota Sawlogs 40 cm c.d.u.b. and larger

| <u>Period</u> | <u>Total Quota Sawlog Volume 40 cm cdub and larger (m³ net)</u> | <u>Average Annual volume from 1982 (m³ net/yr)</u> |
|--|--|---|
| 1982-1997 (Remainder Cutting Cycle 1) - 15 years | 132 000 | 8 800 |
| 1997-2022 (Cutting Cycle 2) - 25 years (154 000 x 70%) | 108 000 | 4 320 |
| 1982 - 2022 (40 years) | 240 000 | 6 000 |
| 2022-2057 (Cutting Cycle 3) - 25 years (262 000 x 70%) | 183 000 | 7 320 |
| 1982 - 2057 (65 years) | 423 000 | 6 500 |

A reduction in net quota-sawlog yield as then defined (excluding logs less than 40 cm cdub) of about 2 000 m³/yr from 8 480 m³/yr to less than 6 500 m³/yr, was therefore indicated as necessary.

At the same time it was clear that satisfactory utilisation of logs less than 40 cm cdub was required:

- To enable harvesting of the smaller trees as thinnings and stand improvement fellings to concentrate growth on the better potential sawlog and pole stems,
- To improve the economic practicability of harvesting of the mature and defective larger quota-sawlog trees,
- Thereby to improve the overall timber-production capacity of the Area.

Investigation of stands remaining to be logged in Cutting Cycle 1 indicated that, provided satisfactory utilisation could be achieved of logs down to 25 cm small end diameter, 30 cm butt diameter and 3 metre length, an increase in total sawlog yield of about 2 000m³/yr would be available in logs between 30 cm and 40 cm centre diameter. This volume is more or less equivalent to the reduction in quota necessary to reduce to a sustained yield on criteria existing in the 1977 Plan.

It was considered that satisfactory utilisation of these small sawlogs, and inclusion in quota, would prevent the necessity for reductions in the present levels of sawlog quota volume allocation by:

- . Improving utilisation of all trees felled
- . Utilisation of smaller silviculturally undesirable trees
- . Promotion of increased growth on retained potential future sawlogs, for harvesting in subsequent cutting cycles.

Subsequent agreement with industry was achieved to utilise this material, and to incorporate the extra volume in sawlog quota by re-definition of quota sawlogs to include all material within these new limits without change in the pre-existing quota volume allocations, as from 1st January, 1983.

In order to sustain the revised quota sawlog yields and to avoid, as far as possible, a necessity for future sawlog-quota reduction, it will be necessary to:

- (a) Ensure a continued high standard of tree marking, utilisation and control of bush operations.
- (b) Continually monitor actual against expected yields per hectare, to judge the effectiveness of the revised utilisation standards in increasing quota-sawlog yields/hectare, and to enable more confident yield projections.
- (c) Select areas where the most silvicultural benefit would be obtained from harvesting, and schedule harvesting operations appropriately.

It was accepted that a further and more intensive inventory assessment would be necessary before completion of harvesting in Cutting Cycle 1, as the basis for revised determination of the yield that can be sustained from the Area. It was also accepted that such assessment and revised yield determination should be deferred until toward completion of harvesting in the current cutting cycle as defined to enable:

- . Reliable conversion factors from gross assessed to net quota-sawlog volume to be determined from monitoring of actual yields from harvesting to the revised utilisation standards and under the revised quota-sawlog definition.
- . Accumulation of representative growth data from the established Permanent Growth Plot system.
- . Concentration of the inventory on trees retained in harvesting during the current cutting cycle, for further growth.

1.5.2.2 Poles

The calculations from the 1972 inventory assessment (detailed in Appendix 8(c) as a reproduction of Appendix 10 of the 1977 Plan) indicated a pole volume of about 193 000 m³ as available from the Casino Management Area, and about 79 000 m³ as available from the Casino West Management Area, during an assumed initial 25 year cutting cycle. They also indicated that a yield of about 10 000 m³/yr from both Areas, including in excess of 7 000m³/yr from the Casino Management Area, could probably be sustained through subsequent cutting cycles. It was stated that in using these figures the deficiencies of the 1972 assessment must be recognised.

Revised 1982 estimates indicate a total pole volume of only about 105 000 m³ available for harvesting from the Casino Management Area over the whole of the current cutting cycle which commenced 1972. About 52 000 m³ is estimated to be available as from June 1983. Little more than 6 000 m³ of poles has been harvested from the Casino West Management Area from 1977-1983, and present indications of practical availability are that availability will be restricted to perhaps 500 m³/yr over the remainder of the assumed cutting-cycle period.

The basis of these revised 1982 estimates for the Casino Management Area is the actual yields/ha obtained from pole harvesting operations during the period 1972-1982; and the predicted yields/ha, judged from actual yields obtained from comparable areas including expectations of improved utilisation standards, for areas not yet harvested for poles during the current cutting cycle. Details are given in Appendix 10 of this Plan.

Total pole yield allocations, essentially from Casino and Casino West Management Areas, have been determined as follows:

- . 1977 - 10 000 m³/yr, including an expected average 7 000 m³/yr from Casino West Management Area, excluding poles less than 10 m in length.
- . 1980 - reduced to 7 500 m³/yr
- . 1983 - determined that poles less than 10m in length would be included in the 7 500 m³/yr allocation as from June, 1984.

These determinations were based on the 1972 assessment indications; and progressively revised estimates of yield availability based on:

- . Actual yields achieved from harvesting, and
- . Individual licensee performance in actual volume cut and utilisation standards achieved;

The actual total pole yield from Casino Management Area over the period 1977-1983 has averaged 6 800 m³/yr.

1.5.2.3 Sleepers, Piles, Girders, Miscellaneous Sawn and Fencing Timber

An average annual volume of 3 300m³ gross of this material has been harvested during recent years. Overall yield availability and demand is expected to remain at about this level during the Plan period, with possible reduction in the economically available yield of fencing timber as harvesting of presently available material in the more accessible areas is completed.

1.5.3 Future Yield Prospects

1.5.3.1 Sawlogs

It is expected that sawlog-quota yield can be sustained at the present level (8 480m³ net in logs 30cm c.d.u.b. and larger) provided that high standards of utilisation are maintained, and estimated available volumes/ha in the 30 cm to 40 cm log diameter class are available from the application of the harvesting prescriptions of this Plan and are fully utilised.

1.5.3.2 Poles

It is apparent that

- . Continued efforts through maintenance of tree-marking and marketing-supervision standards will be necessary to ensure that all pole volume available under the harvesting prescriptions of this Plan is effectively utilised.
- . Continued monitoring of actual pole yields/ha obtained in harvesting operations and related to 1983 stand condition maps; and early further review of expected pole yield availability, both in this Management Area and the Casino West Management Area; will be necessary as the basis for revised determination of pole yield allocations.
- . An early and substantial further reduction in pole yield allocations is indicated as being necessary (of the order of about 50% from 1984), if more drastic reductions in yield at the completion of the current cutting cycle are to be avoided.
- . As for sawlog yield determination, a further and more intensive inventory assessment will be necessary as the basis for reliable estimation of long term sustained-yield pole availability. Such assessment should be deferred until toward completion of sawlog and pole harvesting in the current cutting cycle, so that both reliable growth information, and accumulated practical experience of realistically achievable standards of utilisation can be incorporated in the yield review and determination based on the assessment. Such standards of utilisation would need to reflect market demand and overall availability of pole-sized trees for harvesting.

Chapter 1.6 Non-Wood Values

1.6.1 Catchment

Because the State forests within the Management Area are a small part only of the lower catchments of the Richmond and Clarence Rivers they play only a minor role in catchment protection.

The sedimentary rocks occurring over most of the Management Area have produced highly erodible soils. Maintenance of an adequate forest cover, and attention to erosion control measures through the application of the provisions of the Standard Erosion Mitigation Conditions of Logging and Clearing in NSW, are therefore important.

There are no existing or proposed major dams for domestic water supplies with catchments within the Management Area. There are no significant irrigation, agricultural or other uses of water flowing from the Area.

1.6.2 Aesthetic and Recreational

The State Forests of the Management Area occur generally on the lowlands of the lower rivers, and for this reason have low visual impact and few vantage points.

The recreational demand on the State Forests of the Management Area is not great, as they have very few recreational focal points. Notable features are the high kangaroo/wallaby populations occurring in and around the Whiporrie Pine Plantation, and the fact that the Pacific Highway and Summerland Way constitute major focal lines for travellers, through some of the Forests.

The Braemar Rest Area is the only recreational development and is situated beside the Summerland Way under an open Spotted Gum forest type. This type of forest is visually attractive and pleasant to walk through.

1.6.3 Nature Conservation, Scientific, and Educational

The forests of the Management Area are an important resource for long-term conservation of the indigenous-forest ecological systems, including dependent fauna. They are supplemented by the National Parks and Nature Reserves on generally poorer sites (refer Appendix 1), and diminishing areas of forested private land also generally on poorer sites.

Their conservation in an ecologically viable condition is therefore important for the maintenance of nature conservation, scientific and educational values.

Further work is necessary in identifying those forest types and stand conditions most important for wildlife, the relative importance of the Area for regional wildlife conservation and hence optimal management strategies. Nevertheless, even with increasing standards of utilisation, general forest stand condition, including relatively high levels of unmerchantable stems, together with the large proportion of non commercial types are considered to have provided for adequate maintenance of wildlife habitat.

Three eucalypt species occurring on the Area are notable for their general occurrence and are of special conservation interest (see Appendix 3). Of these E. glaucina and E. pyrocarpa have been included in Forest Preserves in the Area (Appendix 11). E. rummeryi has been included in a Forest Preserve in the adjoining Casino-West Management Area.

1.6.4 Grazing

Most of the area is composed of vegetation types which by virtue of a generally open understorey of palatable grasses are particularly suitable for rough grazing.

The Management Area is located in a cattle-production area and as a result the demand for grazing is high, particularly when boom conditions prevail. High forest ground provides important agistment for stock during lengthy wet periods when low-lying areas are under water.

The tick-fence which crosses the Area, together with fencing and other improvements, made by grazing lessees over the years add to the value of the Area for this purpose.

Damage to regeneration from grazing is not considered a problem, whilst the reduced fire hazard on grazed areas due to reduction in grass fuels is an aid to fire protection.

1.6.5 Apiculture

Most of the Management Area is composed of vegetation types suitable for the production of honey, and accessible areas are highly valued by apiarists for apiary sites.

1.6.6 Gravel Resource

Limited deposits of surface gravel suitable for road construction occur in specific locations. A relative scarcity of alternative gravel sources has resulted in gravel from suitable State Forest areas within the Management Area being highly valued.

Chapter 1.7 Social Environment of the Management Area

1.7.1 General

Casino (population 11 000) is the main administrative, service and industrial centre. Casino is situated in the north of the District including the Management Area and is 230km by road from Brisbane and 800km from Sydney. Other population centres within the District and of some relevance to the Management Area are Lismore (population 24 000), Ballina (population 9 700), Maclean (population 2 000), Coraki (population 900), Woodburn (population 600), Lawrence (population 300), Rappville (population 100) and Whiporie (population 50).

Other nearby centres of importance are Grafton (population 17 500) situated 100km south of Casino, and Kyogle (population 3 000) 30 km north of Casino.

The North Coast railway and Summerland Way pass north-south through the Management Area and link Casino with Brisbane via Kyogle and Sydney via Grafton

The Pacific Highway passes north-south through the eastern side of the Management Area, and through Grafton, Maclean, Woodburn and Ballina. The Bruxner Highway links Casino with Lismore and Ballina to the east, and Tenterfield to the west.

1.7.2 Social History

1.7.2.1 Regional History

Cedar cutters moved into the Clarence Valley in 1835 and into the Richmond Valley in 1842, and were responsible for the early exploration and development of these areas. Cedar brought with it wealth, developed river transport and established the timber industry. Cedar cutting continued into the 1880s and 1890s by which time the timber trade was moving upstream towards Kyogle, leaving behind a collection of river towns.

Agricultural settlement was accelerated by the passing of the Crown Lands Alienation Act (Robertson Act) in 1861, allowing private acquisition of land through "Conditional Purchase".

Over the last century most of the plains and lower slopes of the Richmond and Clarence Valleys were progressively cleared to improve grazing values and to a lesser extent for cropping purposes. Much of the remaining timbered country on the ranges and less fertile areas became the State Forests of the Management Area. Most of the original State Forest dedications occurred in 1913 and 1914 and the early 1920s. Significant extensions have been made to the State Forests since. Recent history has been characterised by large scale clearing of poor timber country, both freehold and leasehold, for cattle production.

In 1972 legislation came into force encouraging conversion of leasehold land to purchase-tenure provided it was not considered suitable for dedication as State Forest or other public tenure. This legislation prompted the dedication as State Forest of further areas of leasehold lands. In the 1970s the future status of several areas of possible forestry interest was resolved following consultation with the National Parks and Wildlife Service, in favour of reservations by that Service. Banyabba Nature Reserve and Bundjalung National Park are examples. Few leasehold lands which are suitable for State Forest dedication but not dedicated as State Forest now exist.

2027 ha of Southern pine plantation were established at Banyabba/Whiporie from 1924 to 1971 (see Appendix 1 map). In 1978 the

Government decided that these plantations should be expanded by about 1200 ha. These plantations, including areas transferred from Casino Management Area as required to complete the planned expansion, have been incorporated into the Whiporie Management Area.

Today the major industries of the district are agriculture (mainly beef cattle production but to a lesser extent pig and dairy farming and sugar cane production in the coastal areas), associated processing (meatworks, dairy etc.), and timber production including associated sawmilling and pole treatment. The railway and fishing industry are also important contributors to regional income and employment. Tourism, while expanding slowly is still of less significance than these industries as a component of the economy of the district.

1.7.2.2 History of Forest Use

As the cedar resource was depleted, other timber was cut for local needs and also for an important export trade in products such as piles and girders. These operations concentrated on the more accessible and easily worked forests. Large hardwood mills were established at this time, based on river transportation - W.T. Yeager's Mill at Coraki for example, employed 60 men in 1882, cutting approximately 280m³ of hardwood per week from logs transported on rafts floated down the Richmond River. River transportation dominated the industry until the 1930s when improved land transportation facilitated logging in previously inaccessible hardwood forests.

The main use of the forests has been for timber harvesting, mainly for hardwood sawlogs and poles, but with incidental supply of other timber. Rough grazing has also always been an important forest use and most of the forest area is covered by Forest Leases or Occupation Permits for beef cattle grazing.

By the early 1890s sawmills were established at Casino, Banyabba, Busbys Flat, Camira Creek, Upper Mongogarie, Rappville, Lawrence, Woodburn and Maclean for the conversion of hoop pine, other brushwoods and hardwoods.

The four Crown sawmills currently drawing supplies from the Management Area are now centred in Casino, Grafton, Lismore and Woodburn. The mills at Casino and Grafton resulted from the amalgamation and centralisation of a number of smaller mills receiving Crown supplies. The old mill sites are still retained as appraisal sites for log-royalty determination.

The Management Area has been a traditional supplier of hardwood poles. Historically, only durable poles were cut, until the recent introduction of pressure impregnation plants. The majority of poles cut now are in non-durable species such as Spotted Gum. The importance of the pole industry has increased in the last decade because of the availability and acceptance of non-durable poles for preservative treatment.

While some poles are exported, the majority of poles are utilised in eastern Australian coastal areas.

Sleeper cutting has been an important industry. During the 1950s and 1960s up to 38 men were working in the Management Area cutting sleepers. This number has now dwindled to one.

1.7.3 Forest-Dependent Industries

1.7.3.1 Sawmills

The following table lists the current annual quota sawlog commitments from the Management Area. All commitments have the whole Management Area as their supply zone.

| <u>Sawmill</u> | <u>Location</u> | <u>Hardwood Log Quota*</u> (m ³ net quota volume*/annum) |
|-------------------------------|-----------------|--|
| Robb & Brown Ltd. | Casino | 3230 |
| Sly Brothers Pty. Ltd. | Woodburn | 2590 |
| J. Notaras & Sons Pty. Ltd. | Grafton | 1940 |
| James Hurford & Co. Pty. Ltd. | Lismore | <u>720</u> |
| Total | | <u>8480</u> |

* Includes all hardwood logs 30cm c.d.u.b. and larger except for Minimum Rate logs.

The above quotas are supplemented by other annual sources of hardwood-log supply to the individual sawmills as follows:

| | |
|-------------------------------|--|
| Robb & Brown Ltd. | - 12 150m ³ net quota Casino West Management Area |
| Sly Bros. Pty. Ltd. | - Private property timber only (approx. 2 600m ³ net) |
| J. Notaras & Sons Pty. Ltd. | - 9 560m ³ net quota Grafton, Coffs Harbour, and Casino West Management Areas. (subject to reduction from 1985) |
| | - 1 810m ³ gross annual parcel sales allocated from Grafton Management Area |
| James Hurford & Co. Pty. Ltd. | - 6 590m ³ net quota Casino West Management Area 1 430m ³ net quota Murwillumbah Management Area |

Short-term parcel sales of generally low-quality salvage timber have been made available from time to time.

Private property timber has constituted only about 5% of the total input to these Crown hardwood mills in recent years. Most of the private property timber in the area is cut by a large number of generally small local mills entirely reliant on this source of supply.

1.7.3.2 Poles

The following table lists the current annual pole allocations determined for the Casino/Casino West Management Areas, and subject to periodic review.

| <u>Industry</u> | <u>Location</u> | <u>Annual Allocation*</u> |
|-----------------------------|-----------------|---------------------------|
| Robb & Brown Ltd. | Casino | 5 500m ³ |
| Allen Taylor & Co. Ltd. | Uralla | 1 000m ³ |
| Koppers Australia Pty. Ltd. | Koolkhan | 1 000m ³ |
| Total | | 7 500m ³ |

*Currently poles less than 10 m in length are not debited to these allocations, but as from 1/6/84 all length classes harvested will be debited to the allocations.

The allocations are from Casino/Casino West Management Areas as directed by the Regional Forester and based on forward planning and advice from the District Foresters. The commitment from the Casino Management Area is flexible but is expected to average 7 000m³ per annum.

The above allocations are supplemented by other pole sources as follows:

| | |
|-----------------------------|---|
| Robb & Brown Ltd. | - Private Property poles only |
| Allen Taylor & Co. Ltd. | - 4 000m ³ /annum Coffs Harbour Region, plus private property poles and parcel sales from Port Macquarie and Glen Innes Forestry Regions. |
| Koppers Australia Pty. Ltd. | - 6 500m ³ /annum Coffs Harbour Region, plus private property poles and parcel sales from Port Macquarie Forestry Region. |

1.7.3.3 Other Timber and Forest Product Industries

The current total annual allocation of 234m³ sawn volume of sleepers and junk from the Management Area is restricted to the one remaining Crown sleeper cutter. Miscellaneous sawn timber is also cut from sleeper offcuts by this operator.

Other timber and products are supplied on the basis of demand and availability. Sales of fencing timber have been significant over recent years and sales of tea tree oil and to a lesser extent corkwood leaf are made from time to time.

1.7.3.4 Grazing

Beef production is a major industry and land use in the area. Most of the Management Area is leased for grazing and the availability of these areas is important to this industry.

A list of Crown Land Consolidation Act leasehold tenures which have been dedicated as State Forest is given as Appendix 12.

The major boundary fence of the cattle-tick quarantine area passes through the Management Area and presents some minor administrative problems.

1.7.3.5 Apiculture

Bee-keeping is an important industry in the region. Most of the accessible State Forest area is leased by apiarists.

1.7.4 Other Forest Uses and Demands

1.7.4.1 Recreation

The forests of the Management Area attract only a low level of recreational usage.

The Braemar Rest Area receives regular usage by passing motorists. The current facilities adequately cope with this demand.

No other developments are planned at this stage.

1.7.4.2 Military

The Area is regularly used by the Army for training exercises.

1.7.4.3 Gravel

Considerable volumes of gravel have been won from the State Forests by Local Government bodies over a long period. In the past, considerable management problems were encountered because of the shallow nature of the resource and the large number of gravel pits being worked by various operators at any one time.

Individual local government bodies are now responsible for a nominated pit in an allocated area. Appendix 12 illustrates the location of and responsibility for gravel pits in the Management Area. Gravel operations are further subject to a code of conditions to ensure that adverse affects on soil stability and site aesthetics are minimised. Upon completion of operations gravel pits are restored by the responsible body and planted with Blackbutt seedlings.

1.7.5 Employment Dependent on Forest

A total of about 50 people are employed in that part of the timber industry dependent on the Management Area and in the overall management of the Casino Management Area by the Forestry Commission. These people live in and around the major centres of Casino (26), Grafton (12), Woodburn (8), and Lismore (4).

Those 26 people in employment directly dependent on the Management Area and living in and around Casino constitute about 17% of the total of 157 in timber industry and Forestry Commission employment in that area. Accepting an employment multiplier of about 2, the total employment in and around Casino and dependent on the Management Area would be about 50 in relation to the total Casino population of 11 000.

Overall employment in the timber industry has been relatively stable over recent years, with increased sawmill employment being balanced by reduced employment in other sections of the industry.

The Management Area supports some additional employment through its contribution to the grazing, bee-keeping and essential-oil industries.

Chapter 1.8 Economic and Marketing Considerations

1.8.1 Timber Sales

1.8.1.1 Sawlogs

Stumpages are determined by the general appraisal basis for hardwood sawlogs for the State as up-dated from time to time, based on a number of sawmill appraisal sites, and Brisbane as the sawn timber market. The following table lists the various appraisal sites and their distances from Brisbane.

| <u>Appraisal Site</u> | <u>Distance from Brisbane (km)</u> |
|-----------------------|--|
| Ballina | 218 |
| Banyabba | 282 |
| Busbys Flat | 242 |
| Camira Creek | 274 |
| Casino | 226 |
| Lawrence | 305 |
| Lismore | 226 |
| Maclean | 306 |
| Rappville | 255 |
| South Grafton | 332 |
| Woodburn | 253 |

The forests of the Management Area are reasonably well located in relation to appraisal sites. Log haulage distances from harvesting area to appraisal site are in the range of 6 to 30 km.

Felling and snigging costs are relatively high because of relatively small log size and low volumes/hectare, despite generally easy topography and open stand conditions. Margins for log size in this Area tend to reduce the royalty rate. There is no general compensatory increase from less-than-average log defect or margins for higher-value species.

This combination of factors has resulted in average royalty rates comparable with the State average for hardwood sawlogs. The average sawlog stumpage for areas logged during 1982/83 was \$16.07/m³ net compared with the State average stumpage for all hardwood sawlog sales for 1982/83 of \$14.14/m³ net.

In the longer term average stumpages are expected to show a slight drop in real terms due to the increasing proportion of smaller logs.

1.8.1.2 Poles

The average stumpage for poles sold from the Area during 1982/83 was \$35.53/m³. Average pole royalty rates/m³ are significantly higher than those for sawlogs from the Management Area, and comparable with the State average for hardwood poles which was \$37.68/m³ in 1982/83.

In the long term, average pole stumpages are expected to remain much the same in real terms, with any variations being related to the average annual size distribution of poles harvested.

1.8.1.3 Timber Marketing Costs

Average marketing costs for 1982/83 were \$2.03/m³ gross covering all sawlog, pole, post and miscellaneous hewn operations. This average cost includes the cost of sawlog measuring (\$0.57/m³ gross), sawlog and pole tree marking (\$0.91/m³ gross), pole measurement and supervision of

posts, sleepers and miscellaneous sawn-timber operations (\$1.08/m³ gross) and general supervision (\$0.45/m³ gross). Marketing costs are expected to remain much the same in real terms in the future.

Road construction costs are minimal because of the generally adequate roading system. They are generally restricted to construction of minor roads as snig shorteners through sawmiller agreements.

1.8.1.4 Forecast Demand

A continuing demand for the sawlog yield from the Management Area is expected. This expectation is strengthened by the continuing reduction in availability of private property supplies and the high level of building construction in the Region. The main market for sawn timber is Brisbane, supplemented by the Gold Coast and to a lesser extent the Northern Rivers area generally.

Pole using authorities have indicated that demand is expected to continue with moderate increases into the future. The majority of poles produced from the Management Area are supplied to electricity authorities in S.E. Queensland, the Northern Rivers Area and to a lesser extent Sydney.

A continuing demand for other timber products, such as fencing timber, sleepers and junk, is expected.

1.8.2 Other Revenue

Revenue from grazing is significant, representing 5% of total revenue in 1982/83.

1.8.3 Expenditure

Apart from direct timber marketing costs, direct expenditure is largely in maintenance of roads and fire protection, with continuing investment in accumulation of growth data and other research projects, and silvicultural treatment.

Expenditure both on an historical and replacement-accounting basis, including all overheads, depreciation and amortisation and loan interest payable on past capitalised investments, is less than current revenue.

This reflects the generally low level of investment in silvicultural treatment and road construction necessary in the Area, and the favourable timber marketing economics.

Reduction of the yield, particularly of poles, to the level that can be sustained from the Area, could be expected to result in a less favourable expenditure/revenue balance.

1.8.4 Labour Requirements

The present District labour force is considered to be adequate to implement current management prescriptions and developments, in conjunction with those for the adjoining Whiporie Management Area.

PART 2

FUTURE PROPOSALS

Chapter 2.1 General Basis of Management

2.1.1 Management Objectives

The management objectives for Casino Management Area shall be:

1. To supply hardwood sawlogs to local industry on a sustained-yield basis, to the extent economically justifiable and consistent with objective (4) below.
2. To supply poles to meet reasonable industry requirements on a sustained yield basis, to the extent economically justifiable and consistent with Objective (4) below.
3. To supply other timber and forest products where economically justifiable and compatible with Objectives (1), (2) and (4).
4. To maintain the Management Area generally under natural forest vegetation cover adequate to:
 - (a) Conserve the soil resources and water catchment capabilities.
 - (b) Retain an aesthetic forest environment acceptable to the public generally.
 - (c) Maintain a diversity of habitat suitable to wildlife indigenous to the area.
5. To maintain any unique or rare, ecological, historical, floral, faunal or other scientific values occurring within the Area.
6. To provide for grazing and other forest uses where compatible with other management objectives.
7. To provide for the use of the Management Area for public recreation.
8. To maximise net financial returns to the extent possible under other objects of management.

2.1.2 Management Strategy

The management strategy is derived from the Forestry Commission's Indigenous Forest Policy and particularly that part of the Policy relating to Coastal Hardwoods.

Timber production objectives will be met by continuation of management in

- . A Sawlog Working Circle consisting of State Forest areas primarily suited to long term sawlog production, and
- . A Pole Working Circle consisting of
 - . State Forest areas primarily suited to long-term pole production, and
 - . Other Crown-timber lands.

Management of the Pole Working Circle will continue to be directed towards the long-term production of poles by:

- (a) Harvesting of trees suitable for conversion to poles as near as practicable to time of their optimum value development as poles.
- (b) Harvesting of sawlogs and other marketable products from areas harvested for poles, as a silvicultural operation designed to promote the development of growing stock of pole-production potential.

Such marketing will be on a current cutting cycle of 25 years or more.

Crown-timber lands other than State Forest will be managed according to expected future tenure, dedicated as State Forest where justified, and included within the appropriate Working Circle.

Management of the Sawlog Working Circle will continue to be directed towards the long-term production of hardwood sawlogs by harvesting sawlogs, poles, and other marketable products from mature, over-mature and defective trees; and from thinnings the removal of which would promote the increment of potential sawlog growing stock. Such harvesting in the Sawlog Working Circle will be at a rate calculated to provide a sustained yield of sawlogs from the Management Area and which will result in the growing stock of the Working Circle moving towards a normal distribution on a sawlog rotation.

Growth information will be progressively accumulated, and inventory assessment undertaken as required towards the end of the current cutting cycle to define more closely the yield of poles and sawlogs which can be sustained from the Area.

Pending such inventory assessment, monitoring of actual against estimated yields will be continued:

- . To give a reliable basis for conversion of standing inventory volumes to marketing volume units used as the basis of yield regulation, and
- . As the basis for periodic yield reviews which will be undertaken to ensure that the timber-production strategy is effectively implemented.

Future timber production will be further aided in the Sawlog Working Circle by limited culling of unmerchantable stems, following harvesting operations. Such culling will be undertaken at a rate designed to prevent any build-up of an over-burden of unmerchantable trees, while still maintaining a stocking of such trees for ecological balance. Openings created by harvesting operations will be re-stocked, mainly by natural regeneration, but also by supplementary planting of jiffy-pot seedlings in the Blackbutt type where necessary.

Maintenance of an adequate natural forest vegetation cover and related objectives will be met essentially through the inherent constraints and regeneration measures of the timber-production strategy outlined above, and protection from excessive wildfire damage.

Other measures will include:

- . The application of Standard Erosion Mitigation Conditions in harvesting, road design, road construction and maintenance.

- . Exclusion from or modification of logging in specific areas of particular visual sensitivity.

Unique or rare values will be maintained by continuation of existing reservations free from disturbance, and by investigation to define and subsequent action to protect other suitable areas with such values.

The use of the Area for grazing and apiculture will be encouraged and other uses allowed where compatible with other objectives and strategy, and will be controlled by issue of permits and leases as appropriate.

Public recreation objectives will be met in the Plan period by maintaining the existing day use facilities, with new projects being developed only as justified by demand.

Maximisation of net financial benefits will be achieved mainly through the timber-production strategy, and by continuing review of marketing systems, construction and maintenance programs, and operational procedures. The existing road system will be maintained for harvesting, fire protection and recreation to the extent of demand. Road construction and maintenance standards will be limited to those required for effective harvesting, recreation and protection of the forest from excessive fire damage.

2.1.3 Division of Area

The area shall be managed in three working circles as follows:

1. Sawlog Working Circle.
2. Pole Working Circle.
3. Preserved Areas Working Circle.

The existing subdivision of the State Forests of the Area shall be maintained and extended as necessary to include any further State Forest dedications as they occur, or adjusted to take account of any further minor excision of areas for pine plantation establishment and inclusion in the Whiporie or Grevillia Management Areas.

2.1.4 Period of the Plan

This plan shall take effect from the 1st July, 1983 and shall remain in force until replaced by an approved, revised plan. Plan revision should be undertaken by June, 1988 but shall be completed by June, 1993 at the latest.

Chapter 2.2 Plan for the Sawlog Working Circle

2.2.1 Constitution of the Working Circle

The Working Circle shall include generally those State Forest areas primarily suited to long-term sawlog production, described as:

- (a) Better site quality areas - essentially Blackbutt types, the limited area of Moist Hardwood types, and the highest site quality Spotted Gum and other Dry Hardwood types.
- (b) Those areas of the lower site quality Dry Hardwood types deficient in suitable pole species but capable of growing sawlogs.
- (c) Essentially unproductive areas closely associated with the above types.

The composition of the Working Circle by Compartments and broad forest type Areas by State Forests is given in Appendix 5(a).

These areas are shown on the map Appendix 5(b), and constitute 43% of the area of State Forests in the Area.

2.2.2 Yield Regulation

2.2.2.1 Quota Sawlogs

Yield shall be limited to the current annual quota commitment of 8 480 m³ net quota sawlogs less the quota sawlog volume obtained from the Pole Working Circle, and shall be subject to periodic review as required in the light of the results of yield monitoring as prescribed under Section 2.6.1.2 of this Plan.

2.2.2.2 Poles

Yield shall be limited to that available from the Working Circle under the harvesting prescriptions of Section 2.2.3 of this Plan. The annual pole allocation for the Management Area shall be determined by the Regional Forester as part of the total allocation from the Casino/Casino West Management Areas which is currently 7 500 m³/annum.

2.2.2.3 Other Timber and Products

The yield of piles, girders, ex-quota sawlogs, fencing timber and other timber and forest products shall be regulated according to demand and availability under the harvesting prescriptions of Section 2.2.3 of this plan. Specific yield limitations for sleepers/junk shall be determined by the Regional Forester.

2.2.3 Commercial Operations

2.2.3.1 Special Prescription Areas

Harvesting shall be excluded or modified in areas designated for Special Emphasis under the Preferred Management Priority Classification system, as necessary to protect the values designated by the classification.

The above special prescription areas shall be designated in harvesting plans prepared for each individual harvesting area affected, before operations commence in that area.

2.2.3.2 Harvesting Prescriptions

1. Erosion control prescriptions as defined in Standard Erosion Mitigation Conditions for Logging and Clearing in N.S.W., as amended from time to time, shall be applied.
2. Tree marking for removal or retention shall be carried out as necessary to ensure the proper implementation of the harvesting prescriptions of this Plan.
3. Supervision should ensure that trees removed are harvested for the most economic end use, and should aim at maximum economic utilisation of trees felled.
4. Tree marking and supervision should aim at the maximum economically-available quota sawlog yield from trees not required for retention, and not of higher royalty value if harvested as poles.

The following further prescriptions shall apply to all areas except those to be excised from the Management Area and established to pine plantation:

5. Trees judged capable of significant net merchantable timber-value increment for economic harvesting during a subsequent cutting cycle shall be retained, except where removal would result in more valuable increment on preferred retained stems.
6. Poles should be harvested as a silvicultural thinning to concentrate growth on stems retained as potential sawlogs or poles.
7. Trees should be harvested for poles, piles or girders if merchantable as such, provided such harvesting will result in a higher royalty return than subsequent harvesting for sawlogs and they are judged not capable of further realisable timber-value increment to produce larger poles, piles or girders for economic harvesting during a subsequent cutting cycle.

Trees shall be regarded as merchantable as poles if conversion is practicable to produce an acceptable pole to the Standard Specifications of the Standards Association of Australia, including standard straightness, within a reasonable range of orders for size and market specifications.

Acceptance of poles below these standards should be encouraged.

8. Ex quota sawlogs should be harvested as available from trees not required for retention, and not of higher royalty value if harvested as poles, in conjunction with or closely following quota-sawlog operations.
9. Sleeper and post operations shall be restricted to trees not suitable or potentially suitable for poles or quota sawlogs. Split posts may be obtained from Bloodwood trees without tree marking.
10. Other timber and forest products may be utilised from trees or parts of trees felled under the above prescriptions and which prove unsuitable for the purpose for which they were felled; or from trees not suitable or potentially suitable for conversion to the timber products mentioned above and which could be removed in silvicultural culling operations under the prescriptions of Section 2.2.4 of this Plan.

The following further prescriptions shall apply specifically to areas to be excised from the Management Area and established to pine plantation.

12. Harvesting shall aim at the maximum net financial return from the sale of timber and products.

2.2.3.3 Order of Working

The order of working for sawlogs and poles by Compartments shall be determined by the Forester and approved by the Regional Forester each year for the following two years and incorporated in the annual management report prescribed under Section 2.8.1 of this Plan. The following principles and requirements shall be adopted in the determination:

1. Pole operations shall precede sawlog operations where practicable.
2. Logging should concentrate on those areas carrying overmature and mature stands.
3. Areas where the most silvicultural benefit would be obtained from harvesting should have priority.
4. Where practicable, harvesting of areas suitable for wet-weather logging should be deferred until required.
5. As far as practicable the order of working for sawlogs shall avoid relative economic disadvantages in stumpage appraisal and log species and quality mix, for any licensee involved in harvesting the approved yield.

The order of working for other timber and forest products shall be determined by the Forester on the basis of demand and availability under the harvesting prescriptions of this Plan.

2.2.4 Cultural Operations

Following logging, cultural operations shall be undertaken as follows:

(a) Blackbutt Types (Types 36-41)

Culling of unmerchantable stems, the removal of which will promote increment on stems potentially merchantable as sawlogs or poles, subject to the retention of an adequate number of Blackbutt seed trees to provide for regeneration establishment.

Culling of unmerchantable stems to increase openings for regeneration and/or planting of Blackbutt seedlings, subject to a maximum-size opening of one hectare.

Planting of snig tracks, log dumps and other suitable openings with Blackbutt seedlings at a spacing equivalent to 125 per hectare, where an adequate stocking of natural regeneration is not expected to develop.

(b) Higher Site Quality Moist and Semi Moist Hardwood Types (Types 46-48, 60, 62)

Culling of unmerchantable stems, the removal of which will promote increment on remaining stems potentially merchantable as sawlogs or poles.

Planting of snig tracks, log dumps and other suitable openings with seedlings of Blackbutt (Types 60, 62), Flooded Gum or Blue Gum (Types 48, 47, 46) at a spacing equivalent to 125 per hectare, where adequate natural regeneration is not expected to develop.

(c) Higher Site Quality Spotted Gum Types (Types 70, 72, 74)

Culling of unmerchantable stems, the removal of which will promote increment on stems potentially merchantable as sawlogs or poles.

Work under (b) and (c) shall be restricted to that which can be carried out by the existing labour force or the labour force necessary for adequate forest maintenance and protection.

Tree-head disposal burning may be undertaken as soon as practicable after harvesting and before any enrichment planting, to encourage adequate natural regeneration and reduce the risk and intensity of wild-fire, provided that insignificant damage to any potentially merchantable advance growth or existing regeneration would result.

Particular attention shall be paid to monitoring of the adequacy of natural regeneration following logging and subsequent cultural treatment, particularly in the Blackbutt types, and the cost effectiveness of the measures prescribed to encourage and supplement such regeneration. The techniques prescribed shall be reviewed and modified as necessary to ensure the cost-effective establishment of an adequate stocking of regeneration.

No other cultural operations shall be performed.

Chapter 2.3 Plan for the Pole Working Circle

2.3.1 Constitution of the Working Circle

The Working Circle shall include State Forest areas primarily suited to long-term pole production, and Crown-timber lands other than State Forest.

The areas within State Forests are listed by Compartments and by broad forest type areas by State Forests in Appendix 5(a) and shown on the map Appendix 5(b), and constitute about 57% of the area of State Forest in the Area. They consist essentially of those Spotted Gum and Other Dry Hardwood types neither deficient in pole species nor of high site quality and consequently suited to long-term pole production, but include closely associated or broad areas of essentially unproductive types.

2.3.2 Yield Regulation

2.3.2.1 Poles

The annual yield shall be limited to that required for supply against commitments in conjunction with supply from the Sawlog Working Circle. The annual allocation from the Management Area shall be determined by the Regional Forester as part of the total annual allocation from the Casino and Casino West Management Areas which is currently 7 500m³/annum.

The yield should be further limited to that which can be sustained from the Area as determined by periodic review of the results of yield monitoring as prescribed under Section 2.6.1.2 of this Plan. Action should be taken to adjust total allocation commitments as found to be necessary as a result of such reviews. Such review shall be undertaken as early as practicable in the Plan period.

2.3.2.2 Sawlogs

The yield shall be limited to that available under the harvesting prescriptions of this Plan. The quota-sawlog yield shall be supplied as part of the overall maximum quota-sawlog yield from the Area, currently 8 480 m³/yr.

2.3.2.3 Other Timber and Products

The yield of piles, girders, ex-quota sawlogs, fencing timber and other timber and forest products shall be regulated according to demand and the availability of such products under the harvesting prescriptions of this Plan. Specific yield limitations for sleepers and junk shall be determined by the Regional Forester.

2.3.3 Commercial Operations

2.3.3.1 Special Prescription Areas

Harvesting shall be excluded or modified in areas designated for Special Emphasis under the Preferred Management Priority Classification system, as necessary to protect the values designated by the classification.

The above special prescription areas shall be designated in harvesting plans prepared for each individual harvesting area affected, before operations commence in that area.

2.3.3.2 Harvesting Prescriptions

1. Erosion control prescriptions as defined in Standard Erosion Mitigation Conditions for Logging and Clearing in N.S.W., as amended from time to time, shall be applied.
2. Tree marking for removal or retention shall be carried out as necessary to ensure the proper implementation of the harvesting prescriptions of this Plan.
3. Supervision should ensure that trees removed are harvested for the most economic end use, and should aim at maximum economic utilisation of trees felled.
4. Tree marking and supervision should aim at the maximum economically-available quota sawlog yield from trees not required for retention and not of higher royalty value if harvested as poles.

The following further prescriptions shall apply to operations in State Forests or other Crown-timber lands not expected to be converted to purchase tenure, except those areas to be excised from the Management Area and established to pine plantations.

5. Trees judged capable of significant net merchantable timber-value increment for economic harvesting during a subsequent cutting cycle shall be retained, except where removal would result in more valuable increment on preferred retained stems.
6. Trees not required for retention shall be harvested:
 - (a) As poles, if conversion is practicable to produce an acceptable pole to the Standard Specifications of the Standards Association of Australia, including standard straightness, within a reasonable range of orders for size and market specifications.

Acceptance of poles below these standards should be encouraged.
 - (b) As sawlogs if merchantable as such and not capable of conversion to produce an acceptable pole as defined above, because of species, diameter/length ratio, poor form or defect. Where a sawlog yield is available, sawlog operations should be undertaken in conjunction with or closely following pole operations.
 - (c) For sleepers and posts if merchantable as such and unmerchantable as poles or quota sawlogs, to the extent that a market is available.
7. Other timber and forest products may be utilised from trees or parts of trees felled under the prescriptions outlined above and which prove unsuitable for the purpose for which they were felled; or from trees not suitable or potentially suitable for conversion to poles or sawlogs, the removal of which will promote increment on retained stems potentially merchantable as poles or sawlogs.

The following further prescription shall apply specifically to areas to be excised from the Management Area and established to pine plantations:

8. Harvesting shall aim at the maximum net financial return from the sale of timber and products.

The following further prescription shall apply specifically to all purchase-tenure lands and other Crown-timber lands expected to be converted to purchase-tenure.

9. Harvesting shall aim at full realisation of the Crown asset as defined under Section 25F of the Forestry Act.

2.3.3.3 Order of Working

The order of working for poles and sawlogs by Compartments shall be determined by the Forester and approved by the Regional Forester each year for the following two years and incorporated in the annual management report prescribed under Section 2.8.1 of this Plan. The following principles and requirements shall be adopted in the determination:

1. Operations should concentrate on the areas with the highest proportion of poles most likely to grow beyond pole specification sizes.
2. The next priority should be given to those denser stands that would benefit most from a pole operation by concentration of increment on better potential poles.
3. As far as practicable, harvesting of areas suitable for wet-weather operations should be deferred until required.
4. As far as practicable, the order of working shall avoid relative economic disadvantage in pole and log species, size and quality mix in relation to market conditions, and in stumpage appraisal, for any licensee involved in harvesting the approved yield.
5. Superimposed on these above principles is the need to give priority to the harvesting of purchase-tenure lands before expiry of profit à prendre.

The order of working for other timber and forest products shall be determined by the District Forester on the basis of demand and availability under the harvesting prescriptions of this Plan.

2.3.4 Cultural Operations

Tree-head disposal burning should be undertaken as soon as practicable following harvesting to encourage adequate natural regeneration and reduce the risk and intensity of wildfire, provided that insignificant damage to any potentially merchantable advance growth or existing regeneration would result.

No other cultural operations shall be undertaken.

Chapter 2.4 Plan for the Preserved Areas Working Circle

2.4.1 Constitution of the Working Circle

This Working Circle shall consist of areas designated as Preferred Management Priority Classification 1.3, Preserved Natural Forest, including areas:

- . Notified as Flora Reserves
- . Designated as Forest Preserves
- . Under investigation for consideration as to suitability as a Flora Reserve or Forest Preserve.
- . As defined to preserve any unique or rare ecological floral, faunal or other scientific values, as they become known.

A list and a brief description of areas presently so classified is given in Appendix 11. The total area currently included in the Working Circle is 258 ha.

2.4.2 Management Prescriptions

Management of Flora Reserves shall proceed under a Working Plan approved by the Minister for Forests for each Reserve.

Investigations shall be continued toward determination of the final status of areas other than Flora Reserves included in the Working Circle. Appropriate identification and record of these areas as they are defined shall be maintained.

All such areas shall be designated in harvesting plans for adjacent logging areas to ensure that no harvesting operations take place within them.

No operations shall be undertaken in these areas which would reduce their value as potential Flora Reserves, until their final status is determined. Subsequently no operations shall be undertaken which would reduce their value for the purpose for which reservation is maintained.

Chapter 2.5 Protection Prescriptions

2.5.1 Fire Protection

Fire protection shall be as prescribed in the Casino District Fire Plan.

The Plan has the following basis.

1. Intensive fire protection for:
 - (a) The Whiporie Management Area Pine Plantation.
 - (b) Doubleduke/Devils Pulpit Blackbutt plantation.
 - (c) Areas of established regeneration resulting from investment in silvicultural treatment.
2. Extensive fire protection in the balance of State Forest areas.
3. Concentration of activities on prevention including hazard reduction: with emphasis on protection of boundaries of plantation areas, of areas of established regeneration and of State Forests generally.
4. Development of increased liaison with Bush Fire Brigades and neighbours and their fire prevention activities, and/or programs designed to generally assist in the education of the public in fire prevention.

2.5.2 Flora

The taxonomic list of dominant vegetation species occurring within the Management Area (Appendix 3) shall be continually reviewed and updated. Action shall be taken as reasonably necessary to ensure the survival of any rare or endangered plant species which may come to notice.

2.5.3 Fauna

The taxonomic list of native fauna occurring within the Management Area (Appendix 4) shall be continually reviewed and updated. The distribution and abundance of these species should be monitored in order to provide information on the long-term effect of specific management policies on native fauna. Action shall be taken as reasonably necessary to ensure the survival of any rare or endangered species which may come to notice.

Chapter 2.6 Timber Yield Investigations

2.6.1 Growth Information

The planned establishment of Permanent Growth Plots as outlined in Section 1.3.2.7 shall be completed following logging and maintained as part of the North Coast regional system, to provide more comprehensive and representative growth data for use in subsequent yield determinations.

2.6.2 Monitoring of Actual Against Estimated Yields

Progressive monitoring of actual against estimated quota-sawlog and pole yields shall be continued as the basis for:

- . Confirmation or modification of the basis of yield determination as outlined in Section 1.5.2.
- . Subsequent yield review, using the projected inventory and accumulated growth information, and established relationships between gross volumes available for removal and net volumes actually produced to satisfy yield commitments.

Such monitoring shall be designed to establish the relationships for the various sections of forest within the Pole and Sawlog Working Circles, and overall, between:

1. Actual net quota sawlog yields of logs 40 cms c.d.u.b. and larger; and the corresponding net quota yields/ha estimated to be available, as outlined in Section 1.5.2.1 and Appendix 9.
2. Actual net quota-sawlog yields/ha (30 cm cdub and larger); and the corresponding estimated yields/ha derived from the expectation, assumed in the yield determination outlined in Section 1.5.2.1 and Appendix 9, that net quota-sawlog yields 30 cm cdub and larger would be 33% in excess of net quota sawlog yields 40 cm cdub and larger.
3. The proportion of total net quota-sawlog yield (30 cm cdub and larger) obtained in logs 30 - 40 cms c.d.u.b.; and the expected 25% of total quota-sawlog yields (33% of net quota-sawlog yield 40 cms c.d.u.b. and larger) assumed to be available in logs 30-40 cms c.d.u.b. in the yield determination outlined in Section 1.5.2.1 and Appendix 9.
4. Net quota-sawlog volumes actually obtained in logs 40 cms c.d.u.b. and larger, and in logs less than 40 cm c.d.u.b.; and gross volumes removed.
5. Actual pole yields; and those estimated in Section 1.5.2.2 and Appendix 10.

As the basis for continued monitoring and further yield review, estimated yields/hectare shall be revised on the basis of actual yields/ha obtained, calculated from records and areas of forest and stand condition types as now delineated on the 1:25 000 forest type and stand condition maps.

The implications for yield regulation of these relationships as progressively monitored shall be reviewed annually, and this review incorporated in the annual management report prescribed under Section 2.8.1 of this Plan.

Chapter 2.7 Miscellaneous Prescriptions

2.7.1 Capital Improvements

2.7.1.1 Roads and Trails

Construction of logging tracks by harvesting licensees under construction agreements shall be undertaken as necessary to maintain quota-sawlog and pole supplies and maximise net revenue returns. No major roading is considered to be necessary to satisfy management objectives during the Plan period.

Maintenance shall be kept at a level whereby effective harvesting, management requirements, fire protection and public usage can be achieved. Major roads and current logging roads shall be graded as required to maintain a stable road surface and to minimise erosion.

Minor roads required for fire protection and administration shall be generally maintained by mechanical slashing to promote a vegetative cover and so minimise erosion. Minor logging roads not required for fire protection or administration shall not be maintained but shall be adequately cross drained.

2.7.1.2 Buildings

No construction is expected to be required during the Plan period, but minor specific proposals may be undertaken as and if approved.

All existing buildings, structures and other facilities in use, including the Braemar Rest Area and its road access, shall be adequately maintained. A continuing review of present and potential use of all buildings, structures and facilities should be carried out with a view to disposal of those no longer required.

2.7.2 Recreation

Existing facilities shall be maintained. The level of recreational demand shall be monitored and facilities developed as justified by demand against expected construction and maintenance costs.

2.7.3 Research

Existing projects shall be maintained subject to periodic review of their function, and new projects initiated as found necessary. Research should be undertaken as considered necessary to support any review or modification of regeneration - establishment techniques in the Blackbutt types arising from the provisions of prescription 2.2.4 of this Plan.

2.7.4 Grazing

Grazing shall be encouraged, but restricted where necessary to avoid damage to areas in the Preserved Areas Working Circle or to ensure the adequacy of regeneration for renewal of full forest cover.

2.7.5 Apiculture

Apicultural usage should be continued and encouraged, but specific Commission expenditure on road maintenance solely for access for such usage should be avoided.

2.7.6 Gravel Operations

The existing arrangements for removal of gravel from State Forests of the Management Area may be continued, subject to continuation of the restrictions currently applied and subject to such policy determinations as may be made by the Commission.

2.7.7 Defence Forces Usage

Use of the Management Area by the Defence Forces for training may be permitted subject to the standard conditions.

2.7.8 Labour Provisions

Key employees shall be replaced as vacancies occur during the Plan period, as necessary to implement the strategy and prescriptions of this Plan.

Chapter 2.8 Management Plan Control

2.8.1 Annual Report

Immediately following the completion of each financial year a report shall be submitted comparing performance for the year with the prescriptions of this Plan. This shall include comment on the extent to which the prescriptions appear to be achieving the management objectives through the strategy outlined, and measures proposed or recommended to resolve any difficulties.

Particular attention shall be paid to the results of monitoring of actual against estimated yields from areas harvested and the progress of yield investigations, as prescribed under Chapter 2.6 of this Plan. A close and updated review of the implications for yield regulation as outlined in the strategy shall be included in the report.

Attention shall also be paid to the results of monitoring of the adequacy of natural regeneration as prescribed in Section 2.2.4 and of other relevant investigations.

As well as including the proposed orders of working for commercial operations for the two succeeding years, each report should make recommendations for future revisions of the plan based on experience gained in implementation over the Plan period.

2.8.2 Records

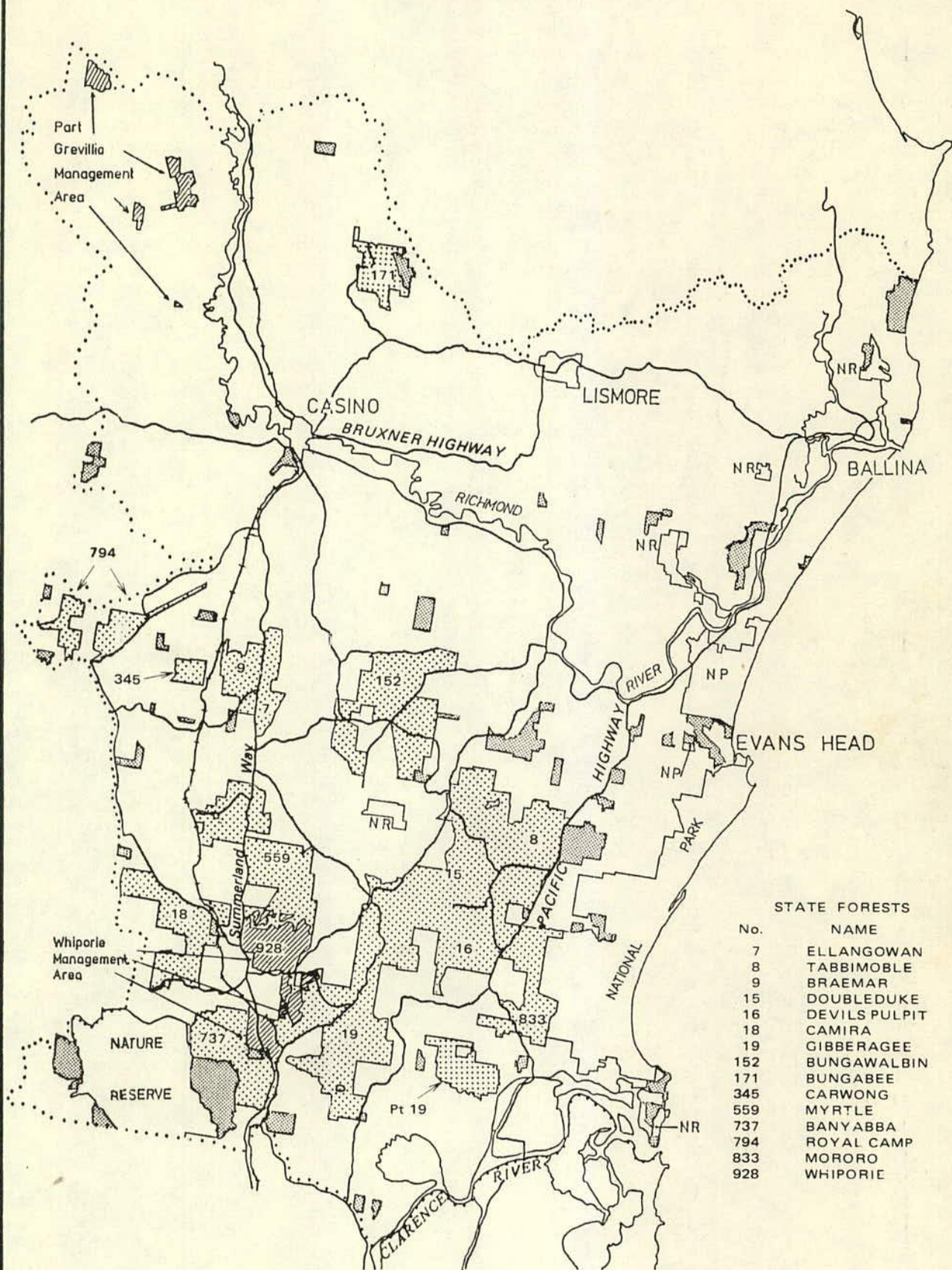
Compartment History records shall be maintained in a form approved by the Regional Forester. These should be updated each year in conjunction with the preparation of the Annual report.

Areas harvested and areas treated shall be recorded on appropriate maps each year in conjunction with the Annual Report preparation. Existing information shall be summarised and transferred to the 1: 25 000 forest-type/stand-condition maps now available.

A progressive record shall be maintained of actual against estimated pole and sawlog yields for areas harvested, as the basis for the yield monitoring prescribed under Section 2.6.2 of this Plan.

As part of the monitoring prescribed in Section 2.2.4, areas, particularly in the Blackbutt types, where difficulty is experienced in obtaining adequate natural regeneration following logging shall be specifically identified and particular attention paid to maintaining a complete record of subsequent treatment and other factors (e.g. fire) influencing successful regeneration establishment and assessments of such establishment.

CASINO MANAGEMENT AREA
LOCALITY MAP



| No. | NAME |
|-----|---------------|
| 7 | ELLANGOWAN |
| 8 | TABBIMOBLE |
| 9 | BRAEMAR |
| 15 | DOUBLEDUKE |
| 16 | DEVILS PULPIT |
| 18 | CAMIRA |
| 19 | GIBBERAGEE |
| 152 | BUNGAWALBIN |
| 171 | BUNGABEE |
| 345 | CARWONG |
| 559 | MYRTLE |
| 737 | BANYABBA |
| 794 | ROYAL CAMP |
| 833 | MORORO |
| 928 | WHIPORIE |

State Forest

Plantations within State Forest (within Whiporie and Grevillia M.A.s)

Other Crown-timber Lands

N P

National Park

N R

Nature Reserve

.....

District Boundary

++++

Railway Line

Casino Management PlanRainfall and Temperature Statistics for Casino

| Month | <u>Mean Daily Temperature 0°C</u> (1908 - 1980) | | <u>Mean Rainfall mm</u> (1858 - 1973) |
|-----------|--|------|--|
| | Min | Max | |
| January | 18.8 | 31.5 | 143 |
| February | 18.7 | 30.5 | 157 |
| March | 17.3 | 29.2 | 148 |
| April | 14.0 | 27.1 | 95 |
| May | 10.4 | 23.9 | 73 |
| June | 7.9 | 21.6 | 69 |
| July | 6.6 | 21.3 | 62 |
| August | 7.4 | 22.9 | 45 |
| September | 10.2 | 25.5 | 46 |
| October | 13.3 | 28.1 | 71 |
| November | 15.9 | 30.1 | 86 |
| December | 17.7 | 31.4 | 112 |
| Total | | | 1 107 |

Rainfall Data

| | |
|--------------------------|----------|
| Lowest Annual Total | 490 mm |
| Highest Annual Total | 1 955 mm |
| Mean number of rain days | 104 |

Temperature Data

| | |
|---|--------|
| Highest daily temperature (1965-80) | 42.8°C |
| Mean number days/year over 35°C (1965-80) | 18 |
| Mean number frosts/year | 1 |

Source: Bureau of Meteorology

Temperatures - Climatological Data Available on Microfiche

Rainfall - Climatic Averages - Australia, August, 1975

Casino Management AreaDominant Vegetation SpeciesKnown to occur within the Management Area

| <u>Family</u> | <u>Botanical Name</u> | <u>Common Name</u> |
|----------------|--|---|
| Akaniaceae | Akania lucens | Turnipwood |
| Araliaceae | Polyscias elegans | Black Pencil Cedar |
| Araucariaceae | Araucaria cunninghamii | Hoop Pine |
| Boraginaceae | Ehretia acuminata | Koda |
| Casuarinaceae | Casuarina cunninghamii C. torulosa C. glauca | River Oak Forest Oak Swamp Oak |
| Celastraceae | Denhamia pittosporoides Elaeodendron australe | Orange Box wood Red Olive-berry |
| Cupressaceae | Callitris collumellaris | Coastal Cypress Pine |
| Ebenaceae | Diospyros pentamera | Black Myrtle |
| Elaeocarpaceae | Elaeocarpus reticulatus | Blueberry Ash |
| Epacridaceae | Trochocarpa laurina | Tree Heath |
| Euphorbiaceae | Baloghia lucida Cleistanthus cunninghamii Glochidion ferdinandi Mallotus philippensis | Brush Bloodwood Cleistanthus Cheese Tree Orange Kamala |
| Eupomatiaceae | Eupomatia laurina | Bolwarra |
| Lauraceae | Beilschmiedia elliptica Cinnamomum camphora (Int) Cryptocarya glaucescens Cryptocarya obovata Endiandra discolor E. muelleri E. pubens Neolitsea cassia | Grey Walnut Camphor Laurel Native Laurel Pepperberry Rose Walnut Mueller's Walnut Hairy Walnut Smooth-barked Bolly Gum |
| Malvaceae | Hibiscus heterophyllus | Native Rosella |
| Meliaceae | Melia azedarach Synoum glandulosum Toona australis Owenia cepiodora | White Cedar Scentless Rosewood Red Cedar Onionwood |
| Mimosaceae | Acacia cunninghamii A. glaucescens | Myall Coastal Myall |
| Monimiaceae | Daphnandra micrantha | Socketwood |
| Moraceae | Ficus fraseri Ficus watkinsiana | Sandpaper Fig Strangler Fig |

| <u>Family</u> | <u>Botanical Name</u> | <u>Common Name</u> |
|----------------|---------------------------------------|------------------------------------|
| Myrtaceae | Syzygium Acmena smithii | Lilly Pilly |
| | Angophora floribunda | Rough-barked Apple |
| | Angophora subvelutina | Broad-barked Apple |
| | A. bakeri | Small-leaved Apple |
| | Callistemon viminalis | |
| | Eucalyptus bancroftii | Cabbage Gum |
| | E. acmenioides | White Mahogany |
| | E. baileyana | Bailey's Stringybark |
| | E. crebra | Narrow-leaved Ironbark |
| | E. eugenioides | Thin-leaved Stringybark |
| | E. fibrosa | Red Ironbark |
| | E. glaucina* | Slaty Red Gum |
| | E. globoidea | White Stringybark |
| | E. grandis | Flooded Gum |
| | E. gummifera | Red Bloodwood |
| | E. haemastoma | Scribbly Gum |
| | E. intermedia | Pink Bloodwood |
| | E. maculata | Spotted Gum |
| | E. microcorys | Tallowwood |
| | E. moluccana | Grey Box |
| | E. pilularis | Blackbutt |
| | E. planchoniana | Needlebark Stringybark |
| | E. propinqua | Small-fruited Grey Gum |
| | E. punctata | Large-fruited Grey Gum |
| | E. pyrocarpa* | Large-fruited Blackbutt |
| | E. robusta | Swamp Mahogany |
| | E. resinifera | Red Mahogany |
| | E. rummeryi* | Steel Box |
| | E. saligna | Sydney Blue Gum |
| | E. seeana | Narrow-leafed Red Gum |
| | E. signata | Scribbly Gum |
| | E. siderophloia | Grey Ironbark |
| | E. tereticornis | Forest Red Gum |
| | E. tindaliae | Tindal's Stringybark |
| | Leptospermum laevigatum | Coast Tea Tree |
| | Melaleuca alternifolia | - |
| | M. bracteata | - |
| | M. irbyana | - |
| | M. linariifolia | - |
| | M. quinquenervia | Broad leaved Tea-tree |
| | Rhodomyrtus psidioides | Native Guava |
| | Rhodamnia trinervia | Brush Turpentine |
| | Syzygium francisii | Giant Water Gum <i>Lillypilly?</i> |
| | Lophostemon confertus | Brush Box |
| | L. suaveolens | Swamp Turpentine |
| | Tristaniopsis laurina | Water Gum |
| Papilionaceae | Castanospermum australe | Black Bean |
| Pinaceae | Pinus elliottii (Int) | Slash Pine |
| | P. taeda (Int) | Loblolly Pine |
| Pittosporaceae | Pittosporum revolutum | Hairy Pittosporum |
| | Hymenosporum flavum | Native Frangipanni |
| Proteaceae | Banksia collina | Hill's Banksia |
| | B. integrifolia | White Banksia |
| | B. serrata | Prickly Ash |
| | Stenocarpus sinuatus | Wheel-of-Fire Tree |

| <u>Family</u> | <u>Botanical Name</u> | <u>Common Name</u> |
|---------------|------------------------------------|----------------------------|
| Rhamnaceae | <i>Alphitonia excelsa</i> | Red Ash |
| Rutaceae | <i>Flindersia schottiana</i> | Cudgerie |
| Santalaceae | <i>Exocarpus cupressiformis</i> | Native Cherry |
| Sapindaceae | <i>Cupaniopsis serrata</i> | Rusty Tucker |
| | <i>Elattostachys nervosa</i> | Green Tamarind |
| | <i>Guoia semiglauc</i> | Guoia |
| | <i>Harpullia pendula</i> | Tulipwood |
| | <i>Jagera pseudorhus</i> | Foam Bark Tree |
| | <i>Sarcopteryx stipitata</i> | Steelwood |
| Solanaceae | <i>Duboisia myoporoides</i> | Corkwood |
| Sterculiaceae | <i>Argyrodendron trifoliolatum</i> | White Booyong |
| | <i>Brachychiton populneum</i> | Kurrajong |
| | <i>Commersonia fraseri</i> | Brush Kurrajong |
| Symplocaceae | <i>Symplocos stawellii</i> | White Hazelwood |
| Urticaceae | <i>Dendrocnide photinophylla</i> | Shiny-leaved Stinging Tree |
| Verbenaceae | <i>Clerodendrum tomentosum</i> | Hairy Clerodendrum |
| | <i>Gmelina leichardtii</i> | White Beech |

* Listed as rare or vulnerable species (J. Leigh et al., 1981, Rare or threatened Australian Plants, Canberra: Aust. Nat. Parks & Wildlife Service, Sp. Publ. 7.; L.D. Pryor, 1981, Australian Endangered Species: Eucalypts, Canberra: Aust. Nat. Parks & Wildlife Service, Sp. Publ. 5.)

Casino Management AreaNative Fauna known to occur within
the Management AreaCommon NameZoological NameI. REPTILES (Confined to confirmed sightings for Area)Family CHELIDAE: Tortoises

Long-necked Tortoise

*Chelodina longicollis*Family AGAMIDAE: Dragons

Eastern Water Dragon

*Physignathus lesueurii*Family VARANIDAE: Monitors

Goulds Goanna

*Varanus gouldii*Family BOIDAE: Pythons

Carpet Python

*Morelia spilotes*Family COLUBRIDAE: Tree Snakes

Common Tree Snake

*Dendrelaphis punctulatus*Family ELAPIDAE: Elapid Snakes

Common Death Adder

Acanthophis antarcticus

Copper Head

Austrelaps superbus

Yellow-Faced Whip Snake

Demansio psammophis

Black-Bellied Swamp Snake

Hemiaspis signata

Stephen's Banded Snake

Hoplocephalus stephensi

Taipan

Oxyuranus scutellatus

Red-Bellied Black Snake

Pseudechis porphyriacus

Eastern Brown Snake

Pseudonaja textilis

Bandy-Bandy

Vermicella annulata

| <u>Common Name</u> | <u>Zoological Name</u> | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|---|-----------------------------|----------------|------------------|---------------|
| II. <u>BIRDS</u> (Confined to confirmed sightings for Area) | | | | |
| <u>Family DROMAIIDAE: Emus</u> | | | | |
| Emu | Dromaius novaehollandiae | O | O | S |
| <u>Family PODICIPEDIDAE: Grebes</u> | | | | |
| Australian Little Grebe | Tachybaptus novaehollandiae | W P | C | S |
| <u>Family PELECANIDAE: Pelicans</u> | | | | |
| Australian Pelican | Pelecanus conspicillatus | W | C | N |
| <u>Family ANHINGIDAE: Darters</u> | | | | |
| Darter | Anhinga melanogaster | W | O | S |
| <u>Family PHALACROCORACIDAE: Cormorants</u> | | | | |
| Little Pied Cormorant | Phalacrocorax melanoleucos | W | C | S |
| Black Cormorant | Phalacrocorax carbo | W P | C | S |
| <u>Family ARDEIDAE: Herons, Egrets & Bitterns</u> | | | | |
| White-necked (Pacific) Heron | Ardea pacifica | W | C | S |
| White-faced Heron | Ardea novaehollandiae | W | F | S |
| Cattle Egret | Ardeola ibis | W P | F | S |
| Large Egret | Egretta alba | W | O | S |
| Nankeen Night Heron | Nycticorax caledonicus | W | O | N |
| Little Bittern | Ixobrychus minutus | W | O | S |

Appendix 4
(iii)

| <u>Common Name</u> | <u>Zoological Name</u> | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|---|--------------------------|----------------|------------------|---------------|
| <u>Family CICONIIDAE: Storks</u> | | | | |
| Jabiru | Xenorhynchus asiaticus | W | O | S |
| <u>Family PLATALEIDAE: Ibises & Spoonbills</u> | | | | |
| Glossy Ibis | Plegadis falcinellus | W | O | M |
| White Ibis | Threskiornis molucca | W P | F | M |
| Straw-necked Ibis | Threskiornis spinicollis | W P | F | M |
| Royal Spoonbill | Platalea regi | W | O | N |
| Yellow-billed Spoonbill | Platalea flavipes | W | O | N |
| <u>Family ANATIDAE: Swans, Geese & Ducks</u> | | | | |
| Black Swan | Cygnus atratus | W P | C | N |
| Black Duck | Anas superciliosa | W | F | S |
| Wood Duck | Chenonetta jubata | W P | F | S |
| <u>Family ACCIPITRIDAE: Kites, Hawks, Eagles & Harriers</u> | | | | |
| Black-shouldered Kite | Elanus notatus | SW P | C | S |
| Letter-winged Kite | Elanus scriptus | O SW | C | S |
| Crested Hawk (Pacific Baza) | Aviceda subcristata | SW | O | S |
| Whistling Kite | Haliastur sphenurus | W P | C | S |
| Collared Sparrowhawk | Accipiter cirrhocephalus | Var. P | O | S |
| Brown Goshawk | Accipiter fasciatus | Var. P | O | S |
| White-breasted Sea-Eagle | Haliaeetus leucogaster | W | O | S |
| Wedge-tailed Eagle | Aquila audax | O SW DSF P | O | S |
| Spotted Harrier | Circus assimilis | O SW | O | S |
| Swamp Harrier | Circus aeruginosus | W P | O | S |

Appendix 4
(iv)

| <u>Common Name</u> | <u>Zoological Name</u> | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|---|------------------------|----------------|------------------|---------------|
| <u>Family FALCONIDAE: Falcons & Kestrels</u> | | | | |
| Peregrine Falcon | Falco peregrinus | Var. P | O | S |
| Brown Falcon | Falco berigora | O SW P | C | S |
| Nankeen Kestrel | Falco cenchroides | O SW P | C | S |
| <u>Family MEGAPODIIDAE: Mound-builders</u> | | | | |
| Brush Turkey (Scrub-Turkey) | Alectura lathamii | RF | O | S |
| <u>Family PHASIANIDAE: Quails, Partridges & Pheasants</u> | | | | |
| Stubble Quail | Coturnix pectoralis | O CP P | C | S |
| <u>Family RALLIDAE: Rails, Crakes, Water-hens & Coots</u> | | | | |
| Water Rail | Rallus pectoralis | W | O | N |
| Dusky Moorhen | Gallinula tenebrosa | W | C | S |
| Swamphen | Porphyrio porphyrio | W | C | S |
| Common Coot | Fulica atra | W | C | S |
| <u>Family GRUTDAE: Cranes</u> | | | | |
| Brolga | Grus rubicundus | W | O | M |
| <u>Family JACANIDAE: Jacanas</u> | | | | |
| Lotus Bird | Irediparra gallinacea | W | C | S |
| <u>Family BURHINIDAE: Stone-Curlews</u> | | | | |
| Bush Stone Curlew | Burhinus magnirostris | O | C | S |
| <u>Family CHARADRIIDAE: Plovers & Dotterels</u> | | | | |
| Masked Plover | Vanellus miles | O P | C | S |

Appendix 4
(v)

| <u>Common Name</u> | <u>Zoological Name</u> | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|---|-------------------------------|----------------|------------------|---------------|
| <u>Family RECURUIROSTRIDAE: Stilts & Avocets</u> | | | | |
| Pied Stilt | Himantopus himantopus | W | O | N |
| <u>Family SCOLOPACIDAE: Turnstones, Curlews, Snipe & Sandpipers</u> | | | | |
| Japanese Snipe | Gallinago hardwickii | W | O | M |
| <u>Family COLUMBIDAE: Pigeons & Doves</u> | | | | |
| Red-crowned Pigeon | Ptilinopus regina | RF | O | S |
| White-headed Pigeon | Columba leucomela | RF | O | S |
| Brown Pigeon | Macropygia amboinensis | R F | C | S |
| Peaceful Dove | Geopelia striata | O P | C | S |
| Common Bronzewing | Phaps chalcoptera | O CP P | C | S |
| Crested Pigeon | Ocyphaps lophotes | W CP P | C | S |
| Wonga Pigeon | Leucosarcia melanoleuca | RF P | O | S |
| <u>Family CACATUIDAE: Cockatoos</u> | | | | |
| Red-tailed Black Cockatoo | Calyptorhynchus magnificus | CP SW | O | S |
| Glossy Black Cockatoo | Calyptorhynchus lathami | DSF WSF | O | S |
| Yellow-tailed Black Cockatoo | Calyptorhynchus funereus | RF DSF P | O | S |
| <u>Family LORIIDAE: Lorikeets & Allies</u> | | | | |
| Rainbow Lorikeet | Trichoglossus haematodus | DSF | A | |
| Scaly-breasted Lorikeet | Trichoglossus chlorolepidotus | DSF | A | |
| Little Lorikeet | Glossopsitta pusilla | DS F WSF P | O | S |
| <u>Family POLYTELITIDAE: Long-tailed Parrots</u> | | | | |
| King Parrot | Alisterus scapularis | WSF RF P | C | S |

Appendix 4
(vi)

| <u>Common Name</u> | <u>Zoological Name</u> | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|---|---------------------------|----------------|------------------|---------------|
| <u>Family PLATYCERCIDAE: Broad-tailed Parrots</u> | | | | |
| Crimson Rosella | Platycercus elegans | W SF DSF P | C | S |
| Eastern Rosella | Platycercus eximius | D SF SW P | C | S |
| <u>Family CUCULIDAE: Cuckoos & Coucals</u> | | | | |
| Brush Cuckoo | Cuculus variolosus | Var. | C | M |
| Koel (Indian Koel) | Eudynamys scolopacea | Var. | C | M |
| Channel-billed Cuckoo | Scythrops novaehollandiae | Var. | C | M |
| Pheasant Coucal | Centropus phasianinus | W | O | S |
| <u>Family STRIGIDAE: Owls</u> | | | | |
| Powerful Owl | Ninox strenua | WSF | R | S |
| Boobook Owl | Ninox novaeseelandiae | S W DSF P | C | S |
| <u>Family TYTONIDAE: Barn Owls</u> | | | | |
| Grass Owl | Tyto longimembris | Var. | R | S |
| Barn Owl | Tyto alba | O | O | S |
| <u>Family PODARGIDAE: Frogmouths</u> | | | | |
| Tawny Frogmouth | Podargus strigoides | SW DSF | C | S |
| <u>Family CAPRIMULGIDAE: Nightjars</u> | | | | |
| White-throated Nightjar | Caprimulgus mystacalis | DSF | O | S |
| <u>Family APODIDAE: Swifts</u> | | | | |
| Spine-tailed Swift | Hirundapus caudacutus | O P | A | M |

Appendix 4
(vii)

| <u>Common Name</u> | <u>Zoological Name</u> | | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|--|--------------------------|----|----------------|------------------|---------------|
| <u>Family ALCEDINIDAE: Kingfishers & Kookaburras</u> | | | | | |
| Azure Kingfisher | Ceyx azureus | | W | O | S |
| Laughing Kookaburra | Dacelo gigas | SW | DSF OP | C | S |
| Forest Kingfisher | Halcyon macleayi | | SW | O | M |
| Sacred Kingfisher | Halcyon sancta | | DSF P | O | M |
| <u>Family MEROPIDAE: Bee-eaters</u> | | | | | |
| Rainbow Bee-eater (Rainbow-bird) | Merops ornatus | | Var. P | A | M |
| <u>Family CORACIIDAE: Rollers</u> | | | | | |
| Dollar-bird | Eurystomus orientalis | | W | O | M |
| <u>Family PITTADAE: Pittas</u> | | | | | |
| Noisy Pitta | Pitta versicolor | | RF | O | M |
| <u>Family MENURIDAE: Lyrebirds</u> | | | | | |
| Superb Lyrebird | Menura novaehollandiae | RF | WSF P | O | S |
| <u>Family ALAUDIDAE: Larks</u> | | | | | |
| Singing Bushlark | Mirafa javanica | | Var. | O | S |
| <u>Family HIRUNDINIDAE: Swallows & Martins</u> | | | | | |
| Welcome Swallow | Hirundo neoxena | | Var. P | A | M |
| Fairy Martin | Cecropis ariel | | Var. P | F | M |
| <u>Family CAMPEPHAGIDAE: Cuckoo-shrikes & Trillers</u> | | | | | |
| Black-faced Cuckoo-shrike | Coracina novaehollandiae | D | SF SW P | C | S |

Appendix 4
(viii)

| <u>Common Name</u> | <u>Zoological Name</u> | | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|--|--------------------------|---|----------------|------------------|---------------|
| <u>Family MUSCICAPIDAE: Flycatchers, Monarchs & Fantails</u> | | | | | |
| Hooded Robin | Melanodryas cucullata | D | SF CP P | C | N |
| Eastern Yellow Robin | Eopsaltria australis | | Var. P | C | S |
| Jacky-Winter (Brown Flycatcher) | Microeca leucophaea | D | SF CP SW | C | S |
| <u>Whistlers & Shrike-thrushes</u> | | | | | |
| Rufous Whistler | Pachycephala rufiventris | | Var. P | C | S |
| Grey Shrike-Thrush | Colluricincla harmonica | | Var. P | C | S |
| <u>Monarch Flycatchers</u> | | | | | |
| Black-faced Monarch (Flycatcher) | Monarcha melanopsis | | WSF RF | C | S |
| Restless Flycatcher | Myiagra inquieta | | SW P | O | N |
| Grey Fantail | Rhipidura fuliginosa | | DSF P | C | S |
| Willie-Wagtail | Rhipidura leucophrys | | SW O P | C | S |
| <u>Family ORTHONYCHIDAE: Chowchillas & Quail-thrushes</u> | | | | | |
| Eastern Whipbird | Psophodes olivaceus | W | SF RF P | C | S |
| Spotted Quailthrush | Cinclosoma punctatum | | DSF P | O | S |
| <u>Family TIMALIIDAE: Babblers</u> | | | | | |
| Grey-crowned Babbler | Pomatostomus temporalis | | CP | O | S |
| <u>Family SYLVIIDAE: Old World Warblers</u> | | | | | |
| Golden-headed Cisticola | Cisticola exilis | | O | O | S |
| <u>Family MALURIDAE: Australian Warblers (Wrens)</u> | | | | | |
| Superb Blue Wren | Malurus cyaneus | O | Var. P | C | S |
| Red-backed Wren | Malurus melanocephalus | O | Var. | O | S |

Appendix 4
(ix)

| <u>Common Name</u> | <u>Zoological Name</u> | | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|---|------------------------------|----|----------------|------------------|---------------|
| <u>Family ACANTHIZIDAE: Australian Warblers, Scrubwrens, Thornbills</u> | | | | | |
| Striated Thornbill | Acanthiza lineata | DS | F WSF P | C | S |
| Yellow-rumped Thornbill | Acanthiza chrysorrhoa | | O P | C | S |
| <u>Family CLIMACTERIDAE: Treecreepers</u> | | | | | |
| White-throated Treecreeper | Climacteris leucophaea | | DSF P | O | S |
| Brown Treecreeper | Climacteris picumnus | | DSF | O | S |
| <u>Family MELIPHAGIDAE: Honeyeaters</u> | | | | | |
| Little Wattlebird | Anthochaera chrysoptera | V | ar. DSF | C | S |
| Striped Honeyeater | Plectorhyncha lanceolata | | CP SW | O | S |
| Noisy Friarbird | Philemon corniculatus | | DSF | F | S |
| Blue-faced Honeyeater | Entomyzon cyanotis | | Var. | C | S |
| Noisy Miner (Soldierbird) | Manorina melanocephala | | DSF | C | S |
| Lewin's Honeyeater | Meliphaga lewini | | RF WSF | C | S |
| White-naped Honeyeater | Melithreptus lunatus | | DSF P | O | S |
| Brown Honeyeater | Lichmera indistincta | | Var. | C | S |
| Eastern Spinebill | Acanthorhynchus tenuirostris | | DSF P. | C | S |
| Scarlet Honeyeater | Myzomela sanguinolenta | | Var. | C | S |
| <u>Family DICAEDIDAE: Flowerpeckers</u> | | | | | |
| Mistletoe bird | Dicaeum hirundinaceum | D | SF SW P | O | S |
| <u>Family PARDALOTIDAE: Pardalotes</u> | | | | | |
| Striated Pardalote | Pardalotus striatus | D | SF SW P | C | S |
| <u>Family ZOSTEROPIDAE: (Silvereyes) White-eyes</u> | | | | | |
| Silvereye (Grey-backed) (Grey-breasted) | Zosterops lateralis | V | ar. | C | S |

Appendix 4
(x)

| <u>Common Name</u> | <u>Zoological Name</u> | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|--|---------------------------|----------------|------------------|---------------|
| <u>Family PASSERIDAE: Weaver-finches</u> | | | | |
| House Sparrow (Int) | Passer domesticus | O P | C | S |
| <u>Family ESTRILDIDAE: Australian Grass Finches & Allies</u> | | | | |
| Red-browed Firetail | Emblema temporalis | O P | C | S |
| Double-barred Finch | Poephila bichenovii | O P | C | S |
| Chestnut-breasted Finch (Mannikin) | Lonchura castaneothorax | O | C | S |
| <u>Family STURNIDAE: Starlings & Mynas</u> | | | | |
| Common Starling (Int) | Sturnus vulgaris | O. P. | C | S |
| <u>Family ORIOLIDAE: Orioles & Figbirds</u> | | | | |
| Olive-backed Oriole | Oriolus sagittatus | Var. P. | C | S |
| Figbird | Sphecotheres viridis | WSF | F | N |
| <u>Family DICRURIDAE: Drongos</u> | | | | |
| Spangled Drongo | Dicrurus hottentottus | WSF RF | C | N |
| <u>Family PTILONORHYNCHIDAE: Bowerbirds & Catbirds</u> | | | | |
| Satin Bowerbird | Ptilonorhynchus violaceus | R F WSF P. | C | S |
| Green Catbird | Ailuroedus crassirostris | RF | O | S |
| <u>Family CORCORACIDAE: Australian Choughs & Apostle-birds</u> | | | | |
| White-winged Chough | Corcorax melanorhamphus | S W CP P. | O | S |
| <u>Family GRALLINIDAE: Magpie-Larks</u> | | | | |
| Magpie-lark (Peewee) | Grallina cyanoleuca | D SF SW P | C | S |

Appendix 4
(xi)

| <u>Common Name</u> | <u>Zoological Name</u> | | <u>Habitat</u> | <u>Frequency</u> | <u>Status</u> |
|---|------------------------|---|----------------|------------------|---------------|
| <u>Family ARTAMIDAE: Woodswallows</u> | | | | | |
| White-breasted Woodswallow | Artamus leucorhynchus | | Var. | O | N |
| Dusky Woodswallow | Artamus cyanopterus | | Var. P. | C | N |
| <u>Family CRACTICIDAE: Currawongs, Butcherbirds & Magpies</u> | | | | | |
| Grey Butcherbird | Cracticus torquatus | D | SF SW P | C | S |
| Pied Butcherbird | Cracticus nigrogularis | | DSF SW | C | S |
| Australian Magpie | Gymnorhina tibicen | | SW P | C | S |
| Pied Currawong | Strepera graculina | | WSF P. | C | S |
| <u>Family CORVIDAE: Ravens, Jays & Crows</u> | | | | | |
| Torresian (Australian) Crow | Corvus orru | | WSF. | C | S |

SYMBOLS USED

| | | |
|-------------------|------|--|
| <u>Habitat:</u> | RF | - Rainforest |
| | WSF | - Wet Sclerophyll forest |
| | DSF | - Dry Sclerophyll forest |
| | SW | - Savannah and Savannah Woodland |
| | CP | - Cypress Pine |
| | M | - Mallee |
| | O | - Openings in forest |
| | W | - Wetlands (dams, swamps, etc.) |
| | P | - Pine Plantation |
| | Var. | - Various, and other habitats including heath, riverine, mulga, etc., not differentiated above, or else quite indiscriminate in selection of forest. |
| <u>Frequency:</u> | VR | - Very rare |
| | R | - Rare |
| | O | - Occasional |
| | C | - Common |
| | F | - Frequent |
| | A | - Abundant |
| <u>Status:</u> | M | - Migratory |
| | N | - Nomadic |
| | S | - Sedentary |
| | V | - Vagrant |

Common Name

Zoological Name

III. MAMMALS (Confined to confirmed sightings for Area)

NATIVE SPECIES

Family ORNITHORHYNCHIDAE: Platypus

| | |
|----------|--------------------------|
| Platypus | Ornithorhynchus anatinus |
|----------|--------------------------|

Family TACHYGLOSSIDAE: Echidna

| | |
|---------|------------------------|
| Echidna | Tachyglossus aculeatus |
|---------|------------------------|

Family DASYURIDAE: Native Cats, Marsupial Mice

| | |
|--------------------------|----------------------|
| Tiger Cat | Dasyurus maculatus |
| Tuan | Phascogale tapoatafa |
| Yellow-footed Antechinus | Antechinus flavipes |
| Dusky Antechinus | A. swainsonii |
| Brown Antechinus | A. stuartii |
| Common Dunnart | Sminthopsis murina |

Family PERAMELIDAE: Bandicoots

| | |
|-----------------------|------------------|
| Short-nosed Bandicoot | Isoodon obesulus |
| Long-nosed Bandicoot | Perameles nasuta |

Family PHALANGERIDAE: Possums

| | |
|---------------------|-----------------------|
| Brush-tailed Possum | Trichosurus vulpecula |
| Mountain Possum | T. caninus |

Family PETAURIDAE: Ringtails and Gliders

| | |
|-----------------------|--------------------------|
| Common Ringtail | Pseudocheirus peregrinus |
| Sugar Glider | Petaurus breviceps |
| Squirrel Glider | P. norfolcensis |
| Yellow Bellied Glider | P. australis |
| Greater Glider | Petauroides volans |

Family BURRAMYIDAE: Pygmy Possums

| | |
|----------------------|--------------------|
| Feathertail Glider | Acrobates pygmaeus |
| Eastern Pigmy Possum | Cercatetus nanus |

Family PHASCOLARCTIDAE: Koala

| | |
|-------|------------------------|
| Koala | Phascolarctos cinereus |
|-------|------------------------|

Family VOMBATIDAE: Wombats

| | |
|---------------|------------------|
| Common Wombat | Vombatus ursinus |
|---------------|------------------|

| <u>Common Name</u> | <u>Zoological Name</u> |
|--|---------------------------|
| <u>Family MACROPODIDAE: Kangaroos, Wallabies</u> | |
| Eastern grey Kangaroo | Macropus giganteus |
| Wallaroo | M. robustis |
| Pretty-Face Wallaby | M. parryi |
| Red-necked Wallaby | M. rufogriseus |
| Parma Wallaby | M. parma |
| Swamp Wallaby | Wallabia bicolor |
| Red-necked Pademelon | Thylogale thetis |
| Red-legged Pademelon | T. stigmatica |
| Rock Wallaby | Petrogale penicillata |
| Potoroo | Potorous tridactylus |
| Rufous Rat Kangaroo | Aepyprymnus rufescens |
| <u>Family MURIDAE: Rats and Mice</u> | |
| Southern Bush Rat | Rattus fuscipes |
| Eastern Swamp Rat | R. lutreolus |
| Water Rat | Hydromys chrysogaster |
| Fawn-footed Melomys | Melomys cervinipes |
| Eastern Chestnut Native Mouse | Pseudomys gracilicaudatus |
| <u>Family PTEROPODIDAE: Large Fruit Bats</u> | |
| Red Flying Fox | Pteropus scapulatus |
| Grey-headed Flying Fox | P. poliocephalus |
| <u>Family EMBALLONURIDAE</u> | |
| White-bellied Sheath-tailed Bat | Taphozous flaviventris |
| <u>Family RHINOLOPHIDAE</u> | |
| Eastern Horseshoe Bat | Rhinolophus megaphyllus |
| <u>Family MOLLOSSIDAE</u> | |
| White-striped Bat | Tadarida australis |
| Little Flat Bat | T. planiceps |
| <u>Family VESPERTILIONIDAE</u> | |
| Greater Long-eared Bat | Nyctophilus timoriensis |
| Lesser Long-eared Bat | N. geoffroyi |
| Bent-winged Bat | Miniopterus schreibersii |
| Gould's Wattled Bat | Chalinolobus gouldii |
| Chocolate Bat | C. morio |
| Little Bat | Eptesicus pumilus |
| Tasmanian Pipistrelle | Pipistrellus tasmaniensis |
| Large-footed Bat | Myotis adversus |
| Greater Broad-nosed Bat | Nycticeius ruepellii |

Casino Management AreaArea Composition of Sawlog and Pole Working Circles
within State Forests by Compartments and by Broad Forest Types

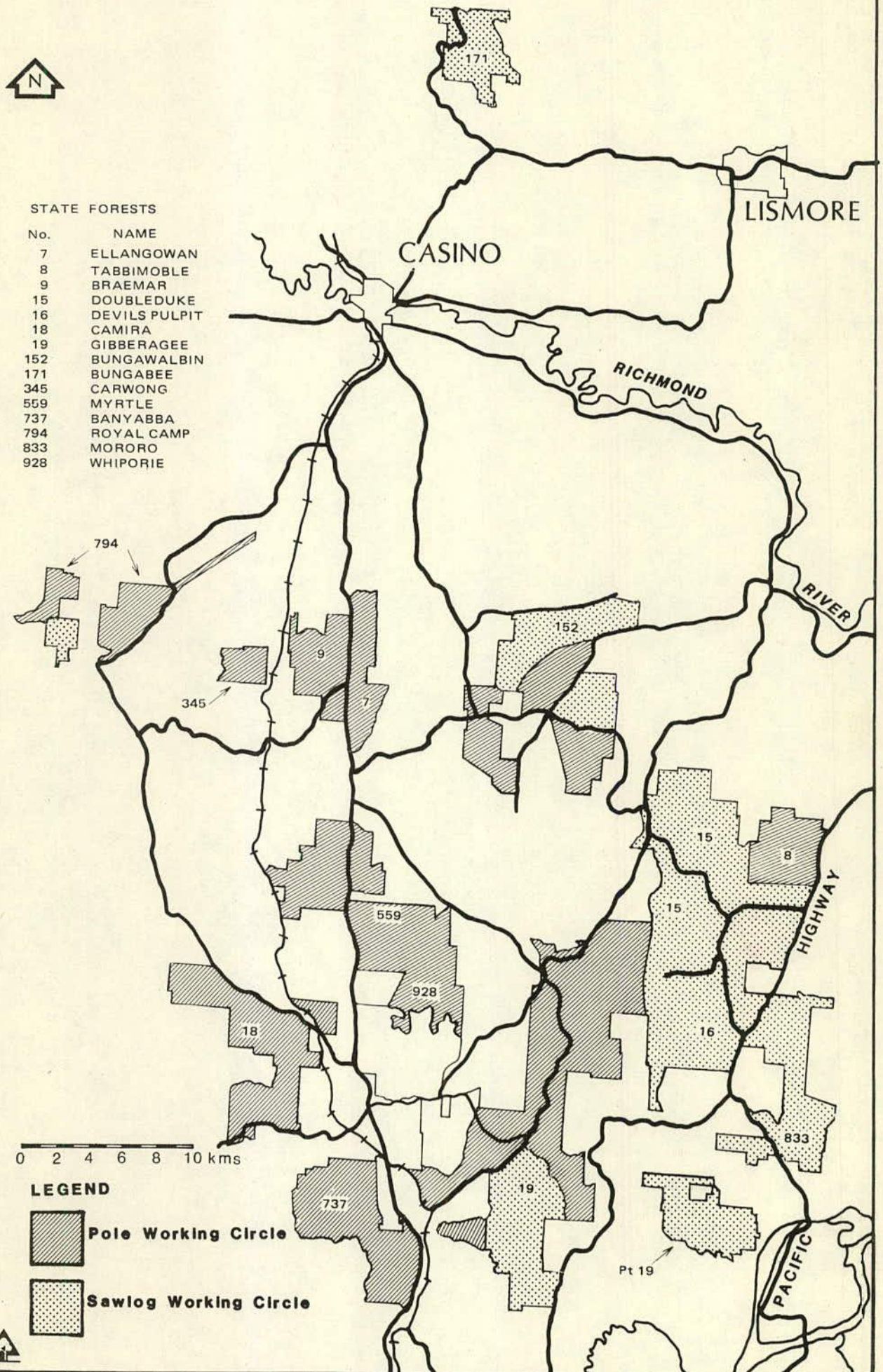
[N.B. Includes associated areas (total 258 ha) included
in Preserved Areas Working Circle]

Broad Forest Type Areas (ha)

| State Forests | Compartment- ments | Blackbutt | Moist Hardwood* | Spotted Gum | Other Dry Hardwood | Cleared, Rock, Non- Commercial | Total |
|--|---|--------------|--------------------|----------------|--------------------------|--------------------------------------|--------------|
| <u>Sawlog Working Circle</u> | | | | | | | |
| Bungabee | 1 - 9 | | 833 | | 775 | | 1608 |
| Bungawalbin | 41-44, 49,50 | 808 | 51 | 164 | 1145 | 1229 | 3397 |
| Doubleduke | 141-147 | | | | | | |
| Tabbimoble and Devils Pulpit | 149-156 161-170 | 6086 | 883 | 1282 | 1730 | 2882 | 12863 |
| Gibberagee | 115,117, 119-121, 123-132 | 2794 | 247 | 593 | 320 | 906 | 4860 |
| Mororo | 171-175 | 469 | 200 | 239 | 221 | 547 | 1676 |
| Royal Camp | 12 | 179 | 33 | 121 | 50 | 44 | 427 |
| TOTAL | | 10336 | 2247 | 2399 | 4241 | 5608 | 24831 |
| Percent of State Forest Total | | 18 | 4 | 4 | 7 | 10 | 43 |
| <u>Pole Working Circle</u> | | | | | | | |
| Banyabba | 91-97 | 159 | 22 | 2507 | 782 | 120 | 3590 |
| Bungawalbin | 45-48, 51, 52 | 166 | | 1308 | 909 | 939 | 3322 |
| Camira | 71-82 | 70 | 15 | 2802 | 856 | 235 | 3978 |
| Carwong, Braemar & Ellangowan | 21-32 | | | 2809 | 638 | 359 | 3806 |
| Doubleduke, Tabbimoble & Devils Pulpit | 148, 157-160 | 193 | 3 | 811 | 534 | 1373 | 2914 |
| Eden Creek Gibberagee | Pt Lehman 101-114, 116, 118, 122 | 61 | 319 | 4129 | 20 1186 | 2351 | 20 8046 |
| Myrtle & Whiporie | 61-68 | 49 | | 3170 | 695 | 2171 | 6085 |
| Royal Camp | 11,13-16 | 73 | 142 | 1465 | 45 | 98 | 1823 |
| Total | | 771 | 501 | 19001 | 5665 | 7646 | 33584 |
| Percent of State Forest Total | | 1 | 1 | 32 | 10 | 13 | 57 |

* 36 ha comprising Hoop Pine 17 ha, Myrtle 2 ha, and Viney Scrub 17 ha included within Moist Hardwood type.

CASINO MANAGEMENT AREA DISTRIBUTION OF POLE AND SAWLOG WORKING CIRCLE



Casino Management AreaArea Composition of Sawlog and Pole Working Circles
within State Forests by Compartments and by Broad Forest Types

[N.B. Includes associated areas (total 258 ha) included
in Preserved Areas Working Circle]

Broad Forest Type Areas (ha)

| State Forests | Compartment- ments | Blackbutt | Moist Hardwood* | Spotted Gum | Other Dry Hardwood | Cleared, Rock, Non- Commercial | Total |
|--|---|-----------|--------------------|----------------|--------------------------|--------------------------------------|------------|
| <u>Sawlog Working Circle</u> | | | | | | | |
| Bungabee | 1 - 9 | | 833 | | 775 | | 1608 |
| Bungawalbin | 41-44, 49,50 | 808 | 51 | 164 | 1145 | 1229 | 3397 |
| Doubleduke | 141-147 | | | | | | |
| Tabbimoble and Devils Pulpit | 149-156 161-170 | 6086 | 883 | 1282 | 1730 | 2882 | 12863 |
| Gibberagee | 115,117, 119-121, 123-132 | 2794 | 247 | 593 | 320 | 906 | 4860 |
| Mororo | 171-175 | 469 | 200 | 239 | 221 | 547 | 1676 |
| Royal Camp | 12 | 179 | 33 | 121 | 50 | 44 | 427 |
| TOTAL | | 10336 | 2247 | 2399 | 4241 | 5608 | 24831 |
| Percent of State Forest Total | | 18 | 4 | 4 | 7 | 10 | 43 |
| <u>Pole Working Circle</u> | | | | | | | |
| Banyabba | 91-97 | 159 | 22 | 2507 | 782 | 120 | 3590 |
| Bungawalbin | 45-48, 51, 52 | 166 | | 1308 | 909 | 939 | 3322 |
| Camira | 71-82 | 70 | 15 | 2802 | 856 | 235 | 3978 |
| Carwong, Braemar & Ellangowan | 21-32 | | | 2809 | 638 | 359 | 3806 |
| Doubleduke, Tabbimoble & Devils Pulpit | 148, 157-160 | 193 | 3 | 811 | 534 | 1373 | 2914 |
| Eden Creek Gibberagee | Pt Lehman 101-114, 116, 118, 122 | 61 | 319 | 4129 | 20 1186 | 2351 | 20 8046 |
| Myrtle & Whiporie | 61-68 | 49 | | 3170 | 695 | 2171 | 6085 |
| Royal Camp | 11,13-16 | 73 | 142 | 1465 | 45 | 98 | 1823 |
| Total | | 771 | 501 | 19001 | 5665 | 7646 | 33584 |
| Percent of State Forest Total | | 1 | 1 | 32 | 10 | 13 | 57 |

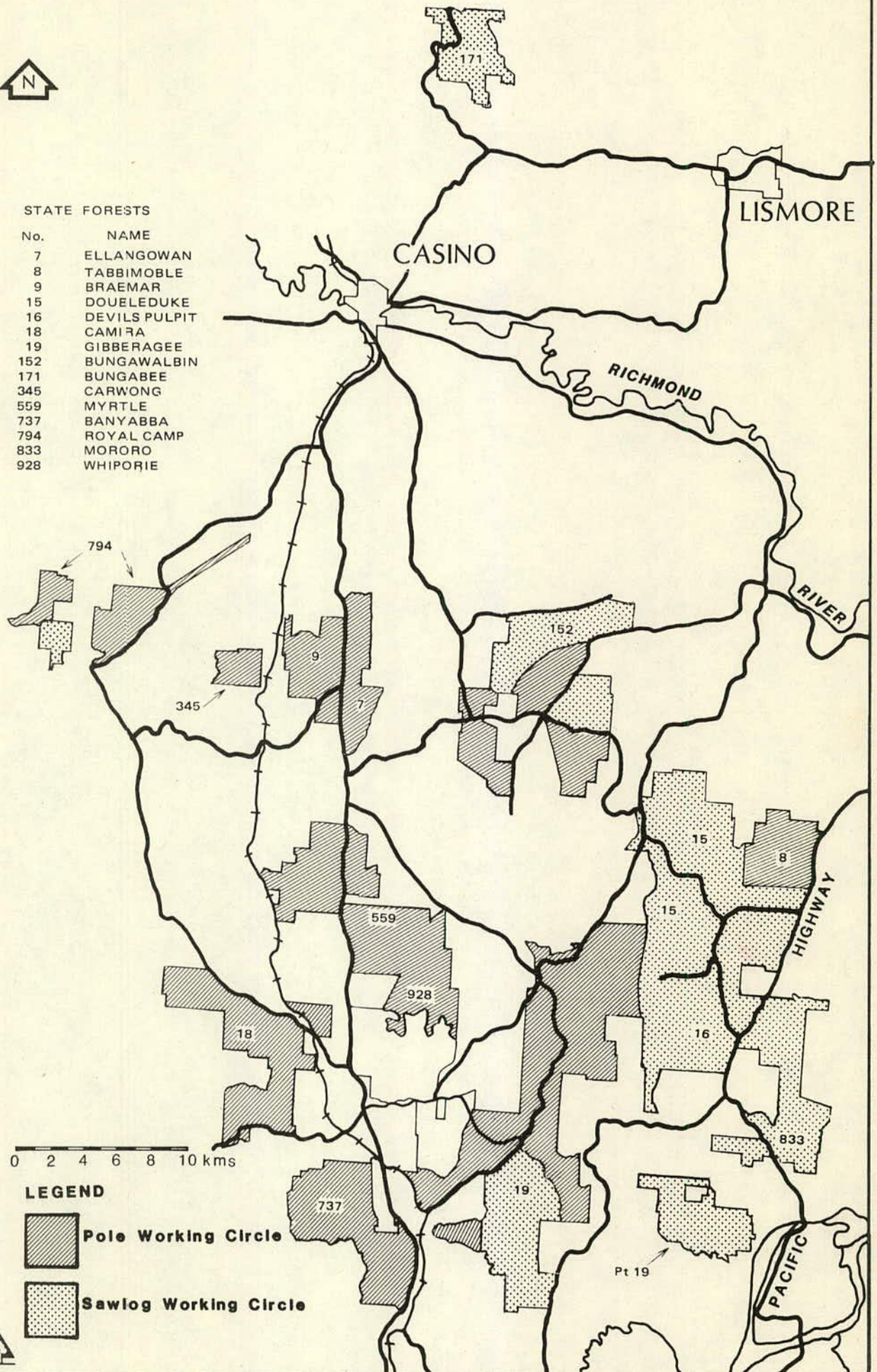
* 36 ha comprising Hoop Pine 17 ha, Myrtle 2 ha, and Viney Scrub
17 ha included within Moist Hardwood type.

CASINO MANAGEMENT AREA DISTRIBUTION OF POLE AND SAWLOG WORKING CIRCLE



STATE FORESTS

| No. | NAME |
|-----|---------------|
| 7 | ELLANGOWAN |
| 8 | TABBIMOBLE |
| 9 | BRAEMAR |
| 15 | DOUELEDUKE |
| 16 | DEVILS PULPIT |
| 18 | CAMIRA |
| 19 | GIBBERAGEE |
| 152 | BUNGAWALBIN |
| 171 | BUNGABEE |
| 345 | CARWONG |
| 559 | MYRTLE |
| 737 | BANYABBA |
| 794 | ROYAL CAMP |
| 833 | MORORO |
| 928 | WHIPORIE |



Casino Management AreaMapping and Aerial PhotographyMappingForestry Commission Project Maps (1975)

Casino (excludes southern extremities)

Coffs Harbour (southern extremities)

Central Mapping Authority 1:25 000 Maps

| <u>Title</u> | <u>Date</u> | <u>Title</u> | <u>Date</u> |
|---------------|-------------|--------------|-------------|
| Afterlee | 1979 | Banyabba | 1974 |
| Ettrick | 1979 | Maclean | 1974 |
| Mummulgum | 1979 | Dunoon | 1975 |
| Hogarth Range | 1980 | Lismore | 1976 |
| Rappville | 1974 | Wardell | 1975 |
| Clearfield | 1974 | Woodburn | 1974 |
| Whiporie | 1975 | Tabbimoble | 1974 |
| Coledale | 1974 | Woombah | 1974 |
| Larnook | 1975 | Yamba | 1975 |
| Casino | 1975 | Byron Bay | 1975 |
| Tatham | 1975 | Ballina | 1975 |
| Ellangowan | 1974 | Empire Vale | 1974 |
| Gibberagee | 1974 | | |

State Forest Maps (Forest and Stand Condition Types) 1:25 000 1983

1. Bungabee S.F.
2. Royal Camp S.F.
3. Carwong, Braemar, Ellangowan S.F.s
4. Bungawalbin S.F.
5. Myrtle, Whiporie S.F.s
6. Camira S.F.
7. Banyabba S.F.
8. Gibberagee S.F.
9. Doubleduke, Tabbimoble, Devils Pulpit S.F.s
10. Mororo S.F.

Temporary State Forest MapsScale 1:31 680

| | <u>Date</u> |
|--|-------------|
| 1. Tabbimoble, Doubleduke, Devils Pulpit, Mororo S.F.s | 1964 |
| 2. Banyabba, Whiporie, Gibberagee S.F.s | 1967 |
| 3. Braemar, Ellangowan, Bungawalbin, Myrtle, Carwong S.F.s | 1967 |
| 4. Camira S.F. | 1951 |
| 5. Royal Camp S.F. | 1950 |

Scale 1:15 840

- | | |
|------------------|------|
| 6. Bungabee S.F. | 1947 |
|------------------|------|

Aerial Photography

| <u>Title</u> | <u>Date</u> | <u>Coverage</u> | <u>Scale</u> |
|--------------|-------------|---------------------------------|--------------|
| Woodburn | 1971 | South-east M.A. | 1:40 000 |
| Coledale | 1971 | South-west M.A. | 1:40 000 |
| Lismore | 1971 | Part of northern M.A. | 1:40 000 |
| Bungabee | 1971 | Bungabee S.F. area | 1:40 000 |
| Grafton | 1977, 78 | Whole M.A. except Bungabee S.F. | 1:25 000 |

Casino Management Area

Past Timber Yields - Tabular Statement

| | <u>Sawlogs and Poles</u> | | | (m ³ net) | | | |
|---------|--------------------------|--------|---------|---------------------------------|-------|--------|--------------|
| Year | <u>State Forests</u> | | | <u>Other Crown-timber Lands</u> | | | <u>TOTAL</u> |
| | Hwd Sawlogs | Poles | Total | Hwd Sawlogs | Poles | Total | |
| 1965/66 | 7 629 | 3 044 | 10 673 | | | | |
| 1966/67 | 7 200 | 2 062 | 9 262 | | | | |
| 1967/68 | 7 473 | 1 615 | 9 088 | | | | |
| 1968/69 | 5 933 | 526 | 6 459 | | | | |
| 1969/70 | 3 110 | 357 | 3 467 | | | (1) | |
| 1970/71 | 1 731 | 116 | 1 847 | | | | |
| 1971/72 | 4 283 | 55 | 4 338 | | | | |
| 1972/73 | 4 801 | 2 306 | 7 170 | | | | |
| 1973/74 | 4 386 | 2 402 | 6 788 | | | | |
| 1974/75 | 4 478 | 3 395 | 7 873 | | | | |
| 1975/76 | 6 677 | 2 497 | 9 174 | | | | |
| 1976/77 | 8 617 | 4 450 | 13 067 | 1 885 | 1 361 | 3 246 | 16 313 |
| 1977/78 | 8 139 | 3 311 | 11 450 | 3 244 | 1 194 | 4 438 | 15 888 |
| 1978/79 | 12 515 | 4 863 | 17 378 | 2 384 | 309 | 2 693 | 20 071 |
| 1979/80 | 8 418 | 5 455 | 13 873 | 7 074 | 383 | 7 457 | 21 330 |
| 1980/81 | 10 255 | 10 542 | 20 797 | 6 797 | 323 | 7 120 | 27 917 |
| 1981/82 | 9 801 | 7 989 | 17 790 | 2 909 | 229 | 3 138 | 20 928 |
| 1982/83 | 9 754 | 4 758 | 14 512 | | 110 | 110 | 14 622 |
| Total | 125 200 | 59 743 | 184 943 | 24 293 | 3 909 | 28 202 | |
| Average | 6 956 | 3 319 | 10 275 | 3 470 | 558 | 4 029 | |

Appendix 7(a)
(iii)

Other Timber Products (m³ net log volume equivalent)

| <u>State Forests</u> | | | | | | | <u>Other Crown-timber Lands</u> | | | | | <u>TOTAL</u> |
|----------------------|---------------|---------------|--------|-------|--------------|--------|---------------------------------|---------------|-------|---------------------|-------|--------------|
| | Sleep- ers | Misc. Sawn | Posts | Piles | Gir- ders | Total | Sleep- ers | Misc. Sawn | Posts | Gir- ders (3) | Total | |
| 1977/78 | (2) 412 | 445 | 1 634 | - | 8 | 2 499 | 61 | (2) 472 | 44 | 41 | 618 | 3 117 |
| 1978/79 | (2) 458 | 272 | 2 699 | 16 | - | 3 445 | - | (2) 67 | 176 | - | 243 | 3 688 |
| 1979/80 | (2) 346 | 261 | 2 791 | - | - | 3 398 | 13 | - | - | - | 13 | 3 411 |
| 1980/81 | (2) 613 | 344 | 2 483 | 152 | - | 3 592 | - | - | 99 | - | 99 | 3 691 |
| 1981/82 | 319 | 662 | 2 614 | - | - | 3 595 | - | - | 82 | - | 82 | 3 677 |
| 1982/83 | 407 | 187 | 2 163 | 20 | - | 2 777 | - | - | 71 | - | 71 | 2 848 |
| Total | 42 195 | 13 576 | 23 954 | 1 039 | 3 131 | 83 895 | 74 | 1 195 | 481 | 41 | 1 791 | |
| Average | 2 344 | 754 | 1 331 | 58 | 174 | 4 661 | 10 | 171 | 69 | 6 | 256 | |

Appendix 7(a)
(iii)

Other Timber Products (m³ net log volume equivalent)

| | | <u>State Forests</u> | | | | | <u>Other Crown-timber Lands</u> | | | | | <u>TOTAL</u> |
|---------|---------------|----------------------|--------|-------|--------------|--------|---------------------------------|---------------|-------|---------------------|-------|--------------|
| | Sleep- ers | Misc. Sawn | Posts | Piles | Gir- ders | Total | Sleep- ers | Misc. Sawn | Posts | Gir- ders (3) | Total | |
| 1977/78 | (2) 412 | 445 | 1 634 | - | 8 | 2 499 | 61 | (2) 472 | 44 | 41 | 618 | 3 117 |
| 1978/79 | (2) 458 | 272 | 2 699 | 16 | - | 3 445 | - | (2) 67 | 176 | - | 243 | 3 688 |
| 1979/80 | (2) 346 | 261 | 2 791 | - | - | 3 398 | 13 | - | - | - | 13 | 3 411 |
| 1980/81 | (2) 613 | 344 | 2 483 | 152 | - | 3 592 | - | - | 99 | - | 99 | 3 691 |
| 1981/82 | 319 | 662 | 2 614 | - | - | 3 595 | - | - | 82 | - | 82 | 3 677 |
| 1982/83 | 407 | 187 | 2 163 | 20 | - | 2 777 | - | - | 71 | - | 71 | 2 848 |
| Total | 42 195 | 13 576 | 23 954 | 1 039 | 3 131 | 83 895 | 74 | 1 195 | 481 | 41 | 1 791 | |
| Average | 2 344 | 754 | 1 331 | 58 | 174 | 4 661 | 10 | 171 | 69 | 6 | 256 | |

- (1) Data not available. Prior to 1976/7 all yields from Leasehold and other Crown-timber lands were grouped for Casino/Casino West Districts
- (2) Volume includes "junk"
- (3) No pile sales have been recorded from Other Crown-timber lands.

NOTE: Net log volume equivalents for the above products were derived using the following conversion factors.

Poles - length (m) x 0.0592 to 1/6/78,
thence actual volumes

Sleepers - piece (2 438 mm x 229 mm) x 0.1622 to 1/6/74
- piece (2 440 mm x 230 mm) x 0.1856 from 1/6/74
- sawn volume (m³) x $\frac{100}{39.2}$

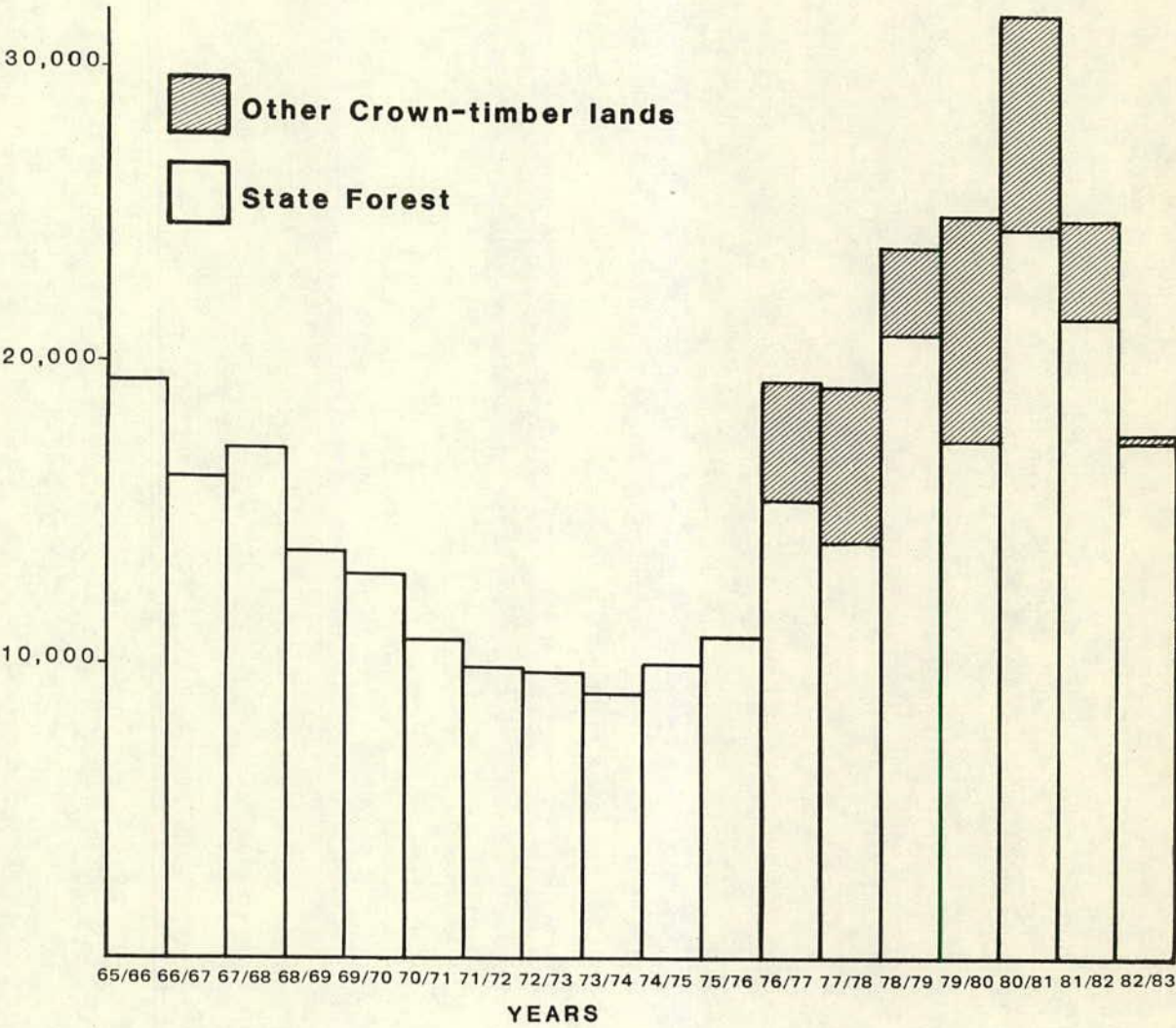
Misc. Sawn - sawn volume (m³) x $\frac{100}{37.5}$

Girders - sawn volume (m³) x $\frac{100}{39.2}$

Posts - sawn volume (m³) x $\frac{100}{52.3}$

CASINO MANAGEMENT AREA
PAST TIMBER YIELDS

YIELD
(m³ net)



* * includes net log volume equivalent for miscellaneous products.

Yield data for other Crown-timber Lands not available
prior to 76/77.

Casino Management AreaDetails of 1972 Assessment

The 1972 assessment covered the Casino Management Area and the Richmond Range Working Circle of the adjoining Casino West Management Area.

1. Assessment Specifications(a) Sample Design

The sample was taken in two parts. The first sample involved the measurement of 47 plots on a 6 000 - yard grid. For the second sample the grid was shifted 3 000 yards east and north and in this case 63 plots fell in the assessment area.

(b) Plot Size

The plots were circular with concentric sub-plots for trees of different diameter.

| <u>dbhob</u> | <u>plot area</u> |
|--------------|------------------|
| 4" + | 0.10 acre |
| 12" + | 0.25 acre |
| 20" + | 1.00 acre |

(c) Tenure Codes (stratum)

1. State Forest
2. Leasehold
3. V.C.L. and other Crown land

(d) Species Type

The following species types recognised are as in the FORWOOD resources inventory:-

2. Dry rainforest
10. Maritime and swamp
11. Blackbutt
12. Tallowwood - Blue Gum
13. Moist hardwood - gully
14. Dry hardwood
15. Spotted Gum
18. Scribbly Gum and others

(e) Tree Species

Each tree measured was identified by the following species codes:-

| | | | | | |
|----|-----|----|-----|----|-------|
| 01 | BBT | 06 | WM | 11 | NLS |
| 02 | TWD | 07 | IBK | 12 | RG |
| 03 | FG | 08 | BBX | 13 | NEB |
| 04 | BLW | 09 | SG | 14 | OS |
| 05 | GG | 10 | BG | 15 | BRUSH |

(f) Merchantability

The following merchantability codes were applied to trees of all sizes:-

1. Sawlog
2. Pole
3. Useless

In determining merchantability class, sawlogs were given preference over poles.

(g) Merchantable Length

The procedure in this inventory differed from the standard procedure designed to ensure compatibility with the volume tables used in the HARDASS processing programme. These tables assume a standard average stump height of 4 feet. However, in the Casino/Bonalbo inventory estimated stump heights were recorded for each merchantable tree and the merchantable length was recorded as the length above the stump to the top of the log. This provided processing difficulties as discussed below. Useless trees were given a standard log length of 20 feet.

The use of log length above an estimated stump was not compatible with the standard procedure of using merchantable height including an average 4 ft. stump. Merchantable height was simulated for processing by adding 4 ft. to the log length on useless trees and 4 ft. or stump height, whichever the greater, to merchantable trees.

2. HARDASS Programme

39 of the plots fell on State Forest or areas to be dedicated as State Forest within the Casino Management Area. 4 of these plots were non-productive and the 35 productive plots were processed using the HARDASS programme.

An area of 51 756 ha was used in this programme and the derivation of this area is detailed below:-

(a) State Forests

| | |
|---------------|--------|
| Tabbimoble | 2 501 |
| Doubleduke | 8 481 |
| Devils Pulpit | 4 454 |
| Mororo | 659 |
| Braemar | 1 968 |
| Carwong | 582 |
| Bungawalbin | 6 356 |
| Ellangowan | 1 167 |
| Myrtle | 3 906 |
| Camira | 3 586 |
| Bungabee | 1 471 |
| * Banyabba) | 6 221 |
| * Whiporie) | |
| Gibberagee | 12 919 |
| Royal Camp | 1 382 |
| <hr/> | |
| TOTAL = | 55 653 |

* Excludes plantation area

(b) Areas Later Dedicated as State Forest

| <u>Proposed S.F.</u> | | <u>Portion</u> | <u>Parish</u> | <u>County</u> | <u>Area</u> |
|----------------------|--------|----------------|---------------|---------------|-------------|
| Mororo | Lease | 192 | Woombah | Clarence | 388 |
| " | V.C.L. | 85 | " | " | 774 |
| " | V.C.L. | 198 | " | " | 75 |
| | | | | | <hr/> |
| | | | | | 1 237 |
| Royal Camp | V.C.L. | 64 & | Busby | Richmond | 716 |
| | | 66 | | | |
| " | " | Lease | 43 | " | 62 |
| | | | | | <hr/> |
| TOTAL = | | | | | 2 015 |

GRAND TOTAL (a) + (b) = 57 668 ha

35 productive and 4 non-productive plots located in the 57 668 ha. The 35 productive plots were processed and the area reduced to:-

$$\frac{35}{39} \times 57\,668 = 51\,756 \text{ ha}$$

Casino Management PlanSummary of 1972 Assessment ResultsA. Sawlogs - Merchantability Class 1

| <u>Diam. Class</u> <u>cms</u> | <u>No. of Trees</u> <u>(1000's)</u> | <u>Total Volume</u> <u>(m³) gross</u> | <u>Mean Volume</u> <u>per tree (m³)</u> |
|----------------------------------|--|---|---|
| 10 - 20 | 1 279 | 54 347 | 0.04 |
| 20 - 30 | 987 | 147 138 | 0.15 |
| 30 - 40 | 438 | 195 355 | 0.45 |
| 40 - 50 | 438 | 373 377 | 0.85 |
| 50 - 60 | 194 | 239 485 | 1.23 |
| 60 - 70 | 55 | 96 725 | 1.76 |
| 70 - 80 | 55 | 138 034 | 2.51 |
| 80 - 90 | 22 | 68 978 | 3.14 |
| 90 - 100 | 22 | 87 394 | 3.97 |
| 100 + | 7 | 39 590 | 5.66 |
| | <u>3 497</u> | <u>1 440 422</u> | |

Species Percentage and Stocking

| <u>Species</u> | <u>% of M1 Stems</u> | <u>% of M1 Volume</u> |
|------------------|----------------------|-----------------------|
| Blackbutt | 11.9 | 19.9 |
| Tallowood | 2.5 | 1.1 |
| Flooded Gum | 0.0 | 0.0 |
| Bloodwood | 0.6 | 0.6 |
| Grey Gum | 0.5 | 1.1 |
| White Mahogany | 3.5 | 4.2 |
| Ironbark | 12.4 | 14.4 |
| Brushbox | 1.2 | 2.9 |
| Spotted Gum | 37.4 | 34.3 |
| Blue Gum | 0.0 | 0.0 |
| N.L. Stringybark | 22.5 | 12.0 |
| Other Hardwoods | 7.1 | 9.0 |
| Brushwood | 0.4 | 0.5 |
| | <u>100.0</u> | <u>100.0</u> |

| <u>Diam. Class</u> <u>(cms.)</u> | <u>Stems/ha</u> | <u>Basal Area</u> <u>(m²/ha)</u> | <u>Volume</u> <u>(m³ gross/ha)</u> |
|-------------------------------------|-----------------|--|--|
| 10 - 20 | 24.71 | .50 | 1.05 |
| 20 - 30 | 19.06 | .86 | 2.84 |
| 30 - 40 | 8.47 | .81 | 3.77 |
| 40 - 50 | 8.47 | 1.39 | 7.21 |
| 50 - 60 | 3.74 | .87 | 4.63 |
| 60 - 70 | 1.06 | .34 | 1.87 |
| 70 - 80 | 1.06 | .45 | 2.67 |
| 80 - 90 | 0.42 | .23 | 1.33 |
| 90 - 100 | 0.42 | .30 | 1.69 |
| 100 + | 0.14 | .14 | 0.76 |
| TOTALS | <u>67.56</u> | <u>5.91</u> | <u>27.83</u> |

Merchantable Sawlog Volume 50 cm + = 12.96 m³/ha gross

B. Poles - Merchantability Class 2

| <u>Diam. Class</u> <u>cms</u> | <u>No. of Trees</u> <u>(1000's)</u> | <u>Total Volume</u> <u>(m³) gross</u> | <u>Mean Volume</u> <u>per tree (m³)</u> |
|----------------------------------|--|---|---|
| 10 - 20 | 1 060 | 36 328 | 0.03 |
| 20 - 30 | 1 352 | 287 465 | 0.21 |
| 30 - 40 | 438 | 231 322 | 0.53 |
| 40 - 50 | 175 | 178 289 | 1.02 |
| 50 - 60 | 4 | 7 660 | 1.92 |
| 60 - 70 | - | - | |
| | <u>3 029</u> | <u>741 064</u> | |

Species Percentage and Stocking

| <u>Species</u> | <u>% of Ml Stems</u> | <u>% of Ml Volume</u> |
|----------------|----------------------|-----------------------|
| Tallowwood | 0.5 | 0.6 |
| Bloodwood | 22.4 | 14.4 |
| Grey Gum | 3.9 | 4.9 |
| White Mahogany | 2.4 | 0.6 |
| Ironbark | 20.5 | 30.3 |
| Spotted Gum | 31.7 | 41.0 |
| NLS | 10.9 | 2.6 |
| Other Species | 7.7 | 5.6 |
| | <u>100.0</u> | <u>100.0</u> |

| <u>Diam. Class</u> <u>(cms.)</u> | <u>Stems/ha</u> | <u>Basal Area</u> <u>(m²/ha)</u> |
|-------------------------------------|-----------------|--|
| 10 - 20 | 20.47 | 0.35 |
| 20 - 30 | 26.12 | 1.25 |
| 30 - 40 | 8.47 | 0.75 |
| 40 - 50 | 3.39 | 0.51 |
| 50 - 60 | 0.07 | 0.02 |
| | <u>58.52</u> | <u>2.88</u> |
| Total | | |

Casino Management Plan1972 Yield CalculationsA. Sawlogs

Yield calculations based on the 1972 assessment took the following form.

1. Von Mantel

$$Y = \frac{2 \text{ GS}}{R} = \frac{2 \times 1\,440\,422}{175} \quad \begin{array}{ll} \text{G.S.} & 1\,440\,422 \text{ m}^3 \\ \text{Rotation Size} & 70 \text{ cm} \\ \text{Diam. Inc.} & .4 \text{ cm per year} \\ R & 175 \text{ years} \end{array}$$

$$= 16\,462 \text{ m}^3 \text{ gross}$$

2. Modified Von Mantel

$$Y = \frac{2 \text{ G.S.} \times R}{R^2 - a^2} = \frac{2 \times 1\,440\,422 \times 175}{30\,625 - 625} \quad \begin{array}{l} \text{a: age equivalent to} \\ \text{the minimum d.b.h.} \\ \text{enumerated - 25 yrs.} \end{array}$$

$$= 16\,800 \text{ m}^3 \text{ gross}$$

3. Brandis

60 cm cutting limit - surplus over 50 years.

| <u>Size Class</u> | <u>No. of Trees</u> | <u>% Survival</u> | <u>Nett Stems</u> | <u>Yrs. in Class</u> |
|-------------------|---------------------|-------------------|-------------------|----------------------|
| 70 + | 106 000 | 100 | 106 000 | |
| 60 - 70 | 55 000 | 100 | 55 000 | 25 |
| 50 - 60 | 194 000 | 100 | 194 000 | 25 |
| 40 - 50 | 438 000 | 90 | 394 000 | 25 |
| 30 - 40 | 438 000 | 75 | 328 000 | 25 |
| 20 - 30 | 987 000 | 60 | 592 000 | 25 |
| 10 - 20 | 1 279 000 | 40 | 512 000 | 25 |
| | | | <u>2 181 000</u> | |

Annual recruitment to 60 + is $194\,000 \div 25 = 7\,760$

Working stock required for 25 year cc = $7\,760 \times \frac{25}{2} = 97\,000$ stems

Average volume per recruited stem (65 cm D.B.H.O.B.) is 1.76 m^3

Annual volume by recruitment = $7\,760 \times 1.76 = 13\,658 \text{ m}^3$

Liquidate surplus over 50 years

Surplus stems are $(106\,000 + 55\,000 - 97\,000) = 64\,000$

Average present volume of 60 cm + stems is 2.67 m^3

Annual volume available from surplus

$$64\,000 \times 2.67 \div 50 = 3\,418 \text{ m}^3$$

Total annual volume $(13\,658 + 3\,418) = 17\,076 \text{ m}^3 \text{ gross}$

4. Cutting Cycle Analysis

25 year cycle (variable cut 50 cm + with percentages as for Bonalbo) diameter increments indicated.

| <u>Cutting Cycle</u> | <u>Total Volume (m³ gross)</u> | |
|----------------------|---|--------------------|
| | <u>(0.3 cm/yr)</u> | <u>(0.4 cm/yr)</u> |
| 1 | 512 000 | 568 000 |
| 2 | 292 000 | 473 000 |
| 3 | 509 000 | 800 000 |
| Total | 1 313 000 | 1 841 000 |
| Volume/annum | 17 500 | 24 500 |

Summary

| | |
|---------------------------|-------------------------------|
| 1. Von Mantel | - 16 462 m ³ gross |
| 2. Modified Von Mantel | - 16 800 m ³ gross |
| 3. Brandis | - 17 076 m ³ gross |
| 4. Cutting Cycle Analysis | - 17 500 m ³ gross |

Based on these calculations a figure of 16 500 m³ gross was accepted.

Conversion of Gross to Nett

Percentage deductions from gross assessed volume were:

| | |
|--------------------------------------|----------------|
| Reject logs | 6.4% |
| Small logs | 0.7% |
| Minimum rate logs | 6.7% |
| Errors in log length | 0.5% |
| Errors in merchantability assessment | 0.5% |
| Economically unloggable | 5.0% |
| Total | = <u>19.8%</u> |

| | |
|--|-------------------------------|
| Therefore gross volume availability | = 80.2% |
| Less defect, 23.2% of 80.2% | = 18.6% of gross assessed |
| Therefore available nett quota volume | = 61.6% " " " |
| Less quota leakage (10% of nett quota) | = 6.16% " " " |
| Therefore nett quota yield (61.6 - 6.16) | = 55% of gross assessed yield |

B. Revised Sawlog Calculation

In determining merchantability class, sawlogs were given preference over poles.

Since the 1972 assessment significant areas of the Management Area have been given the primary function of pole production rather than sawlog production (pole areas). Consequently statistics for the Merchantability (Sawlogs) resource for the Management Area compiled using the 1972 assessment results, include a percentage of stems now considered should be harvested as poles (i.e. Merchantability 2). In an attempt to obtain some indication of the reduction in sawlog yield, it was considered that the reduction in assessed sawlog growing stock through increased pole operations could be likened to a loss through natural mortality.

In calculating the pole cut percentage (i.e. mortality percentage) the following basic assumptions were made:

1. 50% of the Management Area will be pole areas. Appendix 5(b) shows the derivation of this figure.
2. Considering that Ironbark and Spotted Gum make up about 95% of the current pole cut, it is reasonable to examine only those two species in any calculations involving poles.
3. The Ironbark resource is evenly distributed over the Management Area.
4. 80% of the Spotted Gum resource is located in the pole areas.

With these assumptions in mind, an edited table from the HARDASS printout based on the 1972 assessment was produced.

Merchantability 1 - No. of Trees per ha (all of M.A.) (Sawlogs)

| | <u>Size Class (D.B.H.O.B. - cm)</u> | | | | |
|---------------|-------------------------------------|--------------|--------------|--------------|--------------|
| | <u>20-30</u> | <u>30-40</u> | <u>40-50</u> | <u>50-60</u> | <u>60-70</u> |
| Spotted Gum | 9.18 | 3.39 | 3.67 | 1.13 | 0.42 |
| Ironbark | 2.12 | 1.13 | 1.98 | 0.78 | 0.14 |
| Other Species | 7.76 | 3.95 | 2.82 | 1.83 | 0.50 |
| | <u>19.06</u> | <u>8.47</u> | <u>8.47</u> | <u>3.74</u> | <u>1.06</u> |

Consider firstly Spotted Gum.

Spotted Gum 20-30 cm

From experience with pole operations using the new pole marking prescription for pole areas, it is estimated that 10% (by number) of the stems encountered will be tree marked for removal as poles. The remaining 90% will be rejected on the grounds of straightness, pole shortness, etc., but will also include the select pole trees allowed to remain to realise further growth. By bringing together the following statistics and assumptions:

- 80% of Merchantability 1 Spotted Gum resource is located in pole areas (from basic assumptions).

- In the Merchantability 1, 20-30 cm class there is a total of 19.06 stems/ha. 9.18 of these stems are Spotted Gum (from edited HARDASS table).
- In the pole areas only 10% by number of the Merchantability 1 Spotted Gum stems encountered will be removed as poles.

The percentage loss of 20-30 cm Merchantability 1 stems as poles can be calculated as:

$$\frac{(80\% \times 9.18) \times 10\%}{19.06} \times 100 = 3.85\% \text{ (Rounded up to 4\%)}$$

Using a similar approach for the remaining Spotted Gum Size classes the percentage losses were obtained as follows:

Spotted Gum 30-40 cm

Using HARDASS table above and estimate that 50% of stems will be marked for poles in the pole areas, percentage loss is:

$$\frac{(80\% \times 3.39) \times 50\%}{8.47} \times 100 = 16.01\% \text{ (Rounded down to 16\%)}$$

Spotted Gum 40-50 cm

Using HARDASS table and estimate that 25% of stems will be marked for poles, in the pole areas percentage loss is:

$$\frac{(80\% \times 3.67) \times 25\%}{8.47} \times 100 = 8.67\% \text{ (Rounded up to 9\%)}$$

Spotted Gum 50-60 cm

Using HARDASS table and estimate that 5% of stems will be marked for poles, in the pole areas, percentage loss is:

$$\frac{(80\% \times 1.13) \times 5\%}{3.7} \times 100 = 1.22\% \text{ (Rounded down to 1\%)}$$

Spotted Gum 60-70 cm

It is estimated that in this size class the percentage loss will be 0%.

The above results are summarised as:

TABLE 1

% Losses of Merch. 1 S.G. Stems as Poles (Total Management Area)

| Size Class (D.B.H.O.B. - cm) | | | | |
|------------------------------|-------|-------|-------|-------|
| 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| 4% | 16% | 9% | 1% | - |

Considering the Ironbark component of the HARDASS table and keeping in mind that 50% of the Ironbark is located in pole areas (i.e. 50% of Management Area to be pole areas and Ironbark resource thought to be spread uniformly over the Management Area), a similar approach to that used for Spotted Gum can be used to calculate percentage losses as poles.

Ironbark 20-30 cm

Using HARDASS table and the estimate that 10% of the stems will be marked for poles in the pole areas, the percentage loss is:

$$\frac{(50\% \times 2.12) \times 10\%}{19.06} \times 100 = 0.56\% \text{ (Rounded up to 1\%)}$$

Ironbark 30-40 cm

Using HARDASS table and the estimate that 50% of the stems will be marked for poles in the pole areas, the percentage loss is:

$$\frac{(50\% \times 1.13) \times 50\%}{8.47} \times 100 = 3.34\% \text{ (Rounded down to 3\%)}$$

Ironbark 40-50 cm

Using HARDASS table and the estimate that 25% of the stems will be marked for poles in the pole areas, the percentage loss is:

$$\frac{(50\% \times 1.98) \times 25\%}{8.47} \times 100 = 2.92\% \text{ (Rounded up to 3\%)}$$

Ironbark 50-60 cm

Using HARDASS table and the estimate that 5% of the stems will be marked for poles in the pole areas, the percentage loss is:

$$\frac{(50\% \times 0.78) \times 5\%}{3.74} \times 100 = 0.52\% \text{ (Rounded up to 1\%)}$$

Ironbark 60-70 cm

It is estimated that in this size class the percentage loss will be 0%.

The above results are summarised as:

TABLE 2

% Loss of Merch. 1 IBK Stems as Poles (Total Management Area)

| Size Class (D.B.H.O.B. - cm) | | | | |
|------------------------------|-------|-------|-------|-------|
| 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
| 1% | 3% | 3% | 1% | - |

Combination of Tables 1 and 2 will produce a table showing the percentage losses in sawlog growing stock as a result of establishing pole areas. The percentages can be regarded as mortality percentages for processing by the CUTAN programme.

TABLE 3

Mortality Percentages

| <u>Size Class</u> <u>(D.B.H.O.B.)</u> | <u>Over Cycle</u> | <u>Per Year</u> <u>(for 25 year cycle)</u> |
|--|-------------------|---|
| 20-30 cm | 5% | .2 |
| 30-40 cm | 19% | .8 |
| 40-50 cm | 12% | .5 |
| 50-60 cm | 2% | .1 |

These percentages were fed into the CUTAN programme, together with the following constraints - 25 year cutting cycle; diameter increment 0.3 cm per year; variable cut 50 cm +; and mortality above, only over the first cutting cycle. The sale of poles into the second and third cutting cycles was not considered as 25 years seems a reasonable period for planning for this product.

The new sawlog yield calculated by the CUTAN programme with allowance for "mortality" is presented as:

TABLE 4

| <u>Cutting Cycle</u> | <u>Total Volume</u> |
|----------------------|------------------------------------|
| 1 | 509 000 |
| 2 | 281 000 |
| 3 | 477 000 |
| | <hr/> |
| | 1 267 000 m ³ gross |
| | = 16 900 m ³ gross/year |

An approximation of 16 500 m³ was considered from the yields calculated without allowance for mortality in Part A. If this estimation is now corrected for "mortality" by reducing the yield of 16 500 m³ by 600, the yield becomes 15 900 m³ gross.

A 55% conversion from gross gives 8 745 m³ nett.

C. Pole Yield Calculation

Using the "mortality" percentages, the percentage of the volume assessed as sawlogs and now available as poles, can be calculated:

TABLE 5

| <u>Diameter Class</u> | <u>Mortality %</u> | <u>Assessed Sawlog Volume</u> | <u>Pole Volume</u> |
|-----------------------|--------------------|-------------------------------|-----------------------------|
| 20-30 cm | 5% | 147 138 | 7 357 |
| 30-40 cm | 19% | 195 355 | 37 117 |
| 40-50 cm | 12% | 373 377 | 44 805 |
| 50-60 cm | 2% | 239 485 | 4 789 |
| | | | <u>77 046 m³</u> |

The sawlog volumes from the assessment (Appendix 8(b)) were reduced by these figures. The pole volumes (Appendix 8(b)) were correspondingly increased, to give the figures in Table 6 below.

The revised pole volume figures for Casino Management Area and the adjacent Richmond Range Working Circle of the Casino West Management Area (assessed at the same time) can now be used in the following table to calculate yield.

TABLE 6

| <u>Volume 1972 Assessment (m³)</u> | | | | | <u>Yield (m³)</u> | | |
|---|-----------------------|----------------------------|-----------------------|--------------|------------------------------|----------------------------|--------------|
| <u>Diameter Class</u> | <u>Casino M.A.</u> | <u>Richmond Range W.C.</u> | <u>Total</u> | <u>% Cut</u> | <u>Casino M.A.</u> | <u>Richmond Range W.C.</u> | <u>Total</u> |
| 10-20 cm | 36 328 m ³ | 12 431 m ³ | 48 759 m ³ | 0 | - | - | - |
| 20-30 cm | 294 822 | 115 803 | 410 625 | 20% | 60 000 | 23 000 | 83 000 |
| 30-40 cm | 268 439 | 161 128 | 429 567 | 70% | 188 000 | 113 000 | 301 000 |
| 40-50 cm | 223 094 | 30 737 | 253 831 | 100% | 223 000 | 31 000 | 254 000 |
| 50-60 cm | 12 389 | 5 641 | 18 030 | 100% | 12 000 | 5 000 | 17 000 |
| | 835 072 | 325 740 | 1 160 812 | | 483 000 | 172 000 | 655 000 |

The 10-20 cm size class is too small, 80% of the 20-30 cm and 30% of the 30-40 cm size class are left to grow.

The available yields are then discounted by:

| | | |
|----|---|------------|
| 1. | Reduction because of over-assessment and inability of trees to grow | 20% |
| 2. | Lost in Lease conversion | 15% |
| 3. | Overestimate in length | 7% |
| 4. | Rejects | 5% |
| 5. | Economically inaccessible | 8% |
| 6. | Mortality | 5% |
| | | <u>60%</u> |

The available yield then becomes:

| | |
|--------------------------------|------------------------|
| Casino Management Area: | 193 000 m ³ |
| Richmond Range Working Circle: | 69 000 m ³ |

It has been estimated that a further 10 000 m³ of poles will be available from the Ewingar Working Circle of the Casino West Management Area.

The total availability then becomes:

| | |
|------------------------------|------------------------|
| Casino Management Area: | 193 000 m ³ |
| Casino West Management Area: | 79 000 m ³ |
| | <hr/> |
| | 272 000 m ³ |

The yield of poles from Casino Management Area thus represents 70% of the total yield, available from the joint supply zone.

These figures ignore increment. Some rough calculations, based on a 25 year cutting cycle ($272\ 000\text{ m}^3 \div 25\text{ years} = 10\ 880\text{ m}^3\text{ p.a.}$) indicate that a cut of 10 000 m³ per annum could probably be sustained.

In using these figures the deficiencies of the 1972 assessment must be recognised.

Casino Management Area1982 Sawlog Yield Calculation

Based on monitoring of the 1972 sawlog yield estimates during
the 1972-82 period and sawlog quota definition applying to
31st December, 1982

Summary for State Forests of the Management Area

| <u>Total Available Volume</u> | <u>Volume (m³ net quota)</u> | <u>No. of Years of Cut</u> |
|--|---|--------------------------------|
| <u>First Cutting Cycle (25 years) - Commencing 1972</u> | | |
| Actual Sawlog Yield July 1972 - June 1982 | 63 000 (1) | 10 |
| Predicted Yield as at 1st July 1982, from unlogged areas and areas logged prior to 1960 (Based on predicted mean yields by State Forest) | 90 000 (2) | 10 |
| Predicted Yield from 1960 - 1972 logged areas | 42 000 (3) | 5 |
| | <u>195 000</u> | <u>25 yrs.</u> |
| Original prediction, based on 1972 assessment (Appendix 8(c) Section B) | (280 000) | |
| <u>Second Cutting Cycle (25 years) - Commencing 1997</u> | | |
| Original prediction, based on 1972 assessment | (154 000) | |
| Reduced prediction, from experience during part of first cutting cycle (70% of original) | 108 000 | 25 |
| <u>Annual Available Volume - Remainder of 1st C.C., plus 2nd C.C.</u> | | |
| Predicted Yield 1st C.C. (Remainder) | 132 000 | 15 |
| Predicted Yield 2nd C.C. | 108 000 | 25 |
| | <u>240 000</u> | <u>40</u> |
| Average Annual Potential Yield | <u>6 000</u> | |

(1) Actual Sawlog Yield 1972 - 1982

| | | |
|---|-----------------------|-----------------------------|
| Net Volume July, 1972 - June, 1977 (Appendix 7(a)) | 28 959 m ³ | |
| Net Quota Volume (90% Net Volume) | | 26 000 m ³ |
| Net Quota Volume 1977 - 82 | | <u>37 000 m³</u> |
| | | <u>63 000 m³</u> |

Casino Management Area

(2) Predicted Sawlog Yields from Unlogged
Areas and Areas logged prior to 1960

| State Forest | Cpts | Gazetted Area 30/6/82* (ha) | Gross Area Logged 1960-82* (ha) | Gross Area Unlogged * (ha) | Estimated Mean Gross Volume/ha (m ³ /ha) | Estimated Total Gross Volume (m ³) |
|------------------------------|--|-----------------------------------|--|----------------------------------|--|---|
| <u>Sawlog Working Circle</u> | | | | | | |
| Bungabee | All | 1 471 | 852 | 619 | 3 | 1 900 |
| Bungawalbin | 12-14, 16 20, 21 | 3 302 | 3 302 | | | |
| Devils Pulpit | All | 4 454 | 3 518 | 936 | 8 | 7 500 |
| Doubleduke | pt.7,pt.8, 12-23,pt.24, pt.26, Extn. 11 | 5 998 | 5 028 | 970 | 7 | 6 800 |
| Gibberagee | Extns.7,8, 9 | 4 831 | 1 903 | 2 928 | 8 | 23 400 |
| Mororo | All | 1 659 | 183 | 1 476 | 9 | 13 300 |
| Royal Camp | pt.Extn 2 | 424 | | 424 | 6 | 2 500 |
| Tabbimoble | All | 2 503 | 1 551 | 952 | 3 | 2 900 |
| Sub-total | | 24 642 | 16 337 | 8 305 | | 58 300 |
| <u>Pole Working Circle</u> | | | | | | |
| Banyabba | All | 3 414 | 831 | 2 583 | 6 | 15 500 |
| Braemar | All | 1 968 | 125 | 1 843 | 4 | 7 400 |
| Bungawalbin | 15, 17-19, 22, 23 | 3 054 | 2 261 | 793 | 8 | 6 300 |
| Camira | All | 3 586 | 204 | 3 382 | 4 | 13 500 |
| Carwong | All | 582 | | 582 | 4 | 2 300 |
| Doubleduke | 9-11,27,30 | 2 516 | 614 | 1 902 | 5 | 9 500 |
| Ellangowan | All | 1 167 | 186 | 981 | 4 | 3 900 |
| Gibberagee | 70-80, Extn.4,10 | 8 124 | 4 871 | 3 253 | 6 | 19 500 |
| Myrtle | All | 4 333 | 275 | 4 058 | 5 | 20 300 |
| Royal Camp | Extn.1, pt.2 | 1 736 | 780 | 956 | 5 | 4 800 |
| Whiporie | All | 1 762 | 1 762 | | | |
| Sub-total | | 32 242 | 11 909 | 20 333 | | 103 000 |
| Total | | 56 884 | 28 246 | 28 338 | | 161 300 |

Predicted Net Quota Sawlog Yield 90 000 m³ (4)

(56% Gross as per (4) below - quota as defined prior to 1/12/83: all logs 40 cm c.d.u.b. and larger excluding Minimum Rate logs)

* Refer note p. (iii).

Casino Management Area

(3) Predicted Sawlog Yields from 1960 - 72 Logged Areas

| State Forest | Compartments | Gross Area Logged 1960-82* (ha) | Estimated Mean Gross Volume/ha (m ³ /ha) | Predicted Total Gross Volume (m ³) |
|--------------|--------------------------|---------------------------------|---|--|
| Banyabba | | | | |
| Braemar, | | 286 | 4 | 1 100 |
| Ellangowan | | | | |
| Bungabee | 6, 7, 13-19 | 852 | 5 | 4 300 |
| Bungawalbin | 12-16, Pt.17, 20-23 | 5 160 | 4 | 20 600 |
| Camira | | 210 | 4 | 800 |
| Carwong | | | | |
| Devils | | | | |
| Pulpit | Extn. 4 | 1 511 | 3 | 4 500 |
| Doubleduke | 9-11, 15,19, 21-23, 30 | 3 178 | 3 | 9 500 |
| Gibberagee | pt. 71, 72,73 76, 77, 80 | 3 768 | 5 | 18 800 |
| Mororo | | 88 | 8 | 700 |
| Myrtle | | 266 | 5 | 1 300 |
| Royal Camp | | 247 | 5 | 1 200 |
| Tabbimoble | 4, 5, 6 | 1 551 | 5 | 7 800 |
| Whiporie | 81, 82 | 1 762 | 3 | 5 300 |
| Totals | | 18 879 | | 75 900 |

Predicted Net Quota Yield

43 500 (4)

(56% Gross as per (4) below - quota as defined prior to 1/1/83: all logs 40 cm c.d.u.b. and larger excluding Minimum Rate logs)

* Gross area logged derived from logging history maps based on 1:31 680 (and 1:15 840) maps.

Gross area unlogged derived from this area and gazetted State Forest area included in Management Area as at 30/6/82. Both these areas approximate Compartment and Working Circle areas as derived from the 1983 1:25 000 Forest Type maps. The practical approximations involved in this approach are recognised, but are considered to be minor in the overall context of the order of accuracy involved in the yield review and predictions based on monitoring of the 1972 assessment and Cutting Cycle analysis. Areas included in the Preserved Areas Working Circle have not been excluded.

Section 2.6.2 of the Plan prescribes continued monitoring and further yield review on the basis of the 1983 1:25 000 Forest Type and Stand Condition maps now available.

Casino Management Area

(4) Conversion of Gross Sawlog Yield to Net Quota
Sawlog Volume from State Forest for the
period June 1977 - June 1982

| | | |
|--|----|-----------|
| | % | |
| <u>Gross Sawlog Yield Volume</u> | | 100 |
| Less Minimum Rate Logs | 14 | |
| Less Small Logs (Excluding Minimum Rate Logs) | 9 | |
| | — | |
| Sub-total | 23 | |
| <u>Gross Quota Quality Sawlog Yield Volume</u> | | 77 |
| Less quota leakage (1) | 4 | |
| <u>Gross Quota-Sawlog Yield Volume</u> | | 73 |
| Less quota-sawlog defect volume (2) | 17 | |
| <u>Net Quota-Sawlog Yield Volume</u> | | <u>56</u> |
| (Net volume debited to Crown-sawmill quotas) | | |

- (1) Gross quota quality sawlog volume sold to other-than-Crown mills expressed as a percentage of total gross quota-quality yield (5%) x 77%; or gross quota-quality sawlog volume sold to other-than-Crown mills expressed as a percentage of total gross sawlog yield volume (4%).
- (2) Quota-sawlog defect volume expressed as a percentage of gross quota volume yield (debited to Crown-sawmill quotas) (23%) x 73%; or quota-sawlog defect volume expressed as a percentage of total gross sawlog yield volume (17%).

Casino Management Area1982 Pole Yield Calculation

Based on Monitoring of the 1972 Pole
Yield Estimates during the 1972/82 Period.

State Forests of the Management AreaFirst Cutting Cycle - Commencing 1972

| | Volume (m ³) | | Average Annual "Allocation" Cut (m ³ /yr) | Number of Years of Cut |
|--|--------------------------|--------|---|------------------------------|
| | Gross "Allocation" (1) | | | |
| Actual Pole Yield, June 1972 - June 1982 | 47 200 | 41 000 | 4 100 | 10 |
| Estimated Pole Yield, as at June 1982, from Areas not harvested for poles since June 1972 (3) | 57 300 | 50 000 | 7 000 (2) | 7 |
| | 104 500 | 91 000 | | 17 |
| Original Predicted Yield based on 1972 Assessment (193 000) (168 000) | | | | |

- (1) "Allocation" pole volumes constitute those poles 10 metres and over in length. These have been 87% of gross pole sales recorded 1972/82. Poles less than 10 km length to be included in allocation from June 1984.
- (2) Prediction assuming an average of 7 000 m³ per annum allocation volume likely to be required from Casino M.A., with the 500 m³/yr balance obtained from Casino West Management Area, on basis of 1982 commitments.

The 1983 position from the above can be summarised as follows:

| | | |
|---|--------|-------------------------------|
| Estimated pole yield available June 1982 (above) | 57 300 | |
| Production 1982/83 (Appendix 7(a)) | 4 900 | |
| Estimated available June 1983 | 52 400 | |
| Allocation 1983/84 | 8 000 | (7 000 allocation volume (2)) |
| Available from 1984 | 44 400 | |

Therefore the average gross annual volume available for allocation from 1984 over the remainder of the assumed 25 year cutting cycle from 1972, i.e. 1984-1997 or 13 years, is estimated to be 3 400 m³/yr, as against the present effective allocation from 1984 from the Casino Management Area of 7 000 m³ gross/yr.

Average annual pole production over the period 1976-83 was about 6 500 m³ gross/year (Appendix 7(a)).

Casino Management Area

(3) Estimated Pole Yield as at June 1982,
from Areas Not Harvested for Poles since June 1972

| State Forest | Cpts | Gazetted Area as at 30/6/82* (ha) | Gross Area Harvested 6/72-6/82* (ha) | Gross Area not harvested for Poles* (ha) | Estimated Mean Gross Vol/ha (m ³ /ha) | Total Gross Volume (m ³) |
|------------------------------|---|--------------------------------------|---|---|---|---|
| <u>Sawlog Working Circle</u> | | | | | | |
| Bungabee | All | 1 471 | | 200 | 3 | 600 |
| Bungawalbin | 12-14 16,20,21 | 3 302 | 2 045 | | | |
| Devils Pulpit | All | 4 454 | | 700 | 3 | 2 100 |
| Doubleduke | pt.7,pt.8, 12-23,pt.24, pt.26,Extn.11 | 5 998 | | | | |
| Ellangowan | | | | | | |
| Gibberagee | Extns.7, 8,9 | 4 831 | | 250 | 3 | 700 |
| Mororo | All | 1 659 | | 300 | 3 | 900 |
| Royal Camp | pt.Extn 2 | 424 | | | | |
| Tibbimoble | All | 2 503 | | 300 | 3 | 900 |
| Sub-total | | 26 642 | | 1 750 | | 5 200 |
| <u>Pole Working Circle</u> | | | | | | |
| Banyabba | All | 3 414 | 941 | 2 473 | 3 | 7 400 |
| Braemar | All | 1 968 | 291 | 1 677 | 5 | 8 400 |
| Bungawalbin | 15, 17-19, 22, 23 | 3 054 | 3 054 | | | |
| Camira | All | 3 586 | 2 699 | 887 | 5 | 4 400 |
| Carwong | All | 582 | | 582 | 3 | 1 700 |
| Doubleduke | 9-11,27,30 | 2 516 | 2 356 | 160 | 5 | 800 |
| Ellangowan | All | 1 167 | | 1 167 | 4 | 4 700 |
| Gibberagee | 70-80, Extn.4 | 8 124 | 3 650 | 3 291 | 4 | 13 200 |
| Myrtle | All | 4 333 | 1 959 | 2 374 | 3 | 7 100 |
| Royal Camp | Extn.1, pt.2 | 1 736 | 1 424 | 312 | 3 | 900 |
| Whiporie | All | 1 762 | | 1 762 | 2 | 3 500 |
| Sub-total | | 32 242 | 16 374 | 14 685 | | 52 100 |
| Total | | 58 884 | 18 419 | 16 435 | | 57 300 |

(Total Allocation Pole Volume 50 000 (1))

* Refer footnote page (iii).

Casino Management AreaList of Preserved AreasForest Preserves

| <u>Number</u> | <u>Name</u> | <u>State Forest and Compartment</u> | <u>Area (ha)</u> |
|---------------|------------------------------|---|------------------|
| 90 | Pyrocarpa Forest Preserve | Doubleduke State Forest Cpt. 144 | 70 |

Ridgetop above sandstone cliffs, south-east aspect.

Altitude about 150 m. a.s.l.

Largefruited Blackbutt, with Bloodwood and Bailey's Stringybark; true Blackbutt below cliffs. Christmas Bush (Ceratopetalum gummiferum) in understorey.

| | | | |
|-----|-----------------------------------|--------------------------------|-----|
| 198 | Selection Flat Forest Preserve | Myrtle State Forest Cpt. 62 | 141 |
|-----|-----------------------------------|--------------------------------|-----|

Large Forest Red Gum flat, with waterholes, rising to higher land with Spotted Gum and Grey Box types; contains E. glaucina. Altitude about 50 m. a.s.l.

| | | | |
|-----|-------------------------------|-------------------------------------|----|
| 199 | Needlebark Forest Preserve | Gibberagee State Forest Cpt. 124 | 47 |
|-----|-------------------------------|-------------------------------------|----|

Dry sandstone ridgetop to deep sheltered gullies with easterly aspect.

Altitude about 150 m. a.s.l. Stand of Needlebark Stringybark type, with Blackbutt and Stringybark.

Total Area

258 ha

Casino Management Area

List of Crown Land Consolidation Act LeaseholdTenures Dedicated as State Forests

| Lessee | Crown Land Consolidation Act Tenure | State Forest Name | State Forest No. | Area (ha) |
|-----------------------------|---|----------------------|---------------------|-----------|
| <u>Leases in Perpetuity</u> | | | | |
| G.A. Alcorn | C. L. 11/50 | Royal Camp | 794 | 62 |
| N.C. Bradfield | Cn. L. 16/6 | Gibberagee | 19 | 460 |
| N.C. Bradfield | Cn. L. 16/15 | Gibberagee | 19 | 108 |
| J.E. Robertson | Cn. L. 19/3 | Myrtle | 559 | 262 |
| Berg & Strauss | Cn. L. 19/83 | Devils Pulpit | 16 | 1 502 |
| D.J. Paul | Cn. L. 33/1 | Myrtle | 559 | 137 |
| D. McLaren | Cn. L. 44/6 | Mororo | 833 | 388 |
| Total | | | | 2 919 |

Terminating Leases

| | | | | | <u>Date of Termination</u> |
|--------------------------------------|--------------|------------|-----|-------|--------------------------------|
| Ian Robinson | Sp. L. 54/74 | Doubleduke | 15 | 767 | 31/12/85 |
| J.M., P.M., N.A. and S.J. Causley | Sp. L. 59/4 | Mororo | 833 | 74 | 31/12/86 |
| F.G. L.L. and H.R. Lewis | Sp. L. 54/74 | Gibberagee | 19 | 260 | 31/12/85 |
| W.A. Anderson | Sp. L. 54/73 | Gibberagee | 19 | 40 | 31/12/85 |
| Smaug Pty. Ltd. | Sp. L. 43/21 | Gibberagee | 19 | 350 | 22/ 8/84 |
| Total | | | | 1 491 | |
| Total Area | | | | 4 410 | |

CASINO MANAGEMENT AREA
LOCATION OF GRAVEL PITS
 Active pits as at July 1983

