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PROPOSED LOGGING OF TERANIA CREEK

STATEMENT PREPARED BY THE FORESTRY
COMMISSION OF NEW SOUTH WALES AT
THE DIRECTION OF THE GOVERNMENT

SYDNEY

14th DECEMBER, 1979

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what is best advantage of state
F.C. has responsibility to preserve as well as log.

no responsibility on tide S.F. for ~~reformation~~
yet promote usage.
refer to HCC motion & check wording
with Murray Wilcox.

PROPOSED LOGGING OF TERANIA CREEK AND THE REASONS THEREFOR

Statement by the Forestry Commission of New South Wales

1. Introduction

Forestry is an ancient human activity which has been regulated by law in western societies since at least the 13th Century. Its objectives differ from all others in the rural environment because of the great time spans involved. Its methods differ because of the immense size of the produce relative to other crops and because its land base has multiple uses. Its financial base differs because of the long period during which investments mature. Forest management is conservative because of all these factors and for the same reasons there are no facile or instant solutions to its problems.

This is the dilemma now facing the Commission!

In New South Wales, the Forestry Commission, acting under the authority of the Forestry Act, 1916 is charged with these duties (S.8A.):

- a. to conserve and utilise the timber on Crown-timber lands to the best advantage of the State;
- b. to provide adequate supplies of timber from Crown-timber lands for building, commercial, industrial, agricultural, mining and domestic purposes;
- c. to preserve and improve, in accordance with good forestry practice, the soil resources and water catchment capabilities of Crown-timber lands;
- d. to encourage the use of timber derived from trees grown in the State; and
- e. consistent with the use of State forests for the purposes of forestry and of flora reserves for the preservation of the native flora thereon -
 - (i) to promote and encourage their use as a recreation; and
 - (ii) to conserve birds and animals thereon.

ref. to circular statement to all M.P.'s by N.C.C.C.

In the attainment of its objects and the exercise and performance of its powers, authorities, duties and functions under this Act, the Commission shall take all practicable steps that it considers necessary or desirable to ensure the preservation and enhancement of the quality of the environment.

The statute also directs the Commission precisely as to its handling of finances. It is not enjoined to make a profit but rather to pay its moneys into Consolidated Revenue (S.12(1)).

S.13(1) provides that all moneys appropriated by Parliament for the purposes of the Forestry Act will be expended under the control and management of the Commission. S.13(2) then provides for half of the Commission's gross receipts as paid to the Consolidated Revenue to be used for afforestation, reforestation, survey, and improvement of State Forests and Timber Reserves without any other authority than the Act. Other than these funds the Commission receives annual subventions from the Treasury to pay for its administration and marketing activities and from Loan Funds to pay for capital works.

Money expended under S.13(2) is required to be accounted to both Houses of Parliament. All moneys (under S.14(1) are subject to the Audit Act and accounts are open to the Auditor-General under S.14(2).

The nett effect of these legal strictures is that the Commission arranges its internal finances (as opposed to funding received from the general revenue subvention) so that individual logging operations related to native forests are substantially self-funding. Terania Creek is no exception in any sense. There are numerous logging operations in progress which are similar in most characteristics and hundreds now concluded were identical with respect to forest types, financial considerations, roading provisions, techniques to ensure regeneration, and so on. In the aggregate these numerous small logging operations add up to the native forest timber supply of N.S.W.

Controversy over logging Terania Creek is thus an unusual case, mislabelled a "rainforest issue" by the media. It *could* have been a rainforest issue but the Minister for Conservation heeded public representations and decided that the rainforest section of Terania Creek would not be logged. A small area of surrounding hardwood forest (brush box and blackbutt) is all that is proposed to be logged.

Rainforest can be described as a dense community of moisture-loving trees, mainly of broadleaved, evergreen species; frequently numerous species of trees may be present, with the tree crowns tending to be arranged in several layers, and the community usually contains what may appear as strange life-forms, such as vines, epiphytes, palms buttressed stems and stranglers.

Rainforest, with its dense, dark stands, contrasts markedly with the more open eucalypt and similar forests (sclerophyll types) that make up most of the native forest cover in N.S.W. The contrast is not only visual: the botanical composition and the assemblages of animals, both large and small, found in the rainforest are to a large extent quite different from those of the far more widespread sclerophyll forests.

Elements of rainforest involving substantially the same mixture of species as in the rainforest proper, often extend well beyond its limits, but merely occupy the understorey of the wetter sclerophyll (eucalypt and similar) forest. Such understorey elements, in spite of their botanical affinity with rainforests, do not classify as rainforest proper which is defined essentially by its vegetation structural form rather than by its species composition.

Between 1973 and 1976 the Forestry Commission developed a comprehensive policy for native (indigenous) forests in N.S.W. This consolidated previous policies and gave what is now a fairly final pre-statement of intent towards the forest management of most forest types including rainforest and wet sclerophyll forest such as occupy the Terania Creek basin. Previous policies were revised and often reversed. Given that the Terania Creek rainforest had been ruthlessly logged during World War II and is still recovering, given that there was now public concern about rainforests and given that industry could accept the loss of the relatively small quantities of rainforest timber it contained, decisions were taken to accommodate local opinion and to leave the logged rainforest substantially untouched, while also reducing the proposed intensity of logging of the surrounding hardwood forest.

Reversals of policy were not new at Terania Creek. Pre-war, the Minister for Forests, the Hon. Roy Vincent, M.L.A., had decided that the area of State Forest should be managed as a National Forest and part of this area not including Terania Creek basin, should be managed as National Park. (see Appendix 1), some quarter of a century before the present-day concept of national parks emerged in N.S.W. War time exigencies led to intensive logging and also to loss of the records and decisions made by the pre-war administration. Consequently, the Commission's task is one of rehabilitation of a rainforest and ensuring continuous harvests from an associated hardwood forest.

Source?
authentic?

Bay's def'n?

implies
lesser
significance

Summary of
overall
philosophy

whose classification?

part of

over view
only?

Fire history - time since disturbance

Gentle 26/3/8
P60

The association of rainforest and hardwood forest is usual; sometimes there is a distinct boundary brought about by topography or by abrupt changes in soil fertility, at other times there is a transition zone where rainforest or hardwood introgresses. Cold rainforests such as occur in Tasmania (and // *Fire history* their close relatives in New Zealand) are not different in this respect from the subtropical rainforest types of Terania Creek where both topography and soil fertility demarcate the true rainforest from the moist hardwood forest proposed for logging.

It is also useful to set logging controls within their historical perspective before proceeding to the particulars of Terania Creek. Without being too exact the following development can be recognised:

(1) Pre-1900 (The Colonial era)

Logging was regulated basically to obtain revenues to defray the expenses of running a colony. Consequently logging depended on cutting controls on the very highly valued species.

Reserved forest land was often destroyed to obtain access to soils needed for particular crops of interest to the Colonial Office, e.g. tobacco, or fibre crops of interest to the Royal Navy. Settlers were accustomed to clearing forest indiscriminately and helping themselves as the need arose for the products of reserved forest lands. Enforcement of the law relating to forest reserves was infrequent and erratic.

(2) 1901-1916 (Prior to enactment of the Forestry Act).

Alarm about disappearance of forests led to several parliamentary and public inquiries aimed at recommending means of reserving forestry land from settlement rather than regulating the harvest from it. The culmination was passage of the Forestry Act, 1916 and formation of the Forestry Commission in 1917.

(3) 1917-1935

Regulation was largely in the hands of staff who would be judged as sub-professional by today's standards. They were expert bushmen and concentrated on reserving the forest estate, achieving (with the exception of agriculturally derelict land bought for softwood plantations) the pattern of State Forests as they are today. Illegal cutting was stamped out and regulation of logging was by area - mills were allocated areas within which they could cut pretty much what they liked, although in some cases control was achieved by the imposition of minimum girth restrictions aimed at limiting the cut to the older over-mature trees. When thwarted they did not find it difficult to enlist political aid. The forest estate invariably suffered overcutting as a result of these attentions.

(4) 1935-1947

Regulation of cutting began to come under the direction of professional foresters who had the skills to measure the forest stock, its growth rate, and the rate at which stocks were being drained. They also designed the stumpage appraisal (royalty) system in the general outline, which still exists. This system led to the spread of logging to more remote areas of forest because of its inbuilt economic incentives to achieve this aim. Mills still had "areas" but tree marking within these areas gradually came into use so that the older uncontrolled cutting began to decline as staff became available and the first moves towards cutting regulation by control of volume of wood appeared.

The war disrupted these efforts to lower the drain on forests but the war did get the forest industries used to having its operations regulated more generally. Attempts to cut yields so that growth and removals were in balance were usually successfully resisted.

(5) 1947-1953

Professional staff became more generally available at all rankings and the first comprehensive Working Plans appeared. These regulated cuts by area and by volume removal and led to reliable information from which successful pressure to reduce cuts could be exerted for the first time. Nevertheless powerful segments of the industry were still able to exact concessions which meant that they could still cut wood in some areas faster than it was growing. The widespread availability of wood from private properties tended to cloud the State Forest picture put before the political arm of Government.

(6) 1953-1960

Working Plans (some provisional) to regulate cutting became almost general, as did tree marking. From 1962, yields from private lands began to decline gradually. Crown quotas (i.e., the wood quota from Crown estate) for Crown mills became accepted although it was increasingly difficult for political reasons to reduce quotas despite many being in excess of forest growth. Where mills closed for various reasons, quotas were abolished, but the pressure to keep to committed quotas for Crown mills led to extending zones of supply as an alternative to overcutting closer forests which were under regulated yield control. The first large supplies of plantation softwood (pine) also began to alleviate the demand situation, and reliable fire control networks and methods greatly augmented the survival of young trees.

(7) 1960-1979

Yield regulation, aided by computerisation, became strictly controlled and political pressure to make more wood available declined. Quotas became accepted as commitments by Government to be maintained in the interests of regional stability. The industry realised that it was now unrealistic to ask for further allocations of non-existent wood. Certain conservation groups have now assumed this political position, abandoned two decades earlier by the industry, but using the proposition that more non-existent wood should be found to offset national park dedication of productive woodlands of specific interest to them.

(8) From 1980

Increasing supplies from softwood plantations will reduce the demand on native forests. This will not be significant until the late 1980's when large areas of plantation established in the 1960's begin to produce sawlogs. Meantime increasing affluence will mean an increasing demand per capita for wood products.

Against this general historic background it is possible to set the Forestry Commission's reasons for undertaking all those operations which it carries out in rural New South Wales. Terania Creek is one of these, not particularly important in its own right, but an example from a great number of similar activities.

Inability of F.C. to prevent sust. overcutting at regional level.

relate to regional context allocated to an P. 40 i.e. Man. Plan regional context.

check ~~in~~ area of valley to Channon & land types - source of "now extinct wood"

41.9
Unlogged

2. Background of Forestry Commission Activities in Whian Whian and Goonimbar State Forests

2.1 Location (Map 1).

Terania Creek basin, formed by the headwaters of a tributary, is the northern arm of the Richmond River which flows through Lismore. Terania Creek itself is one of the creeks which rise in the State Forests which lie along the Nightcap Range about 25 kilometres north of Lismore. This range, which rises above 800 metres, forms part of the watershed between the Tweed and Richmond Rivers in the far North Coast region of N.S.W. In its upper reaches, Terania Creek forms part of the boundary between Goonimbar State Forest to the west and Whian Whian State Forest to the east. This creek rises in the State Forests on the southern side of the range, then passes through cleared farmlands as it flows south. In the upper catchment of Terania Creek, within the State Forest, there is a distinct basin surrounded by steep slopes leading to a discontinuous line of cliffs.

Terania Creek basin is administered by the Murwillumbah Sub-district within the Casino Forestry District of the Forestry Commission.

The total area of the Terania Creek catchment in State Forest is about 1 890 ha and of this about 740 are in the basin. Of this area, about 70 ha are included in the 375 ha Nightcap Track Flora Reserve and as such is excluded from logging. This leaves about 670 ha accessible and available for logging in the basin. A rough dissection of the accessible vegetation types present in Terania Creek basin is:

Rainforest:	320 ha	320	190 amend.
Brush box :	120 ha	120	222
Blackbutt :	230 ha	230	209
		670	670

Conway
18/3/80
P77
part 5

Geoff T.
Expand beyond S.F. boundaries

Under current plans only ~~70~~ ⁴⁷⁰ ha of brush box and blackbutt are proposed to be logged. This area represents the total now in dispute following earlier compromise by the Forestry Commission.

No rainforest (in the strict descriptive sense of that term) is involved in this dispute.

2.2 History of Logging

Timber-getting in this locality has a long history. European settlement in the Richmond Tweed area commenced about 1839 with the arrival of the first settlers quickly followed by the cedar getters. By 1845 the Richmond Valley was providing about two-thirds of Australia's exports of red cedar. One of the early cedar camps was called the Terania Creek camp and the loggers penetrated into extremely remote areas to obtain this valuable timber. The cedar getters were followed in the 1860's by farmer settlers who commenced large scale clearing on the rainforest areas particularly to develop their farms, mainly for dairying.

Most of the lands along the Nightcap Range and its slopes have, over a long period of time been reserved as State Forest. Whian Whian State Forest was reserved in 1914 and Goonimbar State Forest was reserved in 1917, and subsequently enlarged to their current size. There was pressure put on the government to have parts of these forests revoked and thrown open for settlement and in 1936 the Nightcap National Forest was dedicated.

What difference will only 70 ha make?

Nightcap was the second National Forest to be proclaimed in N.S.W., and consists of the three State Forests on the Nightcap Range, viz. Toonimbar State Forest (3 200 ha), Whian Whian State Forest (5 770 ha) and Whian Whian East State Forest (630 ha), together with two other State Forests, a short distance to the north, viz. Nullum State Forest (4 940 ha) and Burringbar State Forest (70 ha) - see map 1. This dedication made their tenure more secure under S.19A. of the Forestry Act.

After dedication of the State Forests, the first form of forest management introduced was the allocation of licence areas to sawmills and logging contractors. In these early operations, the selection of trees to be removed was left to the discretion of the individual timber-getter. Increased control over logging operations was progressively implemented with the appointment of a forest foreman about 1928 and subsequently the appointment in 1935 of a Forester to Mullumbimby. Surveys to determine the extent of the timber resource were undertaken in the 1940's and 1950's. In 1953, quota controls on a log volume basis were introduced by the Forestry Commission for all Crown sawmills based on the average annual volume of timber cut in previous years. The timber resource of the area has since been reviewed on three occasions, the most recent resulting in a reduction of about 30% in quotas applied as from 1977/78 quota year. The quota system contributes to the stabilisation of the industry, enabling sawmills to plan their operations around a regular supply of timber; it also enables the Forestry Commission to control the amount of timber cut from State Forests and other Crown-timber lands.

2.3 Forest Management

Prior to 1968 Whian Whian State Forest and Goonimbar State Forest were administered as part of Mullumbimby Sub-district. A Management Plan was prepared in 1962 to cover all State Forests in the Sub-district except for Goonimbar State Forest. The Plan prescribed a sustained yield of sawlogs calculated from data obtained from an assessment survey of the timber resource. This means that the commitment to supply a given quantity of sawlogs and the growth rate of a satisfactory range of tree age/size classes are approximately in balance for the Management Area and that, subject to all forest units delivering their programmed cut, the 'lives' of mills being supplied are virtually unlimited.

In 1968 Mullumbimby Sub-district was absorbed by Murwillumbah Sub-district but implementation of the 1962 Mullumbimby Management Plan continued.

A draft new Management Plan, based on the principles outlined in the Commission's "Indigenous Forest Policy" (Oct. 1976) was prepared in 1977 for the Murwillumbah Management Area, embracing all State Forests and other Crown-timber lands in that Sub-district. Although the draft document has not yet been approved in final form by the Commission, the objectives of management are in force as follows:-

- (a) To supply sawlogs to industry at a rate designed to most effectively utilise the economically available and long term productive capacity of the Area.
- (b) To maintain a natural forest vegetation cover adequate to -
 - (i) conserve the soil resources and water catchment capabilities

Not publicly
avail. Ask
to be
tabled!

Objective cannot be evaluated in view of limited scientific knowledge of flora, fauna & ecosystem functioning. No benchmark studies!

- (ii) maintain a diversity of habitat suitable to wildlife indigenous to the area
- (iii) retain a forest environment aesthetically acceptable to the public generally.
- (c) To provide for recreational use by the public in the context of the Forestry Commission's general policy for forest recreation.
- (d) To maintain any unique or rare archaeological, historical, floral, faunal or other scientific values.
- (e) To increase the level of production of sawlogs where economically justified.
- (f) To supply other timber and forest products, where compatible with (a) to (e) above.
- (g) To provide for other forest uses, where compatible with other management objectives.
- (h) To maximise nett financial returns to the extent possible under the preceding objects of management.

How determined (no public involvement)

In the new Plan the former Mullumbimby Management Area has retained its identity as the Mullumbimby Working Circle and with it Whian Whian State Forest, with management directed *inter alia* at providing a supply of hardwood sawlogs at a rate which is equivalent to the rate of growth of timber on the forests, whilst Goonimbar State Forest has been included in what is known as the Murwillumbah Working Circle. A diagrammatic illustration of how various sections of the Murwillumbah Management Area may be harvested over a cycle of about 25 years is given in Figure 1. Terania Creek, scheduled for logging in 1979/80, will on this basis fall due again in the period 2000 - 2006. Whilst management of the Mullumbimby Working Circle remains on a sustained yield basis, application of this concept to Murwillumbah Working Circle where the sawlog commitment at present level can be sustained for only about another seven years, is not practicable.

The yield of sawlogs prescribed in the draft new Plan, which corresponds to the total commitment to industry, is as follows:-

Mullumbimby Working Circle of 8 781 ha comprising Whian Whian State Forest, Whian Whian East State Forest and part of Nullum State Forest.

Prescribed yield : 7 000 m³ nett per annum.

Murwillumbah Working Circle of 12 467 ha comprising Mebbin State Forest, Goonimbar State Forest, Mooball State Forest, Burringbar State Forest, Wollumbin State Forest and part Nullum State Forest.

Prescribed yield : 9 970 m³ nett per annum.

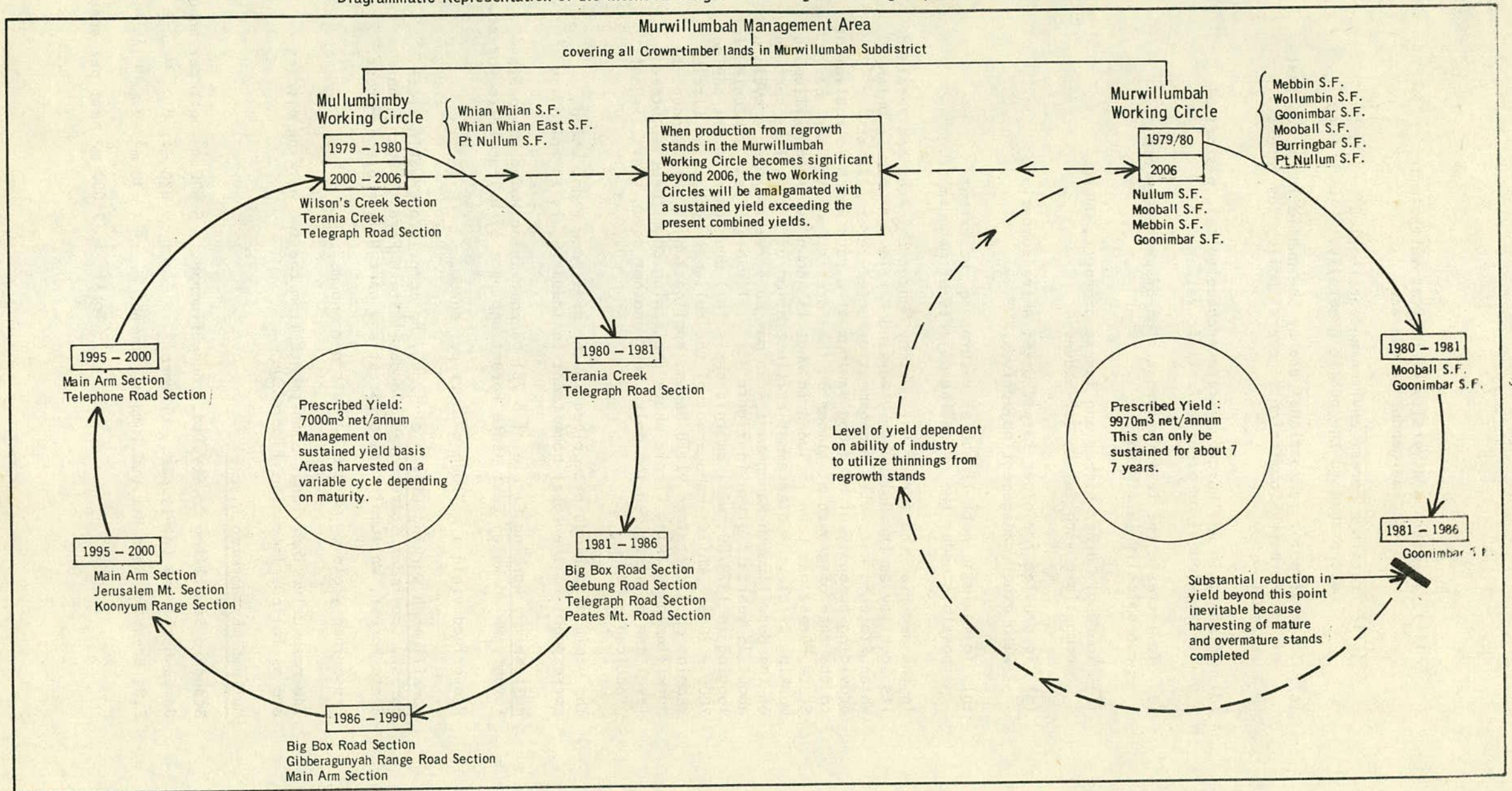
The respective individual commitments from the two working circles are as follows (see also Figure 2).

Mullumbimby Working Circle

Standard Sawmilling Co.Pty.Ltd., Murwillumbah	:	5 500 m ³	nett per annum
James Hurford & Co.Pty.Ltd., Lismore	:	1 430 m ³	" " "
E.B. Bryant & Sons Pty.Ltd., Murwillumbah	:	70 m ³	" " "
Total		:	7 000 m ³ nett per annum

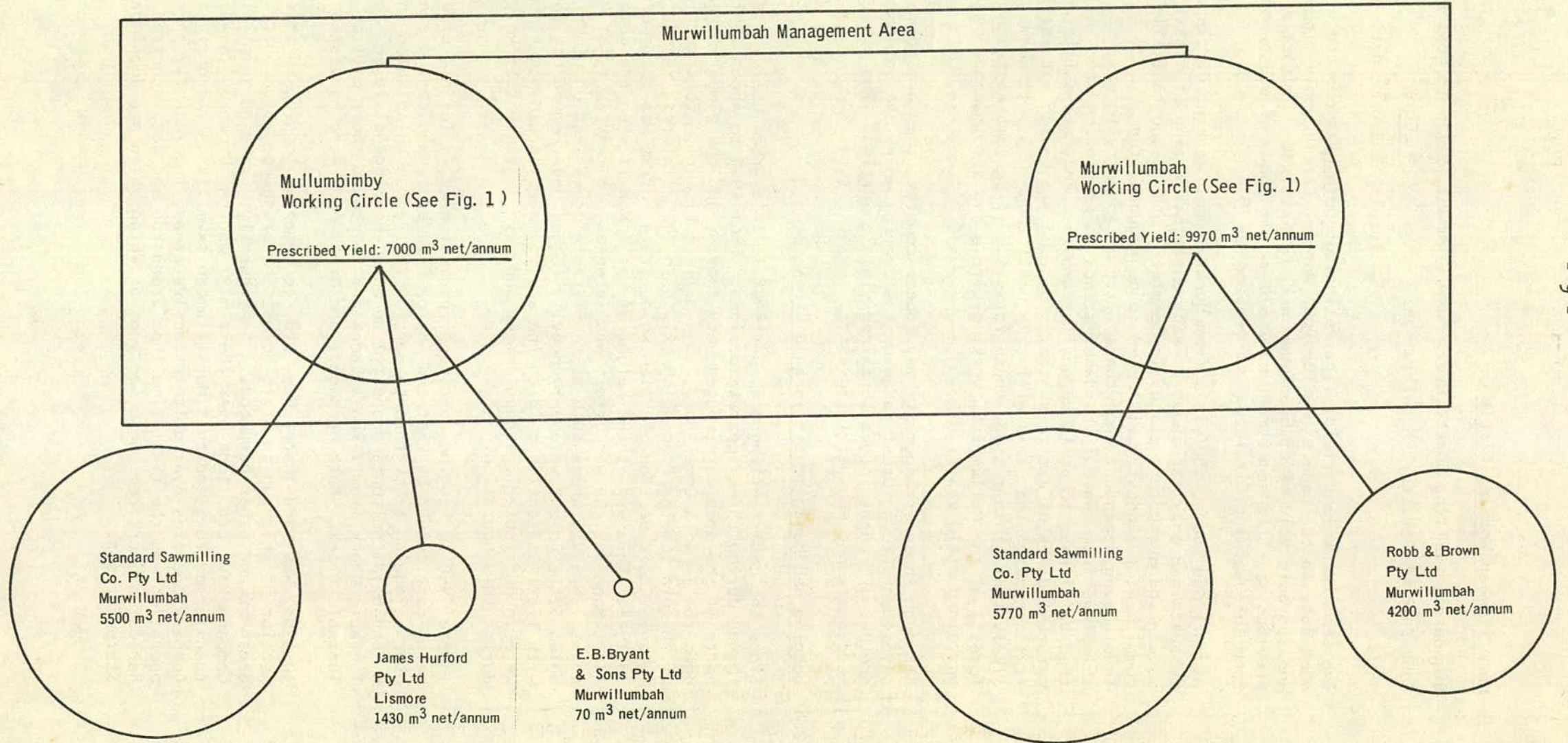
Diagrammatic Representation of the Intended Long Term Sawlog Harvesting Sequence from Murwillumbah Management Area

FIGURE 1



Diagrammatic Representation of the Sawlog Yield Allocation from Murwillumbah Management Area

FIGURE 2



- 6 -

5770
5500

11270

Murwillumbah Working Circle

Standard Sawmilling Co.Pty.Ltd., Murwillumbah:	5 770 m ³	nett per annum
Robb & Brown Pty.Ltd., Murwillumbah:	<u>4 200</u> m ³	" " "
	Total:	9 970 m ³ nett per annum

The commitment (and yield) figures include both hardwood and brushwood but, in the case of Mullumbimby Working Circle, only minor and sporadic volumes of brushwood will be involved. In fact a previous specific commitment of 2 670 m³ per annum of brushwood from this Working Circle was terminated in 1976.

As outlined above, the yield from Murwillumbah Working Circle can be sustained only for about 7 years until harvesting of existing mature and overmature stands is complete, and beyond that time the commitment to industry will need to be reduced, the level being dependent upon the ability of industry to utilise thinnings from regrowth hardwood stands. The growing stock will then be allowed to build up until regrowth stands are sufficiently mature and are of a size suitable for economic sawlog harvesting. It is expected that this will take until 2005-2015. It seems likely that at that stage these forests will be combined with the forests of the Mullumbimby Working Circle and also managed on a sustained yield basis.

N.B.

Although these arrangements may appear complex, they are normal adjustments to a forest management situation where overcut forests are being brought into a sustained yield condition. The time spans needed are not unusual in forestry.

2.4 Logging and Management - Terania Creek

Since the cedar-getting era, parts of Terania Creek basin have been logged during three separate periods. From 1943 to about 1952, parts of the area were logged very heavily and the timber taken down the Terania Creek Road, to a mill in Lismore. Construction of the old logging road which exists in the rainforest stands of Terania Creek section of Whian Whian State Forest was commenced in 1943. This was at the height of World War II when the demand for timber for the war effort was intense. In many parts of coastal N.S.W., areas such as the Terania Creek section of Whian Whian State Forest were very heavily logged under emergency controls with little attention paid to the environment. Brushwood timbers were in particularly strong demand and were logged intensively during this operation.

In the 1950's, logging continued spasmodically in Terania Creek, being carried out by West and Sharpe Pty. Ltd., who carted the logs over a logging track through portion 26, Parish Whian Whian (now H. and N. Nicholson's property) up onto the ridge dividing Tuntable Creek from Terania Creek and thence to their mill at Tuntable Creek. Both hardwoods and brushwoods were harvested.

In 1968, West and Sharpe Pty. Ltd. recommenced logging in this section of Whian Whian State Forest for brushwood, blackbutt, brushbox and other hardwoods. Subsequently, Standard Sawmilling Company Pty. Ltd. took over their mill and the Crown quota was transferred to Standard's Murwillumbah sawmill. Although this Company operates over quite extensive areas, the recently aborted operation was the first time that Standards had been required to harvest timber from these sections of Whian Whian and Goonimbar State Forests.

*ref. -
Sawmill
History*

As noted in Section 2.2, the Terania Creek basin lies within Whian Whian and Goonimbar State Forests which are managed as part of the Murwillumbah Management Area. Terania Creek, as well as forming the boundary between the two State Forests, also forms the boundary between the Mullumbimby Working Circle to the east and the Murwillumbah Working Circle to the west. Logging operations in Terania Creek basin are therefore planned for both working circles. The estimated yield from these is 6 400 m³ gross, equivalent to about 5 000 m³ nett, of hardwood sawlogs, mainly brushbox but with a small amount of blackbutt.

The best estimate of the volume split-up of this timber between the two companies is as follows:-

Standard Sawmilling Co. Pty. Ltd. 5 300 m³ gross being 900 m³ gross (yielding 702 m³ nett) from the Murwillumbah Working Circle and 4 400 m³ gross (yielding 3 432 m³ nett) from the Mullumbimby Working Circle. Overall 4 134 m³ nett.

James Hurford & Co. Pty. Ltd. 1 100 m³ gross yielding 858 m³ nett from the Mullumbimby Working Circle.

This would provide 37% of the quota of Standard Sawmilling Co. Pty. Ltd. and 60% of the quota of James Hurford & Co. Pty. Ltd. for one year. These two sawmills have supplementary sources of timber, viz. Standard Sawmilling Co. Pty. Ltd. obtains limited supplies from private property and also imports rainforest species from Western Samoa. James Hurford & Co. Pty. Ltd. have a quota of 720 m³ nett from the Casino Management Area, 800 m³ nett parcel sale from the Kyogle Management Area and also obtain limited supplies from private property sales.

2.5 The current logging proposals for the Terania Creek section of Whian Whian State Forest and the subsequent problems.

The current problems, which have arisen out of the Forestry Commission's proposed operations in the Terania Creek basin section of Whian Whian and Goonimbar State Forests date to July 1974, when one of the proposed new settlers in the Terania Creek valley, Mr. Hugh Nicholson, then of Queanbeyan, wrote to the Forestry Commission's District Office in Casino to enquire about plans the Commission might have for logging in the State Forest at the head of Terania Creek. In reply, the Commission stated that the investigation and planning for the management of this particular area were not completed. Further representations by other residents followed and letters were written to the then Premier and the Sub-district Office of the Forestry Commission at Murwillumbah. These residents opposed

- (a) logging of rainforest in the Terania Creek basin
- (b) clearfelling of hardwood
- (c) the use of the Terania Creek road for the haulage of timber to the mills.

In March 1975, two of the new settlers in the valley, Messrs. Murphy and Virgona, had discussions with the Forester at Murwillumbah and the plans which the Commission had at that stage were explained fully to them. The operations proposed by the Commission for the Terania Creek basin, at that time, were for further selective logging in some of the rainforest stands and heavy logging of certain of the hardwood stands to be followed by the planting of eucalypt seedlings in the logged areas in accordance with standard practices at that time for regeneration. The timber was to be trucked down the Terania Creek Road to the mill. (This road is also known as Mill Street).

*date of issue?
motives?
see p43*

N.P.A. involvement?

1976 Nature Reserve Proposal?

Resulting from these representations close contact was maintained between the local officers of the Forestry Commission and the residents in the valley. A public meeting was held at The Channon in May 1975, where an officer of the Forestry Commission outlined the proposed operations in this part of Whian Whian and Goonimbar State Forests. This was followed by considerable discussion.

Following this meeting The Channon Residents' Group prepared a submission for the then Minister for Lands and Forests, expressing their objections. The three main recommendations in this submission were:

- that a Forest Preserve be established to protect the rainforest of the basin
- that the hardwood forest areas be treated by selective logging, not clearfelling *- & roading not interfere with N.P.A.*
- that the Terania Creek Road (or Mill Street) be not used for log haulage.

The Commission then indicated that it would review the method to be used in the logging of the brush box stands and in 1976, The Channon Residents' group was informed that, as a general principle, selective logging would be carried out in the brush box stands.

Further representations followed over the next two years, including one to the Minister for Planning and Environment, who said that the State Pollution Control Commission was satisfied that there were insufficient grounds to interfere in the proposed operations and that the Forestry Commission's activities were based on sound silvicultural principles. The area was inspected by senior officers of the State Pollution Control Commission.

In the meantime, as a result of the representations received, the Forestry Commission had reviewed its proposals, and in December 1977, the Minister for Conservation advised that it was not now intended that the rainforest should be logged on this occasion; that the brush box stands would be logged selectively; and that the log haulage would avoid Terania Creek Road. This in effect accommodated all the requests previously made by The Channon Residents' Group, which had by now been renamed the Terania Native Forest Action Group. This Group expressed pleasure at the decision to defer indefinitely the logging of the rainforest and to avoid log haulage over Terania Creek, but now varied its original request by asking that the brush box stands should not be logged and that a Nature Reserve should be gazetted over the entire area. In other words, they requested that no logging at all take place.

Also NPA change of aims can only be viewed in

some way as changing F.C. aims & policies
Detailed examination by the Forestry Commission subsequently showed that the alternative haulage route planned instead of the Terania Creek Road, was not practicable (i.e. McKay's Road). McKay's Road leads through the State Forest from the Terania Creek basin to the main roading system further east on Whian Whian State Forest, but on closer inspection it proved unsuitable under modern day conditions for up-hill log haulage, on both environmental and safety grounds. This was unforeseen, but the Commission had initially only made preliminary investigations of McKay's Road, and subsequently, when further engineering details became available, had to revise its plans. Unfortunately this has been seen by many as being inconsistent and misleading, but this was not the case. In any case, the Commission has no prerogative to determine use of Shire Roads, and the Company correctly drew this to the Commission's attention.

Local residents were informed of this change, and discussions were held with the local (Lismore City) Council about any measures needed to make Terania Creek Road suitable for log haulage. The Council suggested several measures (e.g. roadside brushing in some sections; avoidance of truck use at same times as school bus), and all these were accepted by the Forestry Commission and the Company.

Because of the objections that had been made, and the publicity that these had received, the question of whether logging in the basin should or should not proceed was referred by the Minister to the Government. In May 1979, Terania Creek basin was visited by the Minister for Conservation and Water Resources, at the invitation of the Lismore City Council and in company with representatives of the Terania Native Forest Action Group, timber interests and the Forestry Commission. Following this visit the Government announced, following a Cabinet Meeting at Murwillumbah, that logging, as now proposed by the Forestry Commission, would go ahead. Rain however prevented any operations commencing in Terania Creek basin until August.

→ Omission of events of preceding weeks!
On 16th August, 1979 it was planned to start clearing the old overgrown logging road into the forest and a tractor was moved into the area. Road clearing operations commenced on the next day and the old forest road was cleared of vegetation and fallen timber and road repairs were undertaken. The first trees were felled on 22nd August and others were felled on the next day. There was extensive physical opposition to these logging operations and a large number of people came into the valley to protest. Many of these camped on the edge of the forest and demonstrations took place in the forest as these people tried to prevent the roading and logging operations taking place. A contingent of N.S.W. Police was on hand to maintain law and order. A letter to the local press written by the Forester in charge of operations, Mr. C. Lemaire, is included, to indicate the magnitude of the problem. (See Appendix 2).

Among other actions, steel spikes and nails were driven into standing trees to prevent their being logged - these spikes are largely concealed within the wood and under the bark and make trees too dangerous to saw or mill as they could cause fatal accidents to workers. Spikes were also put into several of the fallen trees and these were also damaged by a series of transverse chain saw cuts which resulted in their being rendered unusable as sawlogs. On 29th August the first logs were hauled to the sawmill, again with some physical opposition to the movement of the trucks, and on 30th August operations in the forest stopped. The sawmillers decided to stop logging because of the generally high risks to their equipment and operators and sought discussions with the Premier. The demonstrators then decamped.

Meanwhile, there were further representations to members of the Government and to the State Pollution Control Commission and these resulted in the matter being again raised at Cabinet level. Cabinet at its meeting on 4th September, 1979, discussed the issue and a sub-committee of Cabinet was formed to investigate the matter and report back. Unfortunately, on the night of 6th September, one of the mills which was to receive timber from Terania Creek - James Hurford & Co. Pty. Ltd. and its associated hardware business in Lismore - was burned down. Police investigation of this fire is continuing to determine the cause.

elaborate on preceding events
The Cabinet sub-committee inspected the area on 16th and 17th September and this was followed by inspections by some backbench members of the Government a week later. In October there were visits by members of both Opposition parties to inspect the area. Cabinet subsequently resolved that a public review of the environmental factors associated with the proposed logging of Terania Creek should be undertaken to determine whether logging should or should not proceed, for which purpose the Hon. Simon Isaacs, Q.C. was appointed.

deleted

not hardwood
by Flaydell's descr.

3. Areas Within the Terania Creek Basin in Whian Whian and
Goonimbar State Forests, Proposed to be Logged.

The timber harvesting operation proposed for the Terania Creek basin involves the selective logging of five small hardwood stands. *by whoal defn?*

The timber to be logged is principally from brush box (*Tristania conferta*) type with some blackbutt (*Eucalyptus pilularis*) on the higher slopes. Two stands occur on the western side of Terania Creek and the other three stands are on the eastern side. The total area to be logged is about 70 ha and the total log volume expected to be obtained is about 6 400 m³ gross. ("Gross" means total log volume inclusive of defects). It is estimated that about 900 m³ gross will come from the western stands and about 5 500 m³ gross from the eastern stands. It is estimated that this will yield about 4 992 m³ nett of sawlogs allowing for about 22% defect *relates P42* in the timber. The logging operation will not extend into the rainforest areas in the floor of the basin, but will be concentrated entirely in the hardwood stands. (Map 3 shows the areas to be logged). It is noted that although there are small areas of rainforest types included within the boundary of the general area to be logged, these in fact will not be logged. Access will be via the old logging roads within the rainforest area and thence by tracks within the hardwood areas for the most part.

The logging operation planned for Terania Creek involved reopening the old logging road which had become overgrown and obstructed since the previous timber harvesting operations finished in the basin in 1972. From the end of this road it is planned to construct new temporary logging tracks in part through the rainforest area, to provide access to the specific hardwood stands where logging is intended. Some of these logging tracks have now been constructed.

Harvesting plans have been prepared by the Forestry Commission for the operation. These detail the boundaries of the areas to be logged, the location of the logging tracks, and the landings (or dump sites). Map 4 outlines the location of these roads and dump sites.

Within harvesting areas, trees to be removed during logging will be marked by Forestry Commission staff, aiming to remove the merchantable mature or overmature stems while retaining a visually acceptable cover of overstorey trees. The marked trees will be felled by logging contractors, converted to logs, snigged to the landings and there loaded onto trucks for haulage to the mill. While some damage to the understorey is inevitable in such an operation during felling and snigging, every effort will be made to minimise this. The operation will be governed by existing standard logging prescriptions, including the Standard Erosion Mitigation Conditions which have been developed jointly by the Soil Conservation Service and the Forestry Commission of N.S.W. (see Appendix 3).

Of the two special sites of special significance recorded in the basin, the traces of the old pathway, Gracie's Track are remote from any currently proposed logging, while harvesting operations will be excluded from an area of 3.4 ha below the rock overhang (with the exception of removal of sabotaged trees).

At the close of the harvesting operations, the logging tracks and snig tracks will be bedded down, i.e. drained and allowed to revegetate.

While not specifically designed to promote regeneration (a clear-cutting operation would be more effective in this regard), the partial opening of the forest canopy and the localised baring and disturbance of areas of soil in the course of logging create conditions that favour the establishment and growth of the native hardwood species of the area. Where considered necessary, flooded gum will be planted to close gaps rapidly.

See classification

7
6

In the logging operation, all care will be taken to minimise damage to the understorey vegetation and adjacent areas. In particular, in the areas where the understorey includes some rainforest species, all efforts will be made to minimise the damage by directional falling of the trees. There are very few big rainforest trees involved but if it is anticipated that any of these are likely to be unavoidably damaged, they will be salvaged and taken to the mill. In the logging to date, only one rainforest tree was logged as a salvage operation. Similarly during the construction of the roading so far constructed, no rainforest species have been salvaged and it is anticipated that in the rest of the roading to be constructed there will be no rainforest logs to salvage. Roading plans have been designed to avoid large trees and minimise damage, in accordance with usual practice.

of actual operation

for which areas & how long?

As mentioned above, the upper section of Terania Creek basin is included in the Nightcap Track Flora Reserve and as such is reserved from logging. This extends over an area of about 70 ha. The Forestry Commission has also established that an area of 3.4 ha below the rock overhang should be reserved from logging.

The timber to be logged in Terania Creek is principally brush box and a smaller volume of blackbutt. It is estimated that about 6 400 m³ gross volume of timber will be obtained and that this will yield approximately 5 000 m³ nett log volume. This in turn will yield approximately 2 400 m³ sawn timber (estimating a 48% recovery rate) which is sufficient timber for about 240 houses.

The two species being logged in the Terania Creek basin are used for general building construction. Brush box is used for general house framing, flooring, feature walls and can be used for external cladding. Its special qualities of wear resistance and beauty have been combined to good effect in the floors of Sydney Opera House. Blackbutt is a utility timber used for hardwood framing and flooring and other general building construction.

*Staked
blow?
frame*

ref. to discussion with McFarlane during timber origins investigation.

Hardwood framing timber, sawn from logs produced in native forest, plays a vital role in meeting the demands of the housing industry in N.S.W. Although the heavy demand for housing at present is pushing prices to a high level, potential home owners are extremely sensitive to building cost escalations. Acceptable alternatives to timber in many parts of a typical house are very much limited by cost. For three vital areas of housing construction in the Sydney Metropolitan Area during 1978/79, the percentage of native hardwood to total sawn timber usage was as follows:-

Floor framing :	65% of total
Roof framing :	55% of total
Wall framing :	17% of total

Timber not to be marketed in Sydney

4. The Nature of the Proposed Logging Operation

Logging proposed in the Terania Creek basin is regarded by the Forestry Commission as a routine management operation carried out as part of the continuing operation of a Sustained Yield Working Circle, among other things, to provide a stable supply of timber for local processing and for the use in the community generally.

approved designed to circumvent EIS procedure

The proposed timber harvesting operation in the Terania Creek basin section of Whian Whian and Goonimbar State Forests is made up of several components, viz. roading, logging, and hauling, and these will be discussed separately.

"patchwork" approach

4.1 Roading

Before any logging operation a harvesting plan is drawn up to define and cost the operation to include roads, tracks etc. which require construction to give access. The plan also provides for the economic harvesting of the timber within it with due regard to environmental constraints. The trees are felled in the bush and then snigged by tractor to a central log dump site (landing) where they are loaded onto trucks for haulage from the forest to the sawmill. Map 3 shows the roads which have been planned for this area. In this locality there was an existing logging road, from a previous harvesting operation which it has been possible to use again. However as it had been constructed originally in the 1940's and had last been used in 1970, it was overgrown and needed some maintenance and reconstruction work to bring it up to today's standards.

Road No 0
not shown

The roading proposals were for 2.8 km of the old logging road to be cleared and reopened for use and a further 4.2 km of road extensions or "snig shorteners" to be constructed to give access into the hardwood stands from which the sawlogs are to be taken.

Eight creek crossings were planned for construction, five on the old road and three on the road extensions. The design of these crossings varies with the site and it was proposed that at three sites pipe crossings or log bridges would be built; splash crossings would be used at four sites utilising the natural stone in the bed of the stream and one temporary bridge would be constructed.

Because of the demonstrations which took place when the operation commenced, the crossings already constructed were not built to the usual standards which the Forestry Commission uses; in normal circumstances, where safety can be assured, there would have been some blasting of rocks and improvement of approaches to some of the crossings, but at that time this was not possible. During the operations demonstrators blocked the creek at the crossings and damaged the causeway in an attempt to flood the road. It is planned that these crossings will be improved.

By purpose
of the difficult
weather
deleted

At this stage, 2.2 km of the old logging road has been repaired, six crossings have been constructed and the wooden bridge in the adjoining private property has been strengthened.

Logging Road No. 4 (0.4 km) and about 0.5 km of Logging Road No. 1 had been constructed when operations ceased.

All roads will be temporary roads and will be drained and blocked after logging is completed and will be allowed to revegetate. After initial clearing, little soil mobilisation is expected as these soils drain freely. This will facilitate the quick revegetation of the road surface.

The roads are to be constructed in part through the rainforest, but have been designed to be of minimal width to avoid unnecessary clearing. The route has been located to avoid large or valuable trees and to minimise damage to standing vegetation. The log dumps and snigging pattern have been drawn up to minimise snigging through the rainforest and though this will extend the length of snig involved, this design minimises snigging through rainforest types. Where considered necessary the gaps in the forest created by the dump sites, snig tracks or roads will be planted with eucalypts indigenous to Terania Creek to encourage revegetation. The landings are centrally located in the hardwood stands to allow easy access for the logs to be loaded onto trucks for haulage out of the forest.

not reflected
in previous
discussion
with remains
on July 9
location?

The Forestry Commission has arranged with Standard Sawmilling Co. Pty. Ltd. to carry out the construction of the roads in this area under the supervision of the Forester, Murwillumbah. This is a standard arrangement that the Forestry Commission makes when a road is required to give access for the economic extraction of the timber from the area served by the road. Construction costs for roads are recouped by allowing the sawmiller a rebate of royalty on the timber obtained from the continuing harvesting operation from the area served by the road which he has constructed under supervision.

Economic Summary of Logging and Roding Proposals

(A) Compartment 46N Whian Whian S.F.

Estimated quota sawlog volume	:	2 800 m ³ gross	
Royalty with roading	:	\$23,450	
Royalty without roading	:	Nil	
Marketing costs (25%)	:	\$ 5,862	
Gross gain from roading after deduction of marketing costs	:		\$17,588

(B) Compartments 46S and 49 Whian Whian S.F.

Estimated quota sawlog volume	:	2 700 m ³ gross	
Royalty with roading	:	\$22,350	
Royalty without roading	:	Nil	
Marketing costs (25%)	:	\$ 5,587	
Gross gain from roading after deduction of marketing costs	:		\$16,763

(C) Compartment 75 Goonimbar S.F.

Estimated quota sawlog volume	:	450 m ³ gross	
Royalty with roading	:	\$ 3,750	
Royalty without roading	:	Nil	
Marketing costs (25%)	:	\$ 937	
Gross gain from roading after deduction of marketing costs	:		\$ 2,813

(D) Compartment 76 Goonimbar S.F.

Estimated quota sawlog volume	:	450 m ³ gross	
Royalty with roading	:	\$ 3,897	
Royalty without roading	:	Nil	
Marketing costs (25%)	:	\$ 974	
Gross gain from roading after deduction of marketing costs	:		\$ 2,923

Total gross gain after allowing for marketing costs	:		<u>\$40,087</u>
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Total gross gain after allowing for marketing costs : \$40,087

Roading Costs

(1) Forestry Commission : \$2,320
 + 75% Overheads : \$1,740
 \$4,060

(2) Sawmiller : \$7,535
 + 25% Overheads : \$1,884
 \$9,419

(3) Estimate of accelerated wear and tear on Terania Creek Shire Road : \$1,000

Total roading costs including overheads: \$14,479

Nett gain from logging and roading : \$25,608

*Souwell?
underestimated
road signs & mudd
at least 1000
this much*

4.2 The Logging Operation

It was planned that two mills would be operating in this area to extract the timber, viz. Standard Sawmilling Co. Pty. Ltd. of Murwillumbah and James Hurford & Co. Pty. Ltd. of Lismore. It is understood that after the fire in September which destroyed the mill of James Hurford & Co. Pty. Ltd. in Lismore, this Company is planning to rebuild its mill and it is anticipated that it will be in production again by June 1980. This being the case, in the planning for the logging in this area the Forestry Commission will continue to assume that both mills will be operating. As logging cannot recommence until after the rainy season has finished and as the roads are temporary this assumption is reasonable. The Supervising Forester or Forest Foreman will mark all the trees which are to be felled and these are the only trees which may be felled. They will also be marked as to direction they are to be felled to avoid damage to other vegetation and to retain as far as possible all the other trees. The fallers employed by the two sawmills will use chain saws and once the trees are on the ground they will be crosscut into sawlogs and then moved by tractor to landings for loading onto trucks.

when originally planned for only Standard involved, Ref. to F.C. briefing statements ACS facts

Standard Sawmilling Company use two experienced fallers, with a tractor driver and his offsider to operate a D8 tractor. James Hurford & Co. Pty. Ltd. use one experienced faller and one tractor operator who uses an HD11 tractor. The Forestry Commission will have one marketing foreman and one forester supervising the operation, as required.

Allowing for breakdowns and wet weather it was proposed that if one mill had undertaken the logging of the Terania Creek basin the operation would have commenced in August and have been completed in five months or by the end of December. With both mills operating this would have been reduced to three months.

It is planned that the order of logging will be to commence at the upper (northern) end of the basin and then proceed towards the south. The slopes average about 15° but trees would be fallen on slopes which range up to 25° - 30°. The major part of the area proposed to be logged is less steep.

Threat of prolonged opposition to the motive behind Hurford's allocation of Terania timber?

Standard Erosion Mitigation Procedures will apply to this logging operation. (See Appendix 3).

In the Terania Creek operations special conditions have been laid down which the logging contractors must comply with. These are:

1. No alteration to snigging pattern, landing (dump) location and area for logging will be permitted unless there has been full investigation by the Forester showing good cause.
2. At no time is a tractor to enter the Reserved Area (mauve colouring) or the Nightcap Track Flora Reserve.
3. Road maintenance and construction is to be carried out in accordance with the letter of acceptance and associated documents covering this roading network.
4. Cross banks will be required on all roads and snig tracks. Banks on roads are to be trafficable to allow rehabilitation planting to take place.
5. Directional felling will be employed in this area. Felling of trees other than in the indicated direction will not be permitted without prior consultation with the Forester or his deputy. In any case all care is to be taken to prevent damage to retained trees.

As well as these special conditions, the standard conditions relating to all logging operations in the Casino Forestry District also apply:

1. No persons may engage in any timber operations on this area unless they hold a current Operator's Licence for the area.
2. Any breach of the conditions of this plan will be viewed very seriously and may lead to the suspension of the relevant Operator's Licence.
3. Changes in implementation of the plan may be made only with the prior consent of the Supervising Forester. The Forester may direct changes in implementation at his own discretion at any time.
4. All operations shall be carried out in such a manner as to minimise soil disturbance, water pollution and vegetative damage on the area.
5. Unless otherwise directed by the Supervising Forester or Foreman, all trees marked for removal shall be felled and any tree not so marked shall be retained.
6. Care shall be taken in falling and snigging that trees currently or potentially of commercial value are not damaged.
7. The area shall be worked in the order directed by the Supervising Forester or Foreman. Systematic working through the bush is required so that a minimum of snig tracks, log dumps and haulage tracks are open at any one time.
8. No haulage tracks or log dumps, other than allowed for in this Plan, may be constructed without the permission of the Supervising Forester.
9. Snigging along roads or fire trails will not be permitted, except with the express permission of the Supervising Forester or Foreman.

10. Logging debris shall not be left on roads or fire trails, or in table drains, mitre drains, or on, or overhanging batters.
11. All operations shall be carried out in accordance with the Standard Erosion Mitigation Conditions for Logging in New South Wales. Particular conditions specific to this area are listed in the Special Conditions of this plan. The soil erosion class for this area is average.
12. Where possible, surface vegetation shall not be removed from snig tracks.
13. Any tree head falling accidentally into a defined watercourse must be removed immediately, unless this action is likely to cause damage, in which case the advice of the Supervising Forester or Foreman should be sought.
14. If there is to be a temporary cessation of operations for any significant period of time, snig and haulage tracks shall be drained in the manner prescribed, before such break or when directed by the Supervising Forester or Foreman.
15. Safe working practices shall be followed. This includes the immediate grounding of hung-up trees and in plantation areas, the flagging of such trees, where grounding is inadvertently delayed, in the manner prescribed.
16. Littering of the area is not permitted.
17. Unless there are mitigating circumstances, no further logging area will be allocated to the operators working under this plan until the conditions of it have been fully carried out in a manner acceptable to the Supervising Forester or Foreman.

Erosion

In order to minimise the possibility of soil erosion affecting water-courses as a result of logging operations, the Forestry Commission has developed a policy of minimising disturbance to vegetation along both sides of streams within a logging area. These areas of vegetation, known as filter strips, extend for at least 20 metres on each side of the stream. They commence at the point on the stream where the catchment exceeds 100 ha (or less at the Forester's discretion) and extend downstream through the logging area. The filter strips to be retained in this proposed logging operation are detailed on Map 4.

After the logging operation is completed it is planned to drain and block logging roads to allow the vegetation to regenerate. No special treatment is planned for the roads through the rainforest and given the regeneration which took place on this road after the previous logging operations in the Terania Creek basin it is confidently expected that this road will again regenerate to rainforest. In the logging areas, in the hardwood stands, it is intended to plant seedlings of flooded gum (*Eucalyptus grandis*) wherever necessary in the gaps created by logging and snigging and in the log dumps to assist in the regeneration of this area. Flooded gum is a native species in the basin. Experience from areas which have been logged in previous operations in Whian Whian S.F. indicates that regeneration will readily take place. In previous logging operations in Terania Creek basin there were no restrictions on sawmillers and maximum extraction of timber took place. This operation is planned differently to be a selective logging operation under special conditions, and consequently the impact of the operation and the regeneration of the forest will be much less on this occasion than previously.

ref. to road
infrastructure
would -
shallow
saturated
removal of
organic
A hazard
severely
limits extent
of natural
collocation of
roadway on
clay subsoil

The Forestry Commission records note that in the 1950's in the lower part of Terania Creek, close to the southern forest boundary, there was an area of extensive weed infestation along the creek. To the best of the Commission's knowledge the combination of heavy fire in 1948, cyclone damage, road widening, very heavy logging and the location of a logging camp at the site caused this concentration of weed growth, which is still obvious. At the completion of logging the Commission plans to clear weed growth from this area by tractor and to plant with flooded gum seedlings to encourage regeneration of forest under their shelter.

4.3 Haulage

As noted above there are two principal sawmilling companies licensed under the Forestry Act to operate in this location. The timber extracted by each company would be taken by truck to their respective mills. Standard Sawmilling Co. Pty. Ltd. generally would operate three trucks each operated by one driver and it is estimated that each would transport two loads per day. It is estimated that James Hurford & Co. Pty. Ltd. would operate one truck and make three trips per day. These details are for each company to determine but are dependent upon such things as operations at the mill, the rate of falling of the timber and the weather - in periods of wet weather logging operations take longer.

Outside State Forest boundaries the Forestry Commission has no jurisdiction but it is anticipated that the routes which the trucks will follow to transport timber from the forest to the sawmills will be:

Standard Sawmilling Co. Pty. Ltd. - down Terania Creek Road to The Channon, thence to Hunters Hill Road and via Trunk Road No. 65 to the Pacific Highway at Bangalow and then to Murwillumbah.

James Hurford & Co. Pty. Ltd. - down Terania Creek Road to The Channon and then onto Main Road 306 to Lismore.

In general Standard Sawmilling Co. Pty. Ltd. only work on weekdays and so the haulage will usually be on weekdays. James Hurford & Co. Pty. Ltd. will work seven days a week if necessary.

Haulage operations are subject to the weather and other conditions which may arise. The sawmilling companies are aware of the concern that residents on the Terania Creek Road have about trucks operating when the school bus is travelling along the road and they have given undertakings that the log trucks will not operate when the school bus is using the road.

4.4 Economics

Royalties are paid to the Forestry Commission for timber removed from State Forests in N.S.W. Royalty value is assessed on an individual log basis. The system of assessment has been designed to equate the value of logs throughout the State. The level of royalty is varied so that logs obtained from an unfavourable economic location relative to the market are as attractive to the sawmiller as those logs from more favourable locations. Thus royalty varies inversely with the distance from market, at the same time taking into account species, log defect, log size, log extraction and haulage conditions and many other factors. The system therefore has the effect of encouraging the utilisation of poorer quality logs and less desirable species. It has effectively eliminated the older style 'creaming' of the forest.

which a many instances was more selective than present systematic logging. i.e. indiscriminate logging, not same as "wholesale" logging ref. p 20

*Logging does not include office overheads
(planning, redrafting of maps, plans, etc, &
considerable time expended in publicly defending
this & other operations)*

Appendix 4 gives in greater detail the various factors which are used in assessing royalty and the method of calculating the value of an individual log.

For the area to be logged in Terania Creek, the economics of the operation have been evaluated as follows:-

Estimated gross volume of timber to be removed :	6 400 m ³	
Estimated defect :	1 410 m ³	
Estimated nett volume is therefore :	4 990 m ³	
Estimated royalty value :		\$53,447 (1)
Marketing costs :	\$13,360	
Roading costs (Sawmiller) :	\$ 9,419	
(F.C.) :	\$ 4,060	
(Shire) :	\$ 1,000	
Total Marketing and Roading costs :		\$27,839 (2)
Nett gain to Crown ((1) minus (2)) :		<u>\$25,608</u> //

The royalty as progressively collected is paid into Consolidated Revenue Fund as required by statute. In accordance with Section 13(2) of the Forestry Act, 1916, 50% of this amount is allocated to the Commission for normal works expenditure.

The value of the timber after it is sawn must also be considered. It is reasonable to expect that 1 m³ of sawlog will produce 0.48 m³ of sawn timber. Hence the logs from this area will produce 2 395 m³ of sawn timber. Assuming a price of \$150/m³ for green rough-sawn timber, the value of the timber produced from the logs will be \$360,000. This value can be divided into the following components:-

Cost of manufacture and profit	\$190,000
Cost of cartage to market	\$ 30,000
Cost of logs in mill yard	<u>\$140,000</u>
Total value	<u>\$360,000</u>

Processing of the green timber adds additional value. This processing may include kiln drying, dressing and manufacture into laminated beams. For select products such as laminated beams the value would be as much as \$315/m³.

Processing could increase the value of the 2 395 m³ of green rough-sawn timber to approximately \$568,000 wholesale. Value additions of this magnitude are vitally important to maintaining diversity in ancillary local industries, most of which could not otherwise exist in rural cities and towns.

The Terania Creek logging operation has a significant value to the community insofar as it contributes its share to maintaining the local industry. This part of Whian Whian S.F. is important because of the limited overall extent of the accessible timber resource within the Management Area and the fairly large volumes of wood that have already been preserved from logging and set aside for scientific purposes.

*unsubstantiated
by evidence
presented*

*relate to post logging a 1967
Report to C. Assay.*

102 in Aug. 1979
% of total workforce?

The Standard Sawmilling Co. Pty. Ltd. mill in Murwillumbah is significant in the economic life of the town. It employs 93 people and it is estimated that the operation of the mill injects about \$1 million per annum directly into the local economy.

James Hurford & Co. Pty. Ltd. of Lismore operated a sawmill and an associated hardware business which employed 50 people before fire destroyed the premises. In a town the size of Lismore, the impact of a mill on the local economy, whilst not as significant as in Murwillumbah, is still important and the Company is important in the town's business community. Direct employment multipliers are estimated at about 2.2x, while on experience elsewhere in Australia, the inclusion of tertiary industries (clubs, insurance, banking, schooling, etc.) raises the multiplier to more than 3x.

Source?
misleading
use of
multiplier

The sawlog yield from the Mullumbimby Working Circle has been reduced in the past to permit implementation of management on a sustained yield basis. The consequent reduction in the quotas of the mills has involved review and rationalisation of their operations. The hardwood sawlog volume available from that part of Terania Creek basin within Whian Whian S.F. was part of the resource considered in determining the sustained yield.

It is noted again that the sawlog resource available in Murwillumbah Working Circle is limited and that sawlog yields from this area can only be sustained for about another seven years. Denial of any further resources to the existing industries therefore has a major effect.

Future
of mill at
this time

4.5 Long Term Management Aims

Timber harvesting in the Mullumbimby Working Circle has been reduced by the Forestry Commission in the past to enable logging operations to be established confidently on a programme of sustained yields. In contrast the operations of the associated Murwillumbah Working Circle have a limited life and the sawlog timber available for logging from this Circle will be exhausted in about seven years, meaning that no relief for further yield reductions can be expected from that source for some years.

Sustained yield from logging in the Mullumbimby Working Circle, associated as it has been with quota reduction in recent years, has required the sawmilling Companies to review and rationalise their operations. The timber in Terania Creek basin section of Whian Whian S.F. is part of the resource which was assessed as available to determine this sustained yield. All the reductions in yield that can be made have been made, the latest in an attempt to satisfy environmental representations. Although it may appear small in absolute terms, the contribution from small areas such as Terania Creek is essential in relative terms to maintaining sustained harvests of wood within the confines of a whole working circle.

not
substantiated
Repetition
comat p 28

It is anticipated that after this logging operation has been carried out it will be 20-25 years before the harvesting cycle will return to the basin for the next economic harvest. Within this 20-25 year period however, there may be one other possible logging operation which would involve thinning the smaller brush box and blackbutt trees not logged in the current logging operation.

Operations can be expected to move around the working circle approximately as shown in Figure 1. More specifically for Terania Creek the following is anticipated:-

(a) Rainforest

The Forestry Commission has no intention of allowing a broad-scale logging operation within the rainforest at any time in the future. The only harvesting that might be permitted would be single tree selection to produce highly priced, special purpose timber. The Commission would need to be satisfied that there would be no permanent damage to rainforest structure or canopy and that only environmentally acceptable logging techniques were to be used.

(b) Hardwood

The eastern side of Terania Creek (Mullumbimby Working Circle) will be managed to supply hardwood logs in perpetuity (see Figure 1). Following operations currently proposed, the next logging some 20-25 years hence would remove trees presently retained to maintain forest cover and trees which by then will have attained merchantability. Faulty non-merchantable trees would be retained as wildlife habitat. If stands of young trees resulting from the present logging are marketable, they will be thinned to improve growth of the remainder.

The western side of Terania Creek (Murwillumbah Working Circle) will be subject to major review in about seven years time. It is not possible now to predict exactly the outcome of that review but it can be predicted that operations similar to those on the eastern side will take place in conjunction some 20-25 years hence (see Figure 1).

5. The Environment of the Terania Creek basin in Whian Whian and Goonimbar State Forests.

5.1 Topography

Terania Creek rises in the State Forests on the southern side of the Nightcap Range which reaches above 700 metres in this locality. In its upper reaches, the catchment of Terania Creek is a shallow alluvial basin surrounded by steep slopes leading to a discontinuous line of cliffs. On the western side of this basin, there is a prominent rocky plug rising from the valley floor. Below the basin the creek flows downstream between opposing spurs through a narrow cliffed valley to the boundary of the State Forest. Downstream of the forest, Terania Creek continues through this valley which widens out as it extends southwards towards The Channon.

Because of this topography, this part of Whian Whian and Goonimbar State Forests has been very sheltered. The cliffline has protected the forest in the basin from extremes of climate and the effects of fires and contributes to the humid microclimate of the basin forests. As a result the basin is not readily visible from outside, the only vantage points being within State Forests, along the Nightcap Range.

Map 5 shows the topography of Terania Creek basin and environs.

5.2 Geology and Soils

The geological structure of this area consists of Palaeozoic and Mesozoic sediments which have been overlain by Tertiary basaltic and rhyolitic lava flows. This area was covered by lava flows from the Mt. Warning shield volcano. The first phase of activity was the basaltic lava (Lismore basalt) which flowed from Mt. Warning in all directions. To the south, this reached Coraki on the lower Richmond. It weathers to form fertile red loams, known technically as Kraznosems.

*Winds still severe
nearby
gymnos. for
delaying
entry
Aug.
Fires
occur as
spot fires
from
burning logs
& cobble rolling &
falling down slope.*

The second phase was the rhyolitic lavas (Nimbin rhyolite) which were of a more viscous blocky nature and piled up near side vents and fissures of Mt. Warning. This rock is much harder and more resistant to erosion than the basalt and remains as cliffs which erode by breaking free from the vertical face to form steep rocky slopes at the base. The rhyolite has a very high proportion of silica and eventually weathers to form much less fertile 'yellow earth' soils than does the Lismore basalt.

The last phase of the laval outpourings was very restricted and this Blue Knob basalt formed a shallow capping along the Nightcap Range. It is soft, easily erodable and is now found only in scattered localities such as along the Gibbergunyah Range, which forms the eastern boundary of Terania Creek catchment. Its contribution to the soils in the basin can only be minimal.

Essentially therefore, the soils of Terania Creek basin are formed from the Lismore basalt and the Nimbin rhyolite. These parent materials have intermixed in the basin and the nature of the soils varies according to the proportion of each parent material present. In turn soil fertility varies within the basin and is reflected by the forest types supported by various soils. In the basin there are variations in the mineral composition and rate of weathering of the lava phases. On the steep slopes the soils are derived principally from the rhyolite, and are therefore shallow and of generally moderate to low nutrient status. In the basin proper the Krasnozem (red loam) soils are more common and as these derive from the basalt they are fertile soils in general, although mixed to varying degrees with poorer soils derived from rhyolite rock types.

Microclimate
- aspect
- altitude

In the absence of climatic variation, variations in soil characteristics determine vegetation types. The bangalow palm forest is found in the valley floor on alluvial soils derived from the Lismore basalt which would be very fertile if they were better drained. Luxuriant subtropical rainforest associations are found in those areas with a predominance of deep well-drained Krasnozem soils. On the poorer rhyolitic-derived soils, the hardwood (brush box, eucalypt) associations are found. On the lower, moister areas brush box with coachwood understorey is present whilst on the higher slopes where soil drainage is faster, blackbutt stands occur.

5.3 Vegetation in Terania Creek basin

Terania Creek basin has three major vegetation types, viz. rainforest, brush box and blackbutt.

The rainforest of this valley has been investigated by A. G. Floyd, now seconded to the National Parks and Wildlife Service, who has prepared a report on the area (See Appendix 5). He has stated that the rainforest distribution in Terania Creek is complicated by the two types of parent rock material which give rise to different soils and by the abrupt changes in topography in the basin. On the lower slopes and alluvial flats adjacent to the creek the booyong-coachwood rainforest type (bangalow palm forest) is found. This is a mixture of at least four floristic associations, depending on the proximity of the stream and the proportion of rhyolite present in the soils.

This rainforest is a mixture of both subtropical and warm temperate rainforest, commonly known as "gully rainforest". Classification of the type of rainforest present in an area is determined by the mixture of species present rather than the individual species found in a locality.

ref. P.
26
for
comment

In Terania Creek basin, the range of species present is such that it is not classified as being of the same type as the rainforest which formed the "Big Scrub". This was an extensive area of rainforest which covered lands in the bend of the Richmond River to the south east of Terania Creek. Frith (1977) in his article on the Big Scrub states that "it was the largest area of tall subtropical rainforest in Australia and compared well with discrete areas of that forest form elsewhere in the world".¹ He also points out that as the area has been cleared except for small remnants it is difficult to locate the exact boundaries of the "Big Scrub", but he suggests that it did not extend into Terania Creek. This is confirmed by Floyd's conclusions which were that the type of rainforest in this valley was not the subtropical white booyong type which made up the "Big Scrub" and which is found in various relicts of the "Big Scrub", such as the Forestry Commission's Big Scrub Flora Reserve.

The rainforest in Terania Creek, according to Floyd, is a mixture of both warm temperate and subtropical rainforest and as such "this is the common gully rainforest found from Taree north to Woolgoolga where it is preserved in the Black Creek Forest Preserve near Kendall, Wilson River Flora Reserve west of Wauchope, New England and Dorrigo National Parks, Mobong Creek, and Woolgoolga Forest Reserves near Coffs Harbour" all of which are truly reserves in that they have been reserved as unlogged areas, whereas Terania Creek has been logged extensively on several occasions.

To summarise Floyd's report ^{five} four associations found in the Terania Creek rainforest are the booyong - yellow carabeen association, the bangalow palm - blue fig association, the coachwood - corkwood association and the callicoma association.

The Booyong - Yellow Carabeen Association

This is a subtropical association of mixed composition with the following species present: white booyong, yellow carabeen, red cedar, strangler fig, giant stinging tree, sour cherry, purple cherry, red carabeen and bog onion. This association does not include many of the species commonly found in the "Big Scrub" and is not as luxuriant as other subtropical rainforests.

The Bangalow Palm - Blue Fig Association

This association is also derived from the subtropical rainforest league. It is found near the creek and appears to form under the influence of excessive soil moisture. In this association there are a number of species found which are typical of the riverine subtropical rainforest including bangalow palms, blue fig, brown tamarind, maidens blush, socketwood, brown beech, blueberry ash, velvet myrtle, white-barked walnut and red bopplenut. In the lower layers are straw treefern and Helmholtzia.

Coachwood - Corkwood Association

This is a typical warm temperate rainforest association on rhyolite-derived soils and is not present in the upper basin. The species found here include coachwood, corkwood, hoop pine, mountain wattle, Tasmanian laurel, grey possumwood, silver quandong, red ash and shrubby hazelwood.

1. Frith H. (1977) "The Destruction of the Big Scrub" in "Rainforests" Parks & Wildlife Vol. 2 No. 1 ed. Goldstein W., N.P. & W.S. N.S.W. p. 7.

a matter of opinion
fact

Availability of "Big Scrub" ref. Floyd's report on remnants

Misleading as text is quoted from a report among from Floyd's first visit.

Quite Floyd's comments N.P.W.S. letter subsequent to report in Appendix 5.

but not completely
KRB
p. 15/1
Coachwood & Corkwood
web Appendix 5

ie SA
diversity not as great?

Callicoma Association

This is the typical warm temperate riverine rainforest and is found on the recent alluvial deposits of the lower part of the basin, adjacent to the creek. The association consists of thickets of callicoma and bonewood.

On the upper slopes of the basin generally well above the valley, pockets of coachwood are found on the rhyolitic-derived soils.

Higher up, on the slopes above the rainforest proper, the brush box associations (essentially those proposed to be logged) are found. These are in the moister localities whereas on the higher and drier areas the blackbutt associations are located. On the western side of the creek, the brush box type extends to the base of the cliffs and whilst there is some blackbutt present in the basin, it is mostly confined to the forest above the cliffs (i.e. outside Terania Creek basin). However, on the eastern side of the creek, hardwood extends to well below the cliffs and in places almost to the creek. In the moister hardwood stands there is often an understorey of rainforest species and some of the brush box stands in this locality carry beneath them scattered species from the warm temperate rainforest, principally coachwood but with mango bark and brown possumwood common. This is a common pattern throughout the North Coast forests. The Forestry Commission's nutritional surveys indicate that soil fertility within such areas is not sufficiently high to support a coachwood rainforest type no matter whether or not logging or other influences are kept out. The blackbutt in the basin commonly has flooded gum growing in association with it.

Typing on the vegetation map (map 2 in this report) was prepared for Whian Whian State Forest in 1972 and the map prepared in 1978. It was typed from aerial photography and on that scale it is often difficult to distinguish specific variations within a more general forest type. For a small area such as Terania Creek basin the rainforest was typed from the air as bangalow palm type, although further specialist investigation has shown that this is a very complex mixture of rainforest associations. The general palm type was given to most of the rainforest because of the visual dominance of bangalow palms. For most strategic management purposes this general typing is usually sufficient. Further investigations are undertaken when planning is carried out prior to logging commencing.

There are no species of outstanding botanical significance present in Terania Creek basin. All the species found are represented in Reserves. A specimen of Acronychia bauerlenii was found in the area in front of the overhang, which it is planned to preserve from logging and though this is an uncommon species, it is not rare. The extent of the natural palm areas is uncommon, although bangalow palm itself is a very common species, which can be related to its tolerance to soils of restricted rooting depth.

5.4 Weeds

In the State Forests in this locality, weeds are a problem in the areas which have been opened up, wherever there has been no treatment to promote rapid regeneration of forest. In particular, this problem arises along the roads which were used in previous logging operations and also along the lower section of the creek. In the Forestry records the Forestry Foreman's report on the Terania Creek area in 1950 states that "a lot of the area along Terania Creek was badly burnt a few years ago with the result that now it is only growing rubbish lantana, tobacco bush etc., with heavy crofton weed along

the creek and scattered through the brush in places very thick . . . To have the ground cleared of lantana, crofton weed etc. would be useless without planting to keep the weed growth in check". Later ecological observation supports the truth of this assessment. As mentioned in Section 4, fire, cyclone and location of a logging camp opened the area up.

A crop, not a weed - not spreading

Among other weeds there are scatterings of marihuana (Cannabis sativa) in both State Forests within Terania Creek basin and in the locality. Some groundsel is present with mist weed (Eupatorium riparium) and crofton weed (Eupatorium adenophorium) along the creeks. With lantana these are the major weeds present in the State Forest. It must be noted that they are not present to any extent within the forested areas, nor in the upper part of the basin, but they are found within disturbed areas where no action has been taken to encourage the regeneration of native vegetation. Often when big openings are made in the canopy, as for example to provide log landings (dumps), weeds are usually the first colonizers.

Hardly a significant threat in the some severe lantana, laurel (W.B. not mentioned).

In the Commission's current logging proposal, it is intended to follow standard practice which is to mechanically clear weeds from this lower section around the old burn and old logging road and plant the area with seedlings of flooded gum (E. grandis). This will overcome the problem of weeds taking over and will encourage the regeneration of forest. In the North Coast lantana is a widespread problem and the Forestry Commission over the last decade has been the innovator in working to develop biological control by establishing populations of the imported lantana beetle to attack the weed. These beetles have been used in this part of Whian Whian S.F. before and will be released again if the need arises. Observation shows that they are very successful in controlling lantana in this area in open country but less so in shaded areas.

Some observed, but little effect

5.5 Fauna

The fauna of the North Coast forests is rich and diverse, reflecting the diversity of habitat. Large numbers of species of mammals and birds have been described or recorded. Reptiles, amphibians, and invertebrate fauna must also occur in the region but as yet the scientific institutions which do this work have not worked intensively in the area to prepare complete listings.

The Forestry Commission itself has not specifically undertaken any faunal studies of Terania Creek basin section of Whian Whian and Goonimbar State Forests. However, there is some information available from two groups who have undertaken very brief surveys of the fauna in this area. The Wildlife Research Group (Queensland) conducted a fauna survey at Terania Creek between 10-12 September, 1976. A group from the Australian Museum undertook a general faunal survey of East Australian rainforests and published an interim report in 1976 - one of their study sites was Terania Creek, but only molluscs were collected in this site.

Mammals

Platypus (Ornithorhynchus anatinus), pademelon (Thylogale sp.), common ringtail possum (Pseudocheirus peregrinus), short-nosed bandicoot (Isodon obesulus) and grey headed flying fox (Pteropus poliocephalus) have been observed in Terania Creek area. However, this is a very limited list of mammals and reflects the limited amount of survey work that has been undertaken in the area. It includes species which would be expected to be present in the habitat types comprising Terania Creek basin. Other native species which would be expected to occur include Melomys cervinipes, bush rat (Rattus fuscipes) and other species of bats

particularly those which have arboreal roosts. The tiger cat (*Dasyurus maculatus*) may also occur here. Forestry practices can affect mammals (particularly arboreal mammals) by destroying their habitat. However the logging operation proposed for Terania Creek Section is to be a selective logging in the hardwood stands and therefore it is not expected that the impact on mammal populations will be significant. Overmature and dead trees which have the most abundant hollows for possums and bats will not be logged and the impact of the logging operation will be minimal on their habitats.

Birds

In Appendix 6 is a bird list compiled by Mr. Milton Trudgeon, a local authority for this part of Whian Whian and Goonimbar State Forests.

Terania Creek is the type location for the Albert lyrebird (*Menura alberti*) and the rufous scrub bird (*Atrichornis rufescens*) although the latter has not been recorded in Terania Creek for many years.

Of the birds that occur in the State Forest several species including the Albert lyrebird, blackheaded pardolote, spectacled flycatcher, the varied triller and bush hen are of northern origin and approach the southern limit of their occurrence in this locality.

There are several rare species found in this part of the State Forests - the plumed frogmouth, which is possibly a subspecies of the marbled frogmouth, is extremely rare and has been observed here. Its habitat is restricted to the rainforest. The powerful and sooty owls are rare species and have been observed here.

The birds that occur in the State Forest, naturally include many species which are dependent on mature forests (both moist hardwood and rainforest). Many of the rainforest-dependent bird species such as pigeons move between the various rainforest areas in the North Coast feeding on the fruits of trees such as bangalow palms which provide a seasonal food source for large pigeon flocks.

The proposed logging operation should have no effect on the rainforest-dependent species because it will not involve any of the rainforest. Because it will only be a selective logging of some 70 ha of the brush box-blackbutt types in the basin, there should be no significant effect on the bird population of the whole area as a result of logging.

Reptiles and Amphibians

The survey of reptiles and amphibians in Terania Creek basin section of Whian Whian and Goonimbar State Forests, undertaken by the Wildlife Research Group of Queensland was very limited, yet it extended the known geographical range of several species collected. Terania Creek basin is part of an interesting geographical zone, being at both the southern and northern limits of many species, e.g. the yellow-bellied legless skink has not been recorded outside south eastern Queensland before, whilst the rare marsupial frog had not been recorded at such a low altitude and the giant barred river frog is an uncommon species. There has been so little survey work on reptiles and amphibians in areas such as Terania Creek that recordings such as this are to be expected. Again for the reason that no rainforest and so little of the hardwood is being disturbed, it can be anticipated that the proposed logging operation would have no significant impact on the reptiles and amphibians in this section of the State Forests.

. Invertebrates

There has been very little survey work undertaken on the invertebrates of areas such as Terania Creek basin. The Australian Museum list of molluscs collected in Terania Creek is included in Appendix 6.

5.6 Climate

The climate of the Terania Creek basin is subtropical with a well defined summer-autumn rainfall season. Appendix 7 shows the average monthly rainfall distribution for Murwillumbah (about 24 km north of Terania Creek).

The wettest months are normally January, February and March, and the driest months August and September. Rainfall is high - a result of mountainous topography close to the coast. Mt. Nardi in Goonimbar State Forest has one of the highest recorded rainfall figures in N.S.W. - 2 985 mm (120 in.) - average 1967-1976. Mean annual rainfall for Terania Creek is in the range of 1 650 mm to 1 775 mm (Appendix 8 shows the average rainfall for the District).

Average monthly temperatures at Rummery Park in an adjacent part of Whian Whian S.F. range from 13°C in July to 22°C in December. Heavy mists may cover higher peaks and mountain ranges for lengthy periods during the wet season. Tropical cyclones moving down the Queensland coast from the Coral Sea affect the general area fairly often and may cause great damage from the associated strong winds and flood rains. Cyclones may occur at any time from December to June, but are more prevalent in the warmer summer-autumn months. The topography of Terania Creek basin protects it from much of the influences of these weather patterns. The cliffs reduce the impact of heavy winds. However, it is worth noting that a cyclone in the 1940's did enormous damage in the basin and may well account for some present weed and other species distributions - particularly some of the younger palm stands.

Wind in summer is predominantly humid coastal and in winter, dry westerly. The occurrence of strong north westerly winds from continental high pressure systems, together with rising mean temperatures and low rainfall can produce periods of high fire danger from August until December. Rainforest is not particularly inflammable, but its species are extremely susceptible to death from fire, whereas brush box and eucalypts resist fire in most instances.

Climate statistics for Rummery Park, Whian Whian S.F., are detailed in Appendix 9.

5.7 Floods

Terania Creek, as with all streams in the Richmond River District, has, as the result of the climatic pattern of the region, periods of intensive flooding. When the cedar cutters were operating in the area "*great torrents of water swept down from the mountains three or four times a year in those days: in 1849 Terania Creek 'rose to forty feet in one night'.*" 1. The cedar getters used these floods to move the logs they had felled in the mountains down to the mouths of the rivers where the timber was loaded onto the schooners of the timber fleet for transfer to Sydney. Given the total rainfall figures for this area, floods must be considered as being part of the normal pattern for its rivers.

1. Daley, L.T. (1966) "*Men and a River. Richmond River District 1828-1895.*"

Effect of canopy opening on mosses (p. 27-32) 1948

Terania Creek joins with Tuntable and Rocky Creeks near The Channon, and it flows into Wilsons River close to Lismore. It is used as a water source for some of the farms and settlements downstream, but it does not flow into Rocky Creek Dam which provides the water supply to Lismore.

5.8 Aboriginal Sites

The rock overhang on the western slope of a ridge above the eastern side of Terania Creek is a long, high shelter facing west 40 m in length, 10 m in depth and 3 m in height. Inspections of this site were carried out by an archaeologist from the National Parks and Wildlife Service and by members of the Service's Sacred Sites team who found some evidence of Aboriginal occupation. However, this was not regarded by the Service as being a significant site and no steps were therefore taken to restrict visitation to the area, although it was noted that all parties visiting the site should be supervised, there should be no excavations and visitors should not camp in the cave. The National Parks and Wildlife Service's district staff will monitor the effects of visitation in the locality.

The Forestry Commission has decided to restrict logging operations from the vicinity of this rock overhang in order to ensure the protection and preservation of the immediate environs. Sabotaged (spiked) trees in the vicinity will however be removed in the interests of safety of workers of future generations. Map 4 indicates the location of the area from which logging will be restricted.

5.9 Sites of Historical Significance

Within that portion of Terania Creek basin in Goonimbar S.F. there is about 80 metres of an old track. This track is less than a metre wide and is on the steep rocky side of the divide between Terania Creek and Tuntable Creek. It has been levelled by hand and has been constructed by sidecutting into the hillside. Part of the track has been lost by a landslide.

A joint inspection was made of this track in October 1978, by officers of the National Parks and Wildlife Service, the Forestry Commission and local residents. It was concluded that this was probably an old bridle trail which possibly followed an old Aboriginal track. Historical records for the area have revealed that after the Nightcap Track was developed between the Tweed River Valley and the Richmond River Valley, there were suggestions that a new route be opened up.

When Mr. Grace ("Gracie") was the Government Surveyor in the region, a new road was surveyed, which left the existing road in the vicinity of what is now Dunoon and rejoined it at Rowlands Creek, this road following a lower course than the Nightcap Track. Subsequently, only a very short part of this track was constructed - about 20 chains which started and ended in scrub. This work was carried out by his roading gang while Mr. Grace was in Murwillumbah attending to office work. It has been concluded that the track which was found in the basin is this part of this alternative route to the Tweed Valley and was known as "Gracie's Mistake" or "Currie's Track".

It is not proposed that any logging be carried out in this section of Terania Creek basin. A proposal to extend the Nightcap Track Flora Reserve to include this historic site is being investigated by the Forestry Commission.

5.10 Recreational Values of the Area

Terania Creek basin has recently developed a certain amount of recreational use from various sources. When the old logging road was cleared of weeds and obstructions, access into the forest became easier for visitors. In the Forestry Commission's experience easier access immediately encourages visitation which is welcomed.

*but aesthetic
quality and
recreational amenity
sign. reduced*

One of the residents of the valley who runs a holiday farm has been conducting tours of the area, taking visitors into the rainforest and to the rock overhang and Gracie's track. The Forestry Commission is happy for these sorts of activities to be undertaken, but if this developed into a commercial enterprise formal approval would be required.

Various groups who are concerned about Terania Creek basin have conducted walks in the State Forest to show the area to groups of interested people. School groups have also visited the area.

*ref to -
Subm.*

The Terania Rainforest Nursery run by Mr. and Mrs. Nicholson obtains seeds for the propagation of native plants from the State Forest.

5.11 Fire History

Forestry Commission records show that there was a major fire in Terania Creek basin in about 1948, but there appears to have been no major fire recorded in this part of Whian Whian S.F. since 1956. This section of the forest is largely protected from the threat of fires by its moist environment and its topography. There is a Sub-district Fire Plan including Whian Whian S.F. and fire protection measures have been developed to minimise the possibility of fires occurring in the forest and to contain any which do start. The significance of the 1948 fire to weed invasion has been noted.

5.12 Adjacent Land Uses

Terania Creek basin lies within Whian Whian and Goonimbar State Forests and it is surrounded by State Forest on all but the southern side. Downstream of the forest the land has been cleared for farms. This happened early in the settlement of the North Coast, when large areas of the Richmond Valley were cleared and dairy farms were established. Many of these farms suffered in the decline of the dairy industry in the region and in the general depression of those sectors of the N.S.W. rural economy based on inadequate or under-capitalised resources. However due to their isolation and pleasant climate these farms have appealed to city people wishing to move to a rural area to establish new lifestyles. In Terania Creek valley (in common with other such valleys on the North Coast) there are a number of new settlers who are establishing new enterprises in traditional rural areas. Some are based on farming, some on crafts, while some are simply retreats from the pressures of city and professional life.

*significant
social impact
on gov't
landholders
if logging
proceeds*

*valuable tree
country under capitalised*

6. Environmental Factors

6.1 Physical Factors

- (a) Air - In the logging operation which has been planned for Terania Creek section of Whian Whian and Goonimbar State Forests, there is little potential for air pollution being created. Some dust will be raised by log trucks travelling along Terania Creek Road, particularly on the unsealed sections. However this occurs with all traffic travelling on this road and as the proposed operation will only be for a limited period of up to five months, it is considered that this will be no significant problem. Logging equipment is predominantly diesel-powered and less polluting than petrol-driven machinery.

(b) Water - It is considered that the proposed operation will cause no significant erosion or pollution problems at Terania Creek. It is recognised that landslips are common in Terania Creek valley, particularly in the cleared lands along the road, which is constructed on the sideslope above the creek. However, this logging operation is planned to be undertaken in the forested lands of the upper basin of the creek on areas where the soils are well structured, stable and therefore not highly erodable. That is, logging will be carried out in the brush box and blackbutt forest stands, which grow on the stable rhyolitic soils. Natural landslips have taken place in the forest in the past, but it is anticipated that the proposed logging operation will not contribute to any increase in the rate of occurrence of landslips. All parts of the harvesting operation have been designed so that the erosion impact will be minimised. The operation will be by the selective logging of only 70 ha of a catchment of some 2 000 ha and so the amount of disturbance caused will be limited and well distributed. As detailed in Section 4.2 outlining the harvesting operation, special conditions have been imposed on this operation. These include the design of the logging roads which will be of minimal width and which will wind through the rainforest areas to avoid the need for unnecessary felling of large trees. It is planned that the operation will be undertaken in the dry season and that roads will be constructed for temporary use only. After the logging has been completed, the roads will be treated to promote regeneration of the vegetation and drains will be constructed to ensure that the roads cannot contribute to long term erosion in the forest or to stream turbidity of any duration.

Consistent with splash crossings?

Most major streams run through rainforest areas which will not be logged. Other significant streams will be protected by "filter strips" in which tractors are excluded to protect them from sediment mobilised within logging areas. The Forestry Commission, with the N.S.W. Soil Conservation Service, has designed the Standard Erosion Mitigation Conditions to protect State Forest areas from soil erosion as a result of logging operations - these conditions will apply to the logging operations in Terania Creek basin.

State Forests within the basin have been subjected to very heavy logging in the past prior to imposition of any special conditions to minimise the impact of such operations. There is now no visible evidence in the basin of serious erosion resulting from these former operations, although short term effects were doubtless evident at the time.

As is usual there may be some short term increases in turbidity levels in Terania Creek downstream of the State Forest as a result of the construction of the roads and creek crossings, but these will not have lasting effects. (See data from nearby Rocky Creek Appendix 10).

The Forestry Commission pioneered forest hydrology in Australia and has continued to conduct forest hydrological research under an hydrologist. In a selection logging operation such as is planned for Terania Creek it can be said with certainty that the principal effects on the forest hydrology of the area are related to:-

Significant even in short term to local families using the water, i.e. to amenity of creek.

1. Effect of the permanently maintained road surface. In the State Forests of the Richmond River this amounts to 1% of the area of logged forest. Increased water runoff from this source is permanent, but is small as only 1% of the logged area is presently retained as road surface. At Terania Creek the permanently maintained road percentage will be minimal (see above).

2. Effect of temporary logging tracks, snig tracks and log dumps. Approximately 7½% of the logged area of State Forest is disturbed in this way, resulting in temporary increases in runoff that become less as the area regenerates. (See research data in Appendix 10 which indicates measurable effect lasting for only a limited period.)
3. Effect (on actual area logged) of selection logging. The increased runoff of water from this effect is unknown, but would be less than from clearfelling. The increase reduces with time.

The combination of these three effects is likely to be an increased runoff from the logged area immediately after logging, reducing with time to something like the original runoff within a few years. This increase in runoff may or may not be accompanied by increased stormflow peaks in this small catchment. The likelihood in such a small disturbed area is that no noticeable increase would occur.

The total area of State Forest logged above Coraki in the catchment of the Richmond River in any year is approximately 1 800 ha, split up into 20 distinct operations of average size slightly less than 100 ha. The total catchment area above Coraki is about 430 000 ha of which 81 400 ha (19%) is State Forest and 26 000 ha (6%) is rainforest.

It is probable that small catchments of, say, 1 000 ha in the upper headwaters of the Richmond River would exhibit increases in runoff after logging. As only 1 800 ha is logged in the entire Richmond catchment each year the increased runoff from logged land is insignificant in terms of total runoff from the whole Richmond catchment. This holds true even if one allows for the fact that upper catchments have a higher annual rainfall and that previous years logging would still be contributing to increased runoff. The hydrological effects, positive or negative, from a single agricultural innovation could well overwhelm the effects from a much smaller area of controlled forest logging.

Total water yield and possibly peak discharges may be very temporarily increased in small forested catchments such as Terania Creek basin in the headwaters of the Richmond River as a consequence of logging operations. Peak discharges in the Richmond River however will not be noticeably affected by these operations.

- (c) Noise - As the area to be logged lies within a basin surrounded by steep cliffs there is little potential for noise to extend outside the State Forests from the logging operation. The logging contractors will be using equipment which conforms, where appropriate, to the requirements of the Noise Control Act 1975, as amended and any noise which is generated in the forest will be identical with that generated in similar isolated logging operations.

The logging trucks travelling on the roads from the forest to the mills, while subject to noise regulations, will cause an increase in noise, but it is not considered that this will cause a major problem nor be of long duration.

6.2 Land Use Factors

Terania Creek basin is part of Whian Whian and Goonimbar State Forests which were reserved in 1914 and 1917 respectively. Whian Whian S.F. is regarded by the Forestry Commission as potentially the most productive native forest in the Casino Forestry District and one of the best in the State and consequently is regarded as a significant source of timber for the region, now and potentially. (See Figures 1 and 2).

State Forests in the Casino Forestry District cover an area of 236 000 ha and are the major remaining forested areas in this part of the State. Early wholesale clearing of forested lands for agriculture, undertaken by the early settlers, left these lands as remnants upon which the Forestry Commission has had to work since its inception in 1917.

limited
scope for
passive
recreation
in natural
areas -

Because these State Forests are very scenic and accessible as well as being highly productive and are located in a region where tourism is an important industry the Forestry Commission has applied its multiple-use principles to their management. Among multiple uses, State Forests play an important role in catchment protection and runoff regulation and the Rocky Creek Dam which supplies Lismore with water, has its catchment in Whian Whian S.F. Recreation facilities have been developed in these forests, camping and picnic areas having been established and forest drives and walks developed to allow visitors to obtain greater enjoyment from these areas. Flora Reserves have been created under the Forestry Act to preserve sections of special significance, particularly rainforest vegetation types. However, the principal reason for reserving and managing these areas is for the production of timber and the Forestry Commission and the timber industry have planned for the continued use of the timber resources in these State Forests over a long period of time. It is considered that this section of State Forest should also continue to be used for the production of timber, as it has been in the past.

6.3 Biological Factors

repeated
see pp 2-3

The forest type of Terania Creek basin proposed to be logged is not rainforest but is moist hardwood consisting principally of brush box and blackbutt. The operation will be a selective logging of about 70 ha of the basin. The logging operation has been designed to be of low intensity and restricted to the hardwood areas.

Details
Not avail.
see p. 16

Roads and logging tracks have been designed to follow original tracks through the rainforest areas in the Terania Creek basin and most of this work has been completed. Short sections of logging tracks nos. 1, 2, 3, 6 and 7 which will go through rainforest stands are still to be constructed.

It is not considered that the impact of these roads will be a significant intrusion into the rainforest, principally because the major part of the roading follows the old logging road which was built through this rainforest in 1943. The new roading through the rainforest has been designed to be of minimum width and to by-pass the larger trees which will be preserved. By minimising the openings in the forest canopy the impact of the road on the rainforest will be reduced and regeneration of rainforest species on these tracks will be encouraged at the expense of weeds.

cf
logging
to date

When trees are felled it is inevitable that there is some damage to the understorey but in this operation it will be minimum as the Forest Foreman will mark all the trees to be fallen and the direction they should be felled. The logging contractors are skilled and can fall trees in precise directions. It is not anticipated that trees will be felled into adjacent rainforest. *Already witnessed*

As part of directional felling logs are directed towards central snig tracks and snigged to log landings (dumps) for haulage out of the forest. These snig patterns and landings have been designed so that they are located in the hardwood stands and obviate snigging through rainforest. The heads of the trees are cut and left in the forest and whilst these operations are highly visible and can appear very messy the impact on the environment is not great and it is restricted to set areas.

The movements of tractors in an area compact the earth but as this will not be an intensive operation it can be anticipated that this will not be a long term or significant impact. The snig tracks and log dumps will be examined after logging has been completed to decide whether flooded gum seedlings will be needed to augment the regeneration of forest.

On the old logging road which is wider than the proposed new logging tracks and which has had infestations of weeds in its lower sections, weeds will be cleared by tractor after the operation has finished and roadside areas will be planted with eucalypt seedlings.

The conditions particularly favouring rainforest development within N.S.W. are those of ample moisture availability and soils of at least moderate fertility by agricultural standards, and high to very high fertility by forestry standards. Such conditions also favour the development of many types of sclerophyll forest, and in many parts of eastern N.S.W. the two major vegetation forms, rainforest and sclerophyll forest, are in active competition for the same site.

Eucalypts and other plants of the sclerophyll forest usually possess inherent adaptations to survive the effects of wildfire, while their regeneration tends to be stimulated by periodic disturbance of the forest, as occurs from fire or storm. By contrast, most rainforest species are less well adapted to withstand fire, but regeneration of many species is well adapted to shaded undergrowth, where seedlings survive until they assume active growth as soon as the tree canopy is opened to provide the stimulus.

Thus over much of the Eastern Division of N.S.W. there has resulted an unusually dynamic vegetation pattern, with two major vegetation forms vying for the same site. Periodic disturbance, for example by fire or storm, coupled with the presence of a sclerophyll forest seed source, will favour the development and maintenance of sclerophyll forest, while continued protection from disturbance, and particularly from fire, will lead to expansion of the rainforest into adjacent sclerophyll forest stands.

Species distributions are limited by a range of inter-related factors which include moisture, temperature, soil physical and soil nutritional factors. Each of these broad requirement categories can be further subdivided. For example, soil nutritional factors are a combination of quantities of nutrients, biological cycling of nutrients, ratios of nutrients and interfering or toxic elements.

Ultimately, but provided soil fertility is sufficiently high, replacement of the sclerophyll forest by rainforest will occur as large old eucalypts or other sclerophyll species die without being able to establish a new crop of regeneration in the dense rainforest shade. Although rainforest and wet sclerophyll forest typically exist as distinct entities, growing immediately adjacent to each other, the wet sclerophyll forest will often carry an understorey of rainforest trees, which have the capacity ultimately to replace the sclerophyll trees unless they are first eliminated by fire or similar disturbance or unless the soil is incapable of meeting their increasing need for nutrients. Conversely, disturbance is likely to permit an expansion of the sclerophyll forest into sites currently carrying rainforest.

In Terania Creek basin, this dynamic process of vegetation invasion is in dynamic equilibrium. The topography of the basin, together with the pattern of varying soil fertility, has resulted in the vegetation types occupying fairly stable positions. Vegetation in the basin has been protected by the cliffline from frequent

disrupts
of significance
of w. scl
margin of
v. f.

|| Fire

7
6

major disturbances, particularly fire and storm, which are a common feature of other rainforest areas and this has enabled the rainforest species to expand to their full extent into the adjacent sclerophyll stands. Hence they are found as common understorey types with little expectation that they will become dominant. Their expansion and dominance has been limited by rhyolitic soils of low fertility and thus the hardwood stands have been able to maintain their ecological integrity. These stands do not form a physical buffer to the rainforest stands as may occur in other localities but are in equilibrium with them.

No!

It is often considered that productivity on soils supporting tropical rainforest ecosystems is maintained by a closed nutrient cycle (i.e. small natural loss) and it could be considered that removals of nutrients could be detrimental to the system. However, unlike rainforests developed on sands or similar soil types, the soils associated with the rainforest proper at Terania Creek (as in most of N.S.W.) have a high nutrient capital. Hence the proportion of nutrients removed in a selective logging operation is very small compared with the nutrient contents of the total ecosystem and hence it is not considered that site deterioration due to nutrient loss will occur.

6.4 Social Factors

The proposed logging operation is part of the overall pattern of timber extraction in the Murwillumbah Management Area of the Casino Forestry District. The timber reserves in Terania Creek basin section of Whian Whian and Goonimbar State Forests have been assessed and this timber resource has been included in overall planning and therefore this logging operation must be viewed in the regional context.

an

The timber resource in this area provides 39% of the annual quota for the two timber mills which have been allocated the timber from this area as part of their quota commitment and these companies have had their timber supplies reduced as a result of their quotas being reduced. Economic viability depends on being of sufficient size to be competitive so that reduction in timber supplies cannot be entertained without limit. "Cottage industry" sawmilling has no place in a modern economy.

A view not shared by all economists cf. Schumacher.

The timber industry has a long history on the North Coast. It has been characterised by steady amalgamation into larger, more efficient, but still mostly family-run concerns. Logging operations such as the one proposed for Terania Creek basin have been taking place for most of the time that this area has been settled in order to supply these industries. The impact of these operations on local communities has not been significant in the past but in recent years there has been a change in the local community and the new settlers have not been aware of the differing historical perspectives of people springing from generations of interaction with, and support from the forests.

Evidence? ref to requests to Gordon Communities with different values!

All too aware -

many current man problems stem from this exploitive interaction

7. Involvement of Other Organisations and Groups

7.1 Local Government

On 1st January, 1977, three local government areas in this part of the North Coast were amalgamated. Terania Creek basin section of Whian Whian and Goonimbar State Forests was formerly within the Terania Shire Council, but now is part of the local government area administered by the Council of the City of Lismore. The planning instrument covering this part of the municipality is Interim Development Order No.1 Terania, which was gazetted in 1967. In this Interim Development Order Terania Creek basin, being part of the State Forests is zoned non-urban, meaning that agriculture and forestry are permitted activities.

Terania Creek Road is a Shire Road and as such the Forestry Commission has no responsibility for it. As it will be used by log trucks, however, officers of the Commission have inspected the road with officers of the Lismore City Council. The inspection was made on 22nd March, 1979, to identify hazards in the existing alignment of the road, and to suggest action to minimise them.

Five major areas of concern were identified and these were discussed by the Council in April 1979.

1. Roadside growth reducing the effective carriageway and obstructing the sight distance on curves.

The Forestry Commission cleared the roadside verges over the whole length of the gravelled section.

2. Severe curves with limited sight distance.

There are three such curves and the Forestry Commission provided safety signs warning motorists of the safety hazards.

3. Sections have insufficient width for passing.

These sections occur in the 6 km between the old Terania Creek School and the Terania Nursery. Signs advising caution and restricting speed to 30 km/hour were erected.

4. Safety fencing.

There is one particular section 1 km north of the old school where safety fencing would be a permanent improvement - the Council will erect this.

5. Conflict with school buses because of the narrow widths of the carriageway and the poor alignment.

Council requested that logging trucks should be restricted to operating outside the school bus timetables. On their part the sawmillers have acceded to the Council requirement that log truck operators be restricted to operating outside hours set by school bus timetables and the agreement is amicable.

Prior to the commencement of the logging operations safety signs were erected along Terania Creek road. Some of these were removed illegally although some were subsequently replaced, presumably by *one or other of the factions among the demonstrators.*

Suggestion of factions
The Forestry Commission and the Council have agreed to inspect the road before and after the logging operation and if any undue damage to the road can be attributed to logging trucks, the Commission is prepared to compensate the Council for this. (This contingency has been included in the roading costs of the operation). It is usual procedure for the Commission to negotiate amicably with Councils where mutual interests are involved.

In May 1979, because of publicity which had been given to the proposed logging operation, the Lismore City Council invited the Minister for Conservation and Water Resources, in company with the Terania Native Forest Action Group, timber interests, and the Forestry Commission to inspect the area. Lismore Council supported the decision to proceed with the proposed logging.

7.2 Planning and Environment Commission and the N.S.W. Heritage Council

Representations have been made by activist groups to the Chairman of the Planning and Environment Commission and also to the N.S.W. Heritage Council about Terania Creek basin. It was not considered appropriate that this matter be referred to the Heritage Council of N.S.W. and the Planning and Environment Commission has adopted a watching brief.

7.3 National Parks and Wildlife Service

Representations have been made to the National Parks and Wildlife Service to reserve this part of Whian Whian and Goonimbar State Forests under the National Parks and Wildlife Act.

As a result two inspections at Terania Creek basin section of Whian Whian and Goonimbar State Forests were made by officers of the National Parks and Wildlife Service and the Forestry Commission. These took place in April 1976 and October 1977, but no recommendations were made to the Forestry Commission regarding future use of this forest. In a report to the National Parks and Wildlife Service, Alex Floyd, a rainforest research expert now on secondment to the National Parks and Wildlife Service and currently undertaking a survey of rainforests in N.S.W., concluded that:

1. Terania Creek basin is an attractive and compact area with much of vegetational interest, particularly as regards the mixture of plant communities.
2. Although there are some fine individual specimens of trees (red cedar, white beech and red ash), there do not appear to be any unusual or rare species not already preserved elsewhere on these forests.
3. The extensive apparently natural palm forests at the head of the creek could be of ecological interest as they must surely be the greatest area of this type in N.S.W. Further comment on their significance is impossible without factual information on how they were formed and whether they represent a passing phase or a stable community.

As mentioned above (Section 5) officers of the National Parks and Wildlife Service also inspected the areas of Aboriginal and historical significance in Terania Creek. These inspections took place in October 1978 and neither the overhang nor the remnant of historical track were considered to warrant special protection. In both cases the Forestry Commission has recognised their significance and arranged that no logging shall take place in their vicinity.

7.4 State Pollution Control Commission

The proposed logging operations were examined by the State Pollution Control Commission in 1977, and the Minister for Planning and Environment stated that "as a result of its inquiries the Commission (S.P.C.C.) concluded that the Forestry Commission's activities in the area were based on sound silvicultural principles and that the logging would have no significant long term adverse effects on the forest environment. The Commission (S.P.C.C.) was satisfied that there were insufficient grounds to justify its intervention in the operations and I concurred in this conclusion". (i.e. The conclusion to log).

predate
request by
IN FAG

ref.
Omukshama's
report.

7
0

There were further representations to the Minister for Planning and Environment in 1979 and the State Pollution Control Commission asked the Forestry Commission to examine the submission made by the Terania Native Forests Action Group and advise them accordingly. The Forestry Commission examined the submission but considered that no new information had been presented and as the proposed logging operation had already been modified in dialogue with the Group so that no rainforest would be logged, the decision that an Environmental Impact Statement was not justified was still appropriate.

7.5 The Minister for Planning and Environment

New legislation regarding environmental planning was passed by Parliament in November 1979: viz. the Environmental Planning and Assessment Act 1979, Land and Environment Court Act 1979, Miscellaneous Acts (Planning) Repeal and Amendment Act 1979, Heritage (Amendment) Act 1979 and Height of Buildings (Amendment) Act, 1979. The objects of the Environmental Planning and Assessment Act under Section 5 are:

- (a) to encourage -
- (i) the proper management, development and conservation of natural and man-made resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment;
 - (ii) the promotion and co-ordination of the orderly and economic use and development of land;
 - (iii) the protection, provision and co-ordination of communication and utility services;
 - (iv) the provision of land for public purposes;
 - (v) the provision and co-ordination of community services and facilities; and
 - (vi) the protection of the environment
- (b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State; and
- (c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.

View not reflected in statement

The Forestry Commission has the view that forestry encompasses ongoing activities of regional significance and as such it is now more appropriate to consider forestry activities in terms of the regional environmental plans as outlined in the new legislation (Part III Division 3, Clauses 40 ff.) than to consider them as isolated parts of working circles as has occurred at Terania Creek. In this way environmental planning for activities such as the proposed logging operation in Terania Creek section of Whian Whian and Goonimbar State Forests can be determined in their true regional context. The aims, objectives, policies and strategies for the region are incorporated into these regional plans and forestry activities form part of the overall pattern of social and economic development in a region.

not "activity"

conservation values also need to be considered in regional context, not in terms of rare species, or identifiers with "Big Scrub"

7.6 Ombudsman

Representations were made to the Ombudsman, by the Terania Native Forest Action Group in May 1979, stating that the Forestry Commission had not carried out an Environmental Impact Statement, that the logging operation was in conflict with the requirements of the "*Principles and Procedures for Environmental Impact Assessment in N.S.W.*" and that it was also in conflict with the 1977 report of Mr. A. G. Floyd on "*The Rainforest of the Terania Creek Basin*". The Ombudsman investigated the situation and concluded that it was not unreasonable of the Forestry Commission to have assumed that an Environmental Impact Statement was not required - given that the Minister for Planning and Environment had concluded that one was not necessary.

part of context

7.7 Other Government Departments

As a result of demonstrations which took place when logging operations commenced in August, the Police Department was involved. However no other government department has been involved in this proposed operation.

7.8 Community Groups

There have been representations made to the government and to the various Departments by a range of groups and organisations within the community. These representations, many in the shape of form letters, have been both in favour of, and opposed to, the proposed logging operations within Terania Creek. These groups and individuals will have an opportunity to make submissions to the Inquiry into the proposed logging of Terania Creek basin.

8. Alternatives

(a) The Present Proposal

The proposed logging operation within Terania Creek basin within Whian Whian and Goonimbar State Forests, as initially formulated by the Forestry Commission in 1975, envisaged selective logging of the rainforest stands using tested methods for subtropical type rainforests and a heavy logging of certain hardwood stands to be followed by the planting of seedlings on the logged site. The timber was to be taken by truck down Terania Creek road to the mill.

As a result of the representations made by the local residents and others objecting to the logging of the rainforest, the clearfelling of the hardwood and the use of Terania Creek road for log haulage, the Forestry Commission reviewed its proposals. In December 1977, the Minister for Conservation advised that the rainforest was not to be logged, the hardwood stands would be selectively logged and the log haulage would not be by Terania Creek road. Unfortunately this last decision had to be reversed when engineering and environmental examination showed that the alternative haulage route was not suitable for uphill hauling. The Terania Native Forest Action Group expressed its pleasure at this revision of the logging plans but then asked that the brush box stands should not be logged and requested that a Nature Reserve be established over the area.

So far as the logging operation is concerned, the Forestry Commission has reduced the amount of timber proposed to be extracted from this section of the Mullumbimby Working Circle by almost half, from 12 406 m³ to 6 400 m³ and has withdrawn the rainforest component entirely.

previous
N.P.A.
proposal
1976, see
P/12 & 39

which ones?
It is not considered that it would be possible to modify the logging proposals further in this section of these State Forests and maintain logging as an economic operation. To the contrary social values have already been underwritten significantly.

(b) Utilisation of McKay's Road

Various options for the transport of timber to the mills have been examined by the Forestry Commission and the conclusion has been reached that there is no viable alternative to the use of Terania Creek Road. McKay's Road could be upgraded by the expenditure of a large amount of money, but this would not be warranted for the amount of timber now to be extracted, nor justified by the short time for which the road would be used.

This kind of road construction could not be justified on environmental grounds because of the massive impact a major road building operation such as regrading McKay's Road would have on a small area like Terania Creek. The other possibility would be to use the route used in the 1950's when timber was hauled across into Tuntable Creek valley. This track which passes through portion 26, Parish Whian Whian is not a reserved road and even if permission were given for it to be used, similar road construction would have to be undertaken and this could not be justified on economic or environmental grounds.

(c) Abandon Logging

If logging did not take place in this section of Whian Whian and Goonimbar State Forests, then this would immediately affect the timber reserves in the Murwillumbah Management Area. In order to maintain sustained yields in the Mullumbimby Working Circle two alternatives present themselves:

- . reduce the cycling time of the sustained yield operation, or
- . reduce quotas operating within the working circle.

The first alternative is not feasible because the concept of sustained yield is based on there being sufficient time elapsing between logging operations to allow timber to regrow. If this time scale were reduced the overall amount of timber to be cut from the management area in the second logging operation would be reduced and thus the operations would not be functioning on the principles of sustained yield - they would regress to the old "cut out and get out" philosophy which the Forestry Commission has spent some 60 years eradicating.

If the timber within Terania Creek basin were withdrawn this would reduce the life of the Murwillumbah Working Circle marginally; i.e. there would be slightly less than the predicted seven years remaining. In the Mullumbimby Working Circle it would result in a reduction in the quotas of about 150 m³ nett per annum. This may not seem significant, but there are only four Crown sawmills operating in the management area and only three operate in the Mullumbimby Working Circle where the overall yield has been limited to 7 000 m³ nett per annum - these quotas were reduced in 1977 from 10 280 m³ per annum. Standard Sawmilling Co. Pty. Ltd., the principal mill being supplied from this section of State Forest, has had a significant part of its quota already withdrawn as a consequence of the "Border Ranges" issue. The government decisions in 1978, arising from the "Border Ranges" decision resulted in the Kyogle quota of 9 610 m³ per annum to Standard Sawmilling Co. Pty. Ltd. being withdrawn on completion of their 1978/79 quota operations.

Total supply to Standards understated - private sources have not been considered nor Border Ra. compensation

This Company now only has about half of its former quotas in the two working circles (5 500 m³ per annum in Mullumbimby Working Circle and 5 770 m³ per annum in Murwillumbah Working Circle). The life of the Murwillumbah Working Circle is limited to an estimated seven years at present level of cut. Any further decreases in the quotas to this Company will result in it having to reassess its entire operation, from the viewpoint of deciding whether decreasing economies of scale can be viable for much longer in an industry where increasing scale is the essence of competitive advantage.

not initially involved - ref to earlier reference.

James Hurford & Co. Pty. Ltd., the other sawmilling company involved, has a quota of 1 430 m³ nett per annum in the Mullumbimby Working Circle and a reduction in this quota could influence this Company's decision to reinvest in rebuilding its mill and associated business after the mill was burned in September.

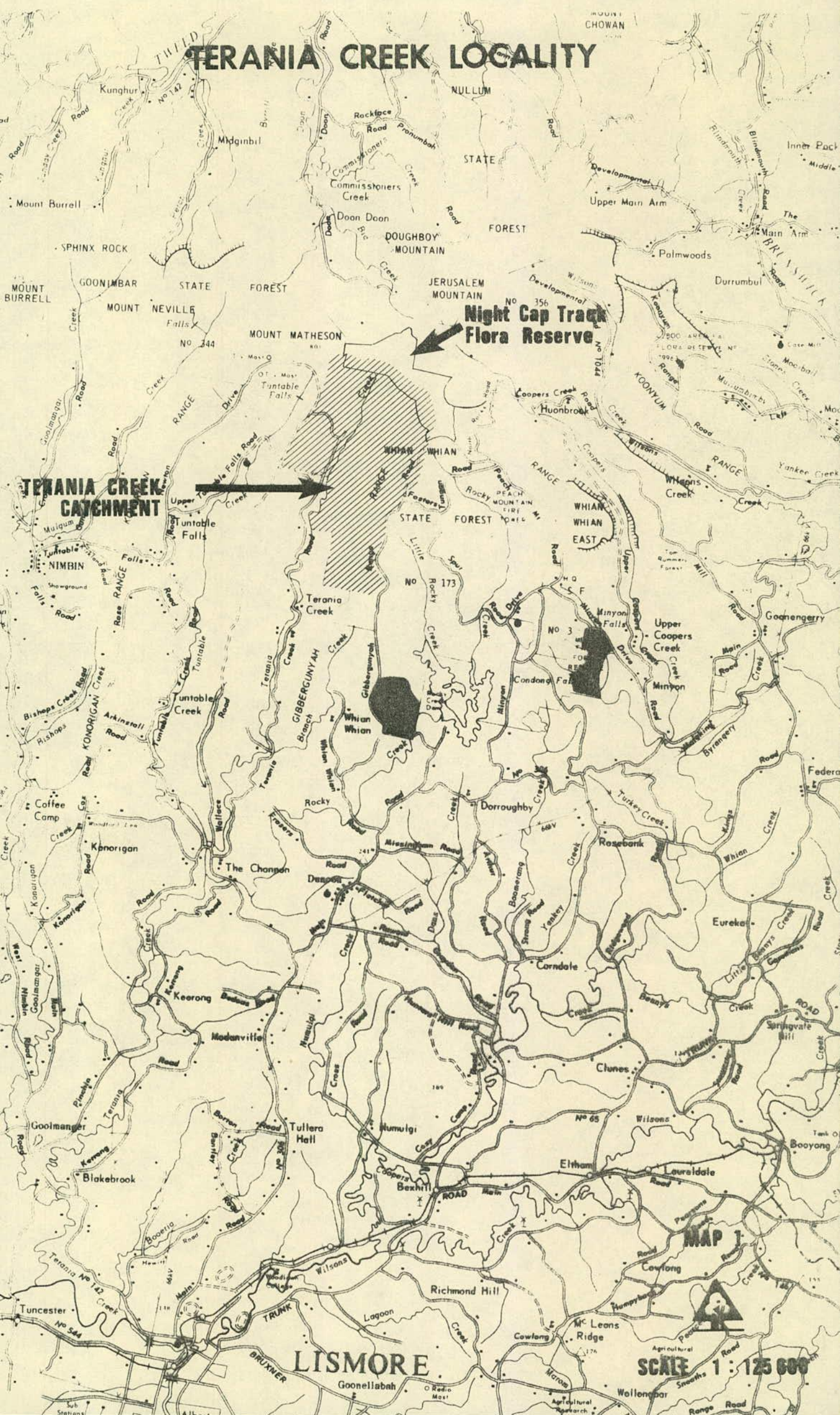
(d)

Log Presently Reserved Forests in Lieu of Terania Creek

The only other sources of supplies of timber in the Murwillumbah Management Area which could be logged instead of the timber in Terania Creek basin section of Whian Whian and Goonimbar State Forests have been included in the assessment of timber in the management area or are included in the various reserves and preserved areas in the State Forests. The Forestry Commission would not propose logging the Reserves and preserved areas as all of these have conservation and scientific values greater than Terania Creek.

unsubstantiated, and cannot be confirmed because of a lack of scientific data at present.

TERANIA CREEK LOCALITY



TERANIA CREEK CATCHMENT

Night Cap Track Flora Reserve

LISMORE

SCALE 1:125 000

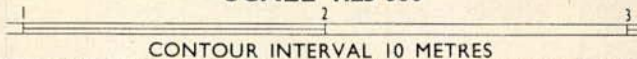
MAP 1



Agricultural Research
Snodgrass Road
Wollongbar

TERANIA CREEK TOPOGRAPHY

SCALE 1:25 000



CONTOUR INTERVAL 10 METRES

MAP No 5



Road loose surface one lane; Embankment; Cutting	
Track vehicular, unimproved earth; Gate; Cattle Grid	
Dense timber; Medium timber	
Scattered timber; Forest, coniferous or pine	
State Forest; National forest boundary	
Contours; Approximate contours	
Cliffs, inland; Coastal	

Compiled, drawn, printed and published by the Central Mapping Authority, of New South Wales.
 Aerial photography - 1971 Field revision - 1974 Reprinting - 1978

HUONBROOK
 9540-I-N

Proposals for a National Park in the Nightcap Range

In 1933, several of the local government and other public groups in the North Coast, made representations to the then Minister for Lands and the Minister for Mines and Forests, urging that about 2,000 acres of Whian Whian State Forest No. 173, be revoked for the establishment of a National Park on the Nightcap Range. This proposal centred around the Nightcap track (which is now included in the Nightcap Track Flora Reserve) but did not include the Terania Creek basin.

The 1933 representations were that this scenic area of the Nightcap Range should be dedicated as National Park for recreation. The Minister considered them but did not think it appropriate that the area be reserved as National Park. However, the whole of Whian Whian State Forest and the adjacent forests were reserved as National Forest under the Forestry Act in 1936. National Forests were designed to serve the community in five ways:-

- . for the production of timber
- . for the protection of watersheds
- . to develop the recreational values of the native woodlands in the service of the tourist industry
- . for the conservation of wildlife
- . for the utilisation of the incidental grazing values of the forest.

This National Forest had a total area of 30,324 acres, and included four areas designated for special management where aesthetic values and the interests of the touring public were to be primarily and specially kept in view, i.e. managed as National Park.

The four localities were:-

- . an area of 2,665 acres on the higher part of the range
- . approximately 120 acres about Peat's Mountain
- . about 120 acres around Boggy Creek Crossing
- . a small scrub area of 4 acres, on the constructed access roads.

(Under the legislation at that time, it was not possible to establish Flora Reserves in National Forests).

Unfortunately, operations in the Nightcap National Forest did not follow the management objectives proposed for these special areas. With the outbreak of World War II, the management of all forestry areas changed, staff were reduced in numbers and there were intense demands for timber for the war effort - rainforest timbers were used extensively in the production of armaments and for aircraft construction. After the war, staff had changed, some records had been lost and the original proposals were overlooked. When subsequent Management Plans for Whian Whian State Forest were drawn up these special management proposals were not included. In retrospect, it is unfortunate that these areas designated for specialised management were not included in post-war management plans, but the war years emergencies overrode all other considerations and effectively obliterated the 1937 plans.

*request from Mumbin 1:63360 from
F.C. a date of acquisition,*

7/5/80.

Nevertheless, within the Nightcap National Forest there are now 706 hectares of Flora Reserve - 704 of them in Whian Whian State Forest. These are:-

History?

Big Scrub Flora Reserve	-	196	hectares
Minyon Falls Flora Reserve	-	109	"
Nightcap Track Flora Reserve	-	375	"
Boomerang Falls Flora Reserve	-	24	"
		<u>704</u>	hectares

There are also 301 hectares designated as Preserved Areas in Whian Whian and Goonimbar State Forests, namely:-

Status History?

Big Scrub Preserved Area	-	110	hectares
Mt. Nardi Preserved Area	-	98	"
Gibbergunyah Roadside Preserved Area	-	35	"
Lost Valley Preserved Area	-	58	"
		<u>301</u>	hectares

This totals 1005 hectares or 2,482 acres which is reserved from all logging, as compared with the 2,000 acres in the 1933 proposal.

In 1963, the then Minister for Lands made representations to the then Minister for Conservation to reserve part of Whian Whian State Forest as National Park. (This proposal also did not include the Terania Creek basin). This plan was rejected by the then Minister for Conservation, as it was considered that Whian Whian State Forest was a very productive State Forest which supplied a significant amount of timber to the sawmills in the region. Also there were already three areas in the State Forest which were being managed as Flora Reserves and facilities had been provided in the forest for recreation.

1974 - developed 1976

*areas not contiguous, & comparison
specimens, not taking into account the
reduction in natural & scientific values resulting
from past logging activities.*

*Demonstrate on map in NCCC
submission.*

MURWILLUMBAH, 2484.

12th September, 1979

The Editor,
The Daily News,
Church Lane,
MURWILLUMBAH. 2484

The Editor,
The Northern Star,
9 Molesworth Street,
LISMORE, 2480

Dear Sir,

Although as Forester, Murwillumbah, I am responsible for the management of Terania Creek, I write this letter, not in my official capacity but as an ordinary Australian. I say this because I believe the real issue now is not Terania Creek.

Milo Dunphy in his letter, "Northern Star" 1/9/79, said on the issue of law and order: "To those who know the totally non-violent nature of the protesters and their protest, the claim is absurd". He also said "five hundred brave local residents standing between bulldozers and this forest have turned it into a test case". I guess it could look that way from a distance of 900 km. As one who has been involved on the spot in the Terania Creek imbroglio over the past three weeks, this is my recollection of events:-

1. Deliberate obstruction to plant and personnel, carrying out the directive of the Minister for Conservation and Water Resources.
2. Sabotage to logging plant and roads.
3. Abuse and invective hurled at members of the logging crews and Forestry Commission personnel.
4. A truck driver hit in the face just below the eye by a stone from a shanghai. A few inches higher and an eye would have been lost.
5. At least 100 people including children swarming through the logging area, endangering not only their lives but also the lives of the police, loggers and Forestry people.

One of my foremen had the unenviable job of getting a protester out of the way of a tree that must have weighed at least 10 tonnes when the chainsaw operator had it at the teetering stage.

The effect of this sort of behaviour on bush workers is quite traumatic. They are experienced professionals and aware that there is always risk in logging under the most favourable conditions.

6. Trenches three feet wide and three feet deep dug across the main access road from the forest into Terania Creek. Steel pipes were hammered into the ground near the trenches and, to give it a sinister twist, barb wire was placed below the spoil from the trenches. These people would not be concerned about the hands of the police officers who repaired the damage.
7. Steel spikes were driven into trees in the logging area. A possible result from this, of course, is that fallers or sawmill employees could be maimed or killed by a broken chainsaw or flying fragments of a circular saw.

8. Logs on the ground were destroyed by means of a series of saw cuts before they could be transported to the sawmill, Prior to destruction their value at stump would be something in excess of \$2000. Replacement logs will now have to be found.
9. The wheel nuts of a front wheel of a police car were loosened and the wheel nearly fell off.
10. To add a little obscenity, one delightful character left his or her excreta all over the seat of the logging tractor,

So much for the peaceful protest by Milo Dunphy's "five hundred brave local residents".

Having said all that, I don't think the pros and cons of logging Terania Creek are the important issue at all. What is important to me and so many of my generation is that the Westminster System which was defended at great cost in the years 1939-45 should prevail. Anarchy is not part of the Westminster System.

The logging of Terania Creek has been debated and canvassed for years. The N.S.W. Government has heard the views of the Terania Native Forest Action Group, the Forestry Commission of N.S.W., the Associated Country Sawmillers of N.S.W., environmental experts and the general public. In addition there were discussions between the Forestry Commission and the State Pollution Control Commission and the latter decided there was no case for its involvement. It is hard to imagine what else could be said about Terania Creek. The area was visited by the Minister for Conservation and Water Resources, Mr. L. Gordon personally and, ultimately, through the full process of democracy, there emerged a decision at the highest level in which the T.N.F.A. Group secured a compromise, to wit no logging of the rainforest and selective logging of the hardwood stands.

The protesters at Terania Creek have defied that decision. This would appal most thinking Australians.

Signed,
C. E. Lemaire,
Murwillumbah.

A copy for the records.

Signed,
C. E. Lemaire,
Murwillumbah.

much of this account is anecdotal. No changes have been made against any individuals in spite of the large number of police present over the period in which these events are purported to have taken place. Relevance to the question of forest management?

Manufacturing Margin

This is the allowance made for converting the log into sawn timber, i.e. the milling process, and includes the sawmiller's profit. It is difficult to assess an average manufacturing margin even with mill studies for it is apparent that it is subject to a significant variation depending on mill design, volume throughput, general efficiency and other factors.

However, at this stage, variable manufacturing margins have not been introduced into the N.S.W. appraisal system.

Felling, Snigging and Loading

The cost allowance for felling, snigging and loading is variable and is assessed for each area being appraised. The main variables considered are average log size (gross), slope and snig distance but other variables such as dense or sparse undergrowth, rocky or wet ground conditions, low stand density and abnormal track construction are also appropriately recognised.

Log Haulage

The cost of log haul from bush to appraisal point is also allowed, roads being classified into four groups varying from highway standard to bush track.

Erosion Control

A variable allowance is made to cover the cost of snig track restoration and any other necessary work of a restorative nature on completion of each logging operation.

The way in which the above items are brought together to calculate the base stumpage rate for hardwood logs is illustrated in the attached stumpage appraisals for part of the Terania Creek basin.

Having determined the base stumpage rate for an area the royalty value of individual logs can be calculated taking cognisance of species, girth and defect.

Log Measurement

In tallying hardwood logs the following details are recorded - species, length, centre diameter under bark and defect. Defect will be "pipe" (i.e. the defect apparent in the end sections of the log) which is expressed as the side of a square, but additionally other defects may be allowed as length deductions.

The total defect is calculated and expressed as a volume so that both gross and nett volumes plus the defect volume are available for the subsequent calculations.

Size and Species

The N.S.W. sales system recognises that various sizes of logs and various species have different values.

Five diameter classes are presently used viz. 80 cm +, 60 - 79 cm, 40 - 59 cm, 30 - 39 cm and 20 - 29 cm. The base stumpage rate is calculated for a log in the 60 - 79 cm class, in Commission terminology a "medium" sized log.

Hardwood species are classified into four groups which are based on the characteristics and acceptability of the individual species. The base stumpage rate is calculated for a "Group B" log.

Margins above and below the base stumpage rate computed for a Group B medium log are applied to the nett volume of each log.

Allowance for Defect

A basic factor in the Commission's sales system for hardwood logs is the manner in which the allowance for defect is made. The logs are priced individually by first calculating the value of a defect free log (i.e. gross volume X base stumpage rate) from which is deducted the defect volume at the mill door log value plus the defect processing allowance.

For example, if one ignores margins for size and species, a log with a gross volume of 8.648 cubic metres and a defect volume of 2.685 cubic metres being sold from that part of Terania Creek listed on the sample stumpage appraisal would be priced:-

8.648 m ³	@ \$19-50	=	\$168-64
less 2.685 m ³	@ \$36-89	=	\$99-05
		Royalty	<u>\$69-59</u>

If the log was other than within the B medium class the value of the nett volume (5.963 m³) at the appropriate margin would be added to or subtracted from the royalty derived above.

This sales system was devised to not only achieve equity between sawmillers but also to encourage millers to utilise a more defective log. It will have been noted that the purchaser is allowed fully the cost of felling, snigging and haulage to mill of the defect volume plus the cost of processing the defect in the mill as a deduction when computing the log royalty. It will also be apparent that the actual stumpage per cubic metre gross will vary from log to log and that logs of high defect can theoretically have negative values.

In point of fact the Commission establishes minimum rates (presently 58 cents per cubic metre gross for hardwoods) and logs with this value are classified as optional i.e. the sawmiller has the option of taking them or not - normally such logs do not form part of the miller's volume quota.


MILL DOOR LOG VALUE APPRAISAL HARDWOOD SAWLOGS

Re-appraisal - 1st April, 1979

APPRAISAL POINT NIMBINDISTRICT CASINO

File Nos.: L.O. _____ D.O. _____ H.O. _____

APPRAISAL OF MILL DOOR LOG VALUE PER CUBIC METRE FOR GROUP "B" MEDIUM LOGS

Sawn value F.I.Y.	<u>BRISBANE</u>	\$154-80
Sawn Haul to Market	<u>190</u> km comprising :-	
	<u>Allowance</u>	
A <u>171</u> km		
B <u>19</u> km	<u>0-48</u>	
C _____ km	_____	
Total <u>190</u> km at Base A	<u>11-23</u>	
	Load and Unload	
	<u>1-40</u>	
	Total	
	<u>13-11</u>	<u>141-69</u>
Special Allowance (if any)	_____	
Sawn value mill yard		<u>141-69</u>
Manufacturing Margin		<u>80-50</u>
Value of log equivalent mill yard		<u>61-19</u>
M.D.L.V. per cu. m true volume at recovery of <u>48</u> %		<u>\$29-37</u>

Description of Appraisal Point:- NIMBIN POST OFFICEGeneral Description of Area Covered by Appraisal Point:- Southern section of Goonimbar State Forest and Terania Creek Section of Whian Whian State Forest.Compiled by K. Sharpe Forest Office CASINO Date 8/3/79Calculations checked by G. Hoosen Date 14/3/79Examined by P. A. Fisher Date 14/3/79Approved by (Marketing Officer) O'Neill Date 12/4/79

STUMPAGE APPRAISAL - HARDWOOD SAWLOGS

Special Licensee Standard Sawmilling Co, Pty. Ltd.,

Location of Mill SOUTH MURWILLUMBAH

Approved Appraisal Point Nimbin


Special License No. _____ Period _____ to _____

Area Whian Whian State Forest 173

Compartments 46S, 49

File A591

APPRAISAL OF BASE STUMPAGE RATE PER CUBIC METRE FOR GROUP 'B' MEDIUM LOGS

Approved M.D.L.V. per cubic metre			\$29.37
Logging Costs per cubic metre			
Fall Snig and Load	150 m	70 cu. m	\$4.28
Erosion Control			0.10
Log Haul to Appraisal Point comprising:-	36 km		
A	11 km		
B	13 km	.33	
C	10 km	1.20	
D	2 km	.60	
Total	36 km at Base A	3.72	
	Total	5.85	5.85
Special Allowance (if any)			10.23
Total Logging Costs			
Base Stumpage Rate			9.14

+ 0.36 (from 1/8/79)
19.50

Approved M.D.L.V. \$29.37 per cubic metre

Defect Processing Allowance 7.52 per cubic metre of defect

Total Allowance for defect 36.89 per cubic metre of defect

Approximate defect per cent above which Group 'B' medium logs may be excluded 51 %

Compiled by M. C. HARRIS Forest Office MURWILLUMBAH Date 10/5/79

Calculations checked by J. DALMAYER K. Sharpe 17/7/79 Date 10/5/79

Approved by (D.F. or A.D.F.) P.A. Fisher Date 24/7/79

Reverse side of Form F.C. 468

FALL SNIG AND LOAD 173/46S, 49

Average Log Size 4.51 - 5.25 m³

Average Distance 150 m

Slope - heavy	1 x	8	=	8	Allowances
slight	3 x	6	=	18	Open
gentle	1 x	8	=	8	Undergrowth
moderate	3 x	12	=	36	Rock
steep	2 x	16	=	32	Density
very steep	x		=		Excess tracks - 4%

Total = 102 Other _____

Average = 10.2 - 8%

Slope Adjustment =

Nett slope rating = 10.2

Daily snig volume = 76.6

Allowance = 6.128

Adjusted volume = 70.472 (70)

EROSION CONTROL

Average Slope 10⁰ - 20⁰

Erosion Class AEC = 10 cents/m³

HAUL

A	B	C	D	
11.6	12.5	9.2	1.8	= 35.1 km
11	13	10	2	= 36 km

Appendix 5.

The Rainforest Of The Terania Creek Basin.

Terania Creek, a tributary of Wilson's River which is the northern arm of the Richmond River passing through Lismore originates on the southern side of the Nightcap Range where it forms the boundary between Goonimbar S.F. to the west and Whian Whian S.F. to the east. Whereas Terania Creek once flowed through many kilometres of the original Big Scrub north of Lismore, the only natural vegetation remaining today is at its source on the above two state forests. There is local opposition to the logging of part of this forested headwaters on aesthetic, biological and road hazard grounds (vide submission of Terania Native Forest Action Group 1977 to State Government).

Two inspections of the forested Terania Creek basin were made on 13th April 1976 and 20th October 1977 to study the vegetation of the rainforest.

A. Topography

When proceeding up Terania Creek from The Channon township the valley narrows, until at the forest boundary there is little flat alluvial creekbank land and the hills commence close to the creek. Just over one km further upstream there are steep slopes on both sides of the creek due to opposing major spurs (see map). Above this point the valley broadens into a wide flat basin with steep slopes all round leading up to a line of cliffs in many places. About 700 m upstream, the creek forks around a prominent rocky plug arising from the valley floor with cliffs around most sides and blackbutt on top. The view from the top of the cliffs on the eastern side of the basin in the clearfelled area is certainly impressive and highlights the basin ringed by hills.

B. Geology and Soils

The geology is entirely related to the lava flows from the Mt. Warning shield volcano. There were three phases, namely:-

1. Lismore Basalt

This was the first phase and consisted of fluid lavas which flowed from Mt. Warning in all directions. To the south it reached Coraki on the lower Richmond and eventually weathered to form the rich red loams (krasnozems), of the Big Scrub. This is the soil of the Terania Creek valley right up to the forest boundary. Within the forest, the forest type map serves also as a geological and soils map. This is so because of the great differences in mineral composition and rate of weathering between the various laval phases. *Hence the bangalow palm forest (coloured light orange) also represents the exposure of the Lismore Basalt in the valley floor with varying degrees of contamination from the laval phase above.

2. Nimbin Rhyolite

The second phase was of a more viscous blocky lava, rhyolite, which piled up near side vents and fissures of Mt. Warning. This rock is much harder than the basalt; and hence the stream has worn away the basalt to form the floor of the valley. The resistant rhyolite remains as cliffs which erode by huge blocks breaking free from the vertical face to form steep rocky slopes at the base. Rhyolite has a very high proportion of silica; and eventually weathers to form a less fertile yellow earth. *The rhyolite is represented on the coloured forest type map by all the other colours except the light and dark oranges. Hence it represents all the sloping and steep areas.

3. Blue Knob Basalt.

This was a very restricted and final phase of laval outpourings forming a shallow capping along the Nightcap Range. Being soft and easily erodable, it is now only found in scattered localities such as on Blue Knob and the Gibbergunyah Range which forms the eastern boundary of the Terania Creek basin. *Hence it is represented on the forest type map by the dark orange on the eastern margin. Its contribution to the alluvium in Terania Creek would now be minimal; and hence it is of little importance in the basin.

The above sequence of basalt - rhyolite - basalt and the resulting topography, soils and vegetation is the common pattern throughout the McPherson Range from Springbrook in the east to Mt. Barney in the west along the Tweed and also the Nightcap Ranges.

C. Vegetation.

Whereas it is usual to find sub-tropical rainforest on krasnozem or alluvial soils derived from basalt and warm temperate rainforest on yellow earths from rhyolite, this pattern is complicated at Terania Creek by mixing of the two rocks and the abrupt change in topography. The attached species lists consist of the booyong - coachwood type (bangalow palm forest) on the alluvial flats and the coachwood type on the lower slopes. However, the former is an intimate mixture of at least four associations, depending upon the proximity to the stream and the proportion of rhyolite present.

1. Booyong - Coachwood Type.

This is type No. 5 of Baur which is a mixture of subtropical and warm temperate rainforest and is often known as "gully rainforest." Whereas conditions are better than those necessary for warm temperate rainforest (eg. coachwood), they are less than adequate for subtropical rainforest (eg. booyong). Hence elements of both these subforms can be recognised; but in addition there are the equivalent river bank species of each.

(a) Booyong - Yellow Carabeen Association.

Some of the species are found here which are typical of the "Big Scrub" further downstream, such as white booyong, yellow carabeen, strangler fig, giant stinging tree, sour cherry, purple cherry, red carabeen and bog onion. Some of the trees have reached a very great size, as in addition to good specimens of strangler figs and giant stinging trees there was one white beech which was estimated at 50 m tall, 250 cm diameter and 25 m to the first branch. A little further upstream was a grove of red cedars, three trees growing in close proximity were each 120 cm diameter and 50 m tall. A local resident, Mr. M. Murphy has found a total of 15 red cedar trees in this basin. However, there are many typical species absent such as, red bean, black bean, teak, yellowwood, black teak and bumpy ash. Generally it falls short of the luxuriance and variety of the Big Scrub.

(b) Bangalow Palm - Blue Fig Association.

Near the creek and particularly towards the forest boundary there are a number of species present which are typical of the riverine sub-tropical rainforest, such as:-

bangalow palms, blue fig, brown tamarind, maiden's blush, socketwood, brown beech, blueberry ash, velvet myrtle, white-bark walnut and red bopplenut. In the lower layers are straw tree-fern and helmholtzia.

(c) Coachwood - Corkwood Association.

This is a typical warm temperate rainforest association on rhyolitic soils, but here in Terania Creek many typical species are mixed in with the booyong - yellow carabeen association. In addition to coachwood and corkwood, there is also hoop pine, mountain wattle, Tasmanian laurel, grey possumwood, silver quandong, red ash and shrubby hazelwood. One fine specimen of red ash was estimated at 40 m tall and 120 cm diameter. This warm temperate rainforest component increases in importance upon proceeding upstream from the forest boundary until the narrow section of the valley is reached at about 1 km where rhyolite ridges on both sides come close to the creek. Further upstream in the broad basin there is little evidence of the warm temperate rainforest influence.

(d) Callicoma Association.

Downstream from the pinch just mentioned, there are thickets of callicoma and bonewood lining the creek and occupying recent alluvial deposits. These species are typical of riverine warm temperate rainforest.

It may at first seem strange that this mixture of four associations covering two rainforest subforms should be shown on the *type map as bangalow palm type. However, this *map was produced from aerial photographs which clearly showed a great abundance of starry-headed palm crowns amongst other larger trees. In the roaded southern half of the basin, the palms have tended to expand to fill in the gaps created by past logging. In due course the larger forest species should emerge through these palms to form a new canopy. However, further upstream from this logging there is an extensive area which does not appear to have been logged in recent times, yet contains only scattered clumps of trees with the intervening area also predominantly of palms. When viewed from above by plane or from the cliff tops it resembles a very heavily logged area, yet a ground inspection reveals no evidence of cutting as is found downstream, but there are a number of large rotting trees on the ground which have apparently died of natural causes. The cause of this vegetation pattern is indeed a mystery, as it is not repeated in other valleys to the best of my knowledge. One could postulate a blowdown from a particularly violent storm, a very fierce wildfire which burnt through the rainforest or perhaps excessive waterlogging during a very wet period. It is quite likely that an intensive research effort could provide the answer; but at the present time I am unable to evaluate its significance.

II. Coachwood and Brush Box Types.

*The forest type map shows a number of small areas coloured dark pinkish-red which are the coachwood type on the poorer rhyolitic yellow earth usually situated well above the valley. However, much of the brush box type *(mauve) consists of very large trees with a well developed coachwood rainforest beneath, as included in the second species list. This may represent an advanced seral stage following fire several centuries earlier; and that with the eventual death of the brush box, the climax coachwood rainforest will be produced (similar to the Norman Jolly Memorial Grove on Moonpar S.F. in the Dorrigo area). If this is so, then eventually the booyong - coachwood type in the valley will be surrounded by a considerable area of the coachwood type on the rocky rhyolite slopes.

*It is interesting to observe that on the western side of the creek, this brush box type extends to the base of the cliffs whilst the blackbutt type (coloured green) is mostly confined to the forest above the cliffs. However, on the eastern side of the creek the blackbutt extends well below the cliffs and in places almost to the creek. This can be explained by the necessity for fire as a prerequisite for

refutes statement p 26

microclimate effects cf. p. 25

blackbutt regeneration; and hence the drier western aspect east of the creek would permit such fires to burn further down that slope.

Floristically this coachwood type contains several species with discontinuous distributions. Both mangobark and pink cherry occur in the Eastern Dorrigo and then again on Whian Whian - Nullum S.F.'s. They are both represented in the Nightcap Track Flora Reserve at the head of Terania Creek however.

Possible Effects of Logging on the Rainforest.

If it is assumed that the 50% canopy retention prescription will apply to any logging of the booyong - coachwood gully type, then there is very little which could be logged due to past logging and the "natural" open nature of the northern section. It would of course be silvicultural suicide to pretend that the palms are part of the permanent canopy and could therefore be included in the 50% to be retained.

If logging is mainly aimed at the brush box type, which would appear more likely, then the intensity of logging will determine the degree of damage to the coachwood rainforest beneath and its ability to recover. Because the trees to be removed are mainly veterans with large spreading crowns and are on steep to moderately steep slopes, damage downslope could be greater than if the trees were smaller and on gentler topography. Logging under these conditions must also cause some damage to the gully rainforest near the type boundary.

Because of the unknown causes of origin of the "natural" palm forest, any disturbance upslope may be risky and may perhaps jeopardise its future. This certainly needs careful investigation.

Conclusions on Vegetation.

1. Terania Creek basin is an attractive and compact area with much of vegetational interest, particularly as regards the mixture of plant communities.

2. Although there are some fine individual specimens of trees (red cedar, white beech and red ash), there do not appear to be any unusual or rare species not already preserved elsewhere on these forests.

3. The extensive apparently natural palm forests at the head of the creek could be of ecological interest as they must surely be the greatest area of this type in N.S.W. Further comment on their significance is impossible without factual information on how they were formed and whether they represent a passing phase or a stable community.

A.G. FLOYD,
Research Scientist.

14th December, 1977.

* Maps NOT included in this Appendix - refer to Map 2 in the Report for forest types (untinted).

Compare map 2 with Floyd's maps compare naming of forest types

Maps not equivalent, nor are forest type des^{n.s.} map 2 identifies forest types by commercial species only.

VEGETATION LIST

TERANIA CREEK BASIN

I. BOOYONG - COACHWOOD TYPE. Alluvial Flats

A. <u>Trees</u>			<u>Abundance</u>
ARAUCARIACEAE	<i>Araucaria cunninghamii</i>	Hoop Pine	0
PALMAE	<i>Archontophoenix cunninghamiana</i>	Bangalow Palm	VC
MORACEAE	<i>Ficus coronata</i>	Creek Sandpaper Fig	C
	<i>Ficus watkinsiana</i>	Strangler Fig	0
URTICACEAE	<i>Dendrocnide excelsa</i>	Giant Stinging Tree	C
	<i>Dendrocnide photinophylla</i>	Shining-leaved Stinging Tree	0
PROTEACEAE	<i>Hicksbeachia pinnatifolia</i>	Red Boppel Nut	C
	<i>Orites excelsa</i>	Prickly Ash	0
EUPOMATIACEAE	<i>Eupomatia laurina</i>	Bolwarra	R
MONIMIACEAE	<i>Daphnandra micrantha</i>	Socketwood	0
LAURACEAE	<i>Beilschmiedia elliptica</i>	Grey Walnut	R
	<i>Cryptocarya meissneri</i>	Thick-leaved Laurel	R
	<i>Cryptocarya obovata</i>	Pepperberry	R
	<i>Endiandra hayesii</i>	Rusty Rose Walnut	R
	<i>Endiandra pubens</i>	White Bark Walnut	0
	<i>Litsea leefeana</i>	Brown Bolly Gum	R
	<i>Neolitsea dealbata</i>	White Bolly Gum	0
ESCALLONIACEAE	<i>Anopterus macleayanus</i>	Tasmanian Laurel	R
	<i>Cuttsia viburnea</i>	Elderberry	0
	<i>Quintinia verdonii</i>	Grey Possumwood	0
PITTOSPORACEAE	<i>Hymenosporum flavum</i>	Native Frangipani	R
CUNONIACEAE	<i>Ackama paniculata</i>	Corkwood	C
	* <i>Callicoma serratifolia</i>	Callicoma	C
	<i>Ceratopetalum apetalum</i>	Coachwood	0
	<i>Geissois benthami</i>	Red Carabeen	VC
MIMOSACEAE	<i>Acacia melanoxylon</i>	Blackwood	0
	<i>Acacia orites</i>	Mountain Wattle	R
	<i>Abarema sapindoides</i>	Snow-wood	R
RUTACEAE	<i>Acronychia pubescens</i>	Hairy Acronychia	0
	* <i>Bosistoa euodiiformis</i>	Bonewood	0
MELIACEAE	<i>Dysoxylum fraseranum</i>	Rosewood	R
	<i>Pseudocarapa nitidula</i>	Bog Onion	0

MELIACEAE	<i>Toona australis</i>	Red Cedar	O
EUPHORBIACEAE	<i>Baloghia lucida</i>	Brush Bloodwood	C
	<i>Claoxylon australe</i>	Brittlewood	C
ICACINACEAE	<i>Citronella moorei</i>	Soapy Box	R
	<i>Pennantia cunninghamii</i>	Brown Beech	R
SAPINDACEAE	<i>Castanospora alphandii</i>	Brown Tamarind	O
	<i>Harpullia alata</i>	Wing-leaved Tulip	O
	<i>Rapuhia parvula</i>	Satin Tulipwood	R
	<i>Sarcopteryx stipitata</i>	Steelwood	R
AKANIAACEAE	<i>Akania lucens</i>	Turnipwood	O
RHAMNACEAE	<i>Alphitonia excelsa</i>	Red Ash	O
ELAEOCARPACEAE	* <i>Elaeocarpus grandis</i>	Blue Fig	C
	<i>Elaeocarpus kirtonii</i>	Silver Quandong	R
	<i>Elaeocarpus obovatus</i>	Blueberry Ash	R
	<i>Elaeocarpus reticulatus</i>	Lily-of-the-Valley Tree	R
	<i>Sloanea australis</i>	Maidens Blush	VC
	<i>Sloanea woollsii</i>	Yellow Carabeen	VC
STERCULIACEAE	<i>Brachychiton acerifolium</i>	Flame Tree	R
	<i>Commersonia bartramia</i>	Brown Kurrajong	C
	<i>Heritiera trifoliolata</i>	White Booyong	C
	<i>Heritiera actinophylla</i>	Black Booyong	R
MYRTACEAE	<i>Acmena australis</i>	Red Apple	R
	* <i>Austromyrtus lasioclada</i>	Velvet Myrtle	O
	<i>Rhodomyrtus beckleri</i>	Rose Myrtle	O
	<i>Syzygium coolminianum</i>	Blue Cherry	R
	<i>Syzygium corynanthum</i>	Sour Cherry	R
	<i>Syzygium crebrinerve</i>	Purple Cherry	O
	<i>Syzygium luehmannii</i>	Small-leaved Water Gum	O
ARALIACEAE	<i>Polyscias murrayi</i>	Pencil Cedar	O
EPACRIDACEAE	<i>Polyscias elegans</i>		
	<i>Trochocarpa laurina</i>	Tree Heath	O
SAPOTACEAE	<i>Planchcnella australis</i>	Black Apple	O
BORAGINACEAE	<i>Ehretia acuminata</i>	Koda	R
VERBENACEAE	<i>Gmelina leichhardtii</i>	White Beech	R
 B. <u>Shrubs</u>			
CYATHEACEAE	<i>Cyathea cooperi</i>	Straw Tree-fern	C
	<i>Cyathea leichhardtiana</i>	Prickly Tree-fern	C
PROTEACEAE	<i>Triunia youngiana</i>	Native Honeysuckle	C

MONIMIACEAE	<i>Wilkiea austroqueenslandica</i>	Furry-flowered Wilkiea	0
CAPPARIDACEAE	<i>Capparis arborea</i>	Native Pomegranate	0
MYRSINACEAE	<i>Rapanea subsessilis</i>	Short-stalked Muttonwood	0
SYMPLOCACEAE	<i>Symplocos bauerlenii</i>	Shrubby Hazelwood	R
SOLANACEAE	<i>Duboisia myoporoides</i>	Soft Corkwood	R

C. Herbs

ATHYRIACEAE	<i>Athyrium assimile</i>	Small Lady-fern	0
	<i>Athyrium dilatatum</i>	Giant Lady-fern	0
BLECHNACEAE	<i>Blechnum nudum</i>	Fishbone Water-fern	VC
	<i>Blechnum patersoni</i>	Strap Water-fern	0
GLEICHENIACEAE	<i>Sticherus flabellatus</i>	Shiny Fan Fern	VC
PHILYDRACEAE	* <i>Orthothylax glaberrima</i>		C
URTICACEAE	* <i>Elatostemma reticulatum</i>	Smooth Nettle	C

* Species restricted to creek banks.

II. COACHWOOD TYPE. Lower slopes on rhyolite.

A. Trees

CASUARINACEAE	<i>Casuarina torulosa</i>	Forest Oak	C
PROTEACEAE	<i>Orites excelsa</i>	Prickly Ash	O
	<i>Helicia ferruginea</i>	Rusty Oak	R
LAURACEAE	<i>Cinnamomum oliveri</i>	Oliver's Sassafras	O
	<i>Cryptocarya meissneri</i>	Thick-leaved Laurel	O
	<i>Endiandra discolor</i>	Domatia Tree	O
ESCALLONIACEAE	<i>Quintinia sieberi</i>	Brown Possum Wood	C
CUNONIACEAE	<i>Ceratopetalum apetalum</i>	Coachwood	VC
	<i>Schizomeria ovata</i>	Crabapple	O
BURSERACEAE	<i>Canarium australasicum</i>	Mango Bark	C
EUPHORBIACEAE	<i>Austrobuxus swainii</i>	Pink Cherry	O
ELAEOCARPACEAE	<i>Elaeocarpus kirtonii</i>	Silver Quandong	C
MYRTACEAE	<i>Rhodamnia trinervia</i>	Scrub Turpentine	O
	<i>Syncarpia glomulifera</i>	Turpentine	O
	<i>Syzygium crebrinerve</i>	Blue Cherry	R
	<i>Tristania conferta</i>	Brush Box	VC

B. Shrubs

CYATHEACEAE	<i>Cyathea australis</i>	Rough Tree-fern	C
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C. Herbs

CYPERACEAE	<i>Lepidosperma canescens</i>	Rifle Grass	VC
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LEGEND

VC = Very Common

C = Common

O = Occasional

R = Rare

Appendix 6.

Fauna lists for Terania Creek Section of Whian Whian and Goonimbar State Forests

Mammals

Platypus
Pademelon
Short nosed bandicoot
Common ringtail
Grey headed flying fox

Ornithorhynchus anatinus
Thylogale sp,
Isoodon obesules
Pseudocheirus peregrinus
Pteropus poliocephalus

Birds

Birds of the Terania Creek section of Whian Whian and
Goonimbar State Forests. Prepared by Mr. M. Trudgeon
Hon. Life member N.S.W. Gould League and Member R.A.O.U.
and N.S.W. Field Ornithologists.

Little grebe
Black cormorant
Little black cormorant
Little pied cormorant
Darter
White faced heron
Black swan
Black duck
White eyed duck
Musk duck
Grey goshawk
Wedgetailed eagle
Whistling kite
Black-shouldered kite
Nankeen kestrel
Brush turkey
Black breasted quail
Dusky moorhen
Swamphen
Lotus bird
Spurwinged plover
Black-fronted dotterel
Eastern curlew
Redcrowned pigeon
Wompoo pigeon
Topknot pigeon
Brown pigeon
White-headed pigeon
Bar-shouldered dove
Peaceful dove
Green-winged pigeon
Crested pigeon
Wonga pigeon
Rainbow lorikeet
Scaly-breasted lorikeet
Little lorikeet
Yellow-tailed black cockatoo
Sulphur crested cockatoo
King parrot
Crimson rosella
Pale-headed rosella
Eastern rosella
Brush cuckoo
Fantailed cuckoo
Golden bronze cuckoo

Podiceps novaehollandiae
Phalacrocorax carbo
Phalacrocorax sulcirostris
Phalacrocorax melanoleucos
Anhinga rufa
Ardea novaehollandiae
Cygnus atratus
Anas superciliosa
Aythya australis
Biziura lobata
Accipiter novaehollandiae
Aquila audax
Haliastur sphenurus
Elanus notatus
Falco cenchroides
Alectura lathami
Turnix melanogaster
Gallinula tenebrosa
Porphyrio porphyrio
Jacana gallinacea
Vanellus miles novaehollandiae
Charadrius melanops
Numenius madagascariensis
Ptilinopus regina
Megaloprepia magnifica
Lopholaimus antarcticus
Macropygia amboinensis
Columba norfolciensis
Geopelia numeralis
Geopelia striata
Chalcophaps indica
Ocyphaps lophotes
Leucosarcia melanoleuca
Trichoglossus haematodus
Trichoglossus chlorolepidotus
Glossopsitta pusilla
Calyptorhynchus funereus funereus
Cacatua galerita
Alisterus scapularis
Platycercus elegans
Platycercus adscitus
Platycercus eximius
Cacomantis variolosus
Cacomantis pyrrhophanus
Chrysococcyx lucidus plagosus

Koel	<i>Eudynamys scolopacea</i>
Pheasant coucal	<i>Centropus phasianinus</i>
Boobook Owl	<i>Ninox novaeseelandiae</i>
Tawny frogmouth	<i>Podargus strigoides</i>
Spine-tailed swift	<i>Hirundapus caudacutus</i>
Azure kingfisher	<i>Alcyon azurea</i>
Kookaburra	<i>Dacelo gigas</i>
Forest kingfisher	<i>Halcyon macleayi</i>
Sacred kingfisher	<i>Halcyon sancta</i>
Rainbow bird	<i>Merops ornatus</i>
Dollar bird	<i>Eurystomus orientalis</i>
Noisy pitta	<i>Pitta versicolor</i>
Albert lyrebird	<i>Menura alberti</i>
Welcome swallow	<i>Hirundo neoxena</i>
Tree martin	<i>Petrochelidon nigricans</i>
Fairy martin	<i>Petrochelidon ariel</i>
Black-faced cuckoo shrike	<i>Coracina novaehollandiae</i>
Little cuckoo-shrike	<i>Coracina papuensis</i>
Cicada bird	<i>Coracina tenuirostris</i>
Varied triller	<i>Lalage leucomela</i>
Grey fantail	<i>Rhipidura fuliginosa</i>
Rufous fantail	<i>Rhipidura rufifrons</i>
Leaden flycatcher	<i>Myiagra rubecula</i>
Scissor grinder	<i>Myiagra inquieta</i>
Rose robin	<i>Petroica rosea</i>
Blackfaced flycatcher	<i>Monarcha melanopsis</i>
Spectacled flycatcher	<i>Monarcha trivirgata</i>
Yellow robin	<i>Eopsaltria australis</i>
Pale yellow robin	<i>Eopsaltria capito</i>
Golden whistler	<i>Pachycephala pectoralis</i>
Rufous whistler	<i>Pachycephala rufiventris</i>
Grey shrike thrush	<i>Colluricincla harmonica</i>
Rufous shrike-thrush	<i>Colluricincla megarhyncha</i>
Eastern shrike tit	<i>Falcunculus frontatus</i>
Eastern whip bird	<i>Psophodes olivaceus</i>
Southern log runner	<i>Orthonyx temminckii</i>
Mountain thrush	<i>Zoothera dauma</i>
White-throated warbler	<i>Gerygone olivacea</i>
Brown warbler	<i>Gerygone mouki</i>
Striated thornbill	<i>Acanthiza lineata</i>
Little thornbill	<i>Acanthiza nana</i>
Brown thornbill	<i>Acanthiza pusilla</i>
White-browed scrub-wren	<i>Sericornis frontalis frontalis</i>
Large-billed scrub-wren	<i>Sericornis magnirostris</i>
Yellow-throated scrub-wren	<i>Sericornis lathamii</i>
Superb blue wren	<i>Malurus cyaneus</i>
Variegated wren	<i>Malurus lamberti</i>
Red-backed wren	<i>Malurus melanocephalus</i>
Golden-headed fantail-warbler	<i>Cisticola exilis</i>
Pipit	<i>Anthus novaeseelandiae</i>
White-throated tree-creeper	<i>Climacteris leucophaea</i>
Red-browed tree creeper	<i>Climacteris erythroptera</i>
White-headed sittella	<i>Neositta leucocephala</i>
Mistletoe bird	<i>Dicaeum hirundinaceum</i>
Spotted pardalote	<i>Pardalotus punctatus</i>
Eastern striated pardalote	<i>Pardalotus striatus</i>
Black-headed pardalote	<i>Pardalotus melanocephalus</i>
White-naped honeyeater	<i>Melithreptus lunatus</i>
Scarlet honeyeater	<i>Myzomela sanguinolenta</i>
Lewin honeyeater	<i>Meliphaga lewinii</i>
Yellow-faced honeyeater	<i>Meliphaga chrysops</i>
Bell miner	<i>Manorina melanophrys</i>
Noisy miner	<i>Manorina melanocephala</i>
Noisy friar-bird	<i>Philemon corniculatus</i>
Eastern silvereye	<i>Zosterops lateralis</i>
House sparrow	<i>Passer domesticus</i>
Red-browed finch	<i>Aegintha temporalis</i>
Starling	<i>Sturnus vulgaris</i>

Olive-backed oriole
Southern figbird
Spangled drongo
Crow
Pied currawong
Pied butcherbird
Grey butcherbird
Black-backed magpie
Magpie lark
Green catbird
Satin bowerbird
Regent bowerbird
Paradise riflebird

Oriolus sagittatus
Sphecotheres vieillotii
Dicrurus bracteatus
Corvus orru
Strepera graculina
Cracticus nigrogularis
Cracticus torquatus
Gymnorhina tibicen
Grallina cyanoleuca
Ailuroedus crassirostris
Ptilonorhynchus violaceus
Sericulus chrysocephalus
Ptiloris paradiseus

The Wildlife Research group Queensland, have recorded additional species in this locality.

Crested Hawk
Bush hen
Sooty owl
Powerful owl
Owlet nightjar
Eastern spinebill
Little friarbird

Aviceda subcristata
Amaurornis olivaceus
Tyto tenebricosa
Ninox strenua
Aegotheles cristata
Acanthorhynchus tenuirostris
Philemon citreogularis

Additional species have been recorded for Terania Creek by H. Nicholson, J. A. Broadbent and W. Boles.

Brown hawk (falcon)
Banded landrail
Marbled frogmouth
White-throated nightjar

Falco berigora
Rallus philippensis
Podargus ocellatus (plumiferus)
Eurostopodus mystacalis

Reptiles and Amphibians

Yellow bellied legless skink
Grass skink
Common legless skink
Water dragon
Marsupial frog
Tusked frog
Giant barred river frog
Brown marsh frog
Common froglet
Pearson tree frog

Anomalopus truncatus
Lampropholis guichenoti
Sphenomorphus scrutirostrum
Psysignathus leseurii
Assa darlingtoni
Adelotus brevis
Mixophyes iteratus
Limnodynastes peronii
Ranidella signifera
Literia pearsonianna

Molluscs

The Australian Museum data from Northern N.S.W. is partially processed and a partial list of molluscs follows:

RHYTIDIDAE

Echotrida strangeoides strangeoides (Cox)
Strangesta leichhardti (Cox)

ACAVIDAE

Hedleyella falconari (Grey)

PATULIDAE

Gyrocochlea omicron (Pfeiffer)
G. Vinitincta (Cox)
Gyrocochlea sp. Nov. 5
Gyrocochlea sp. Nov. 7

Pernagera brazieri (Cox)
Setomelea seticostata (Hedley)

PHENACOHÉLICIDAE

Oreokera corticicola (Cox)

PUNCTIDAE

Still to be identified

NITORIDAE

Nitor subrugatus (Reeve)

HELICARIONIDAE

Mysticarion leucospira (Pfeiffer)

CYSTOPELTIDAE

Cystopelta astra Iredale

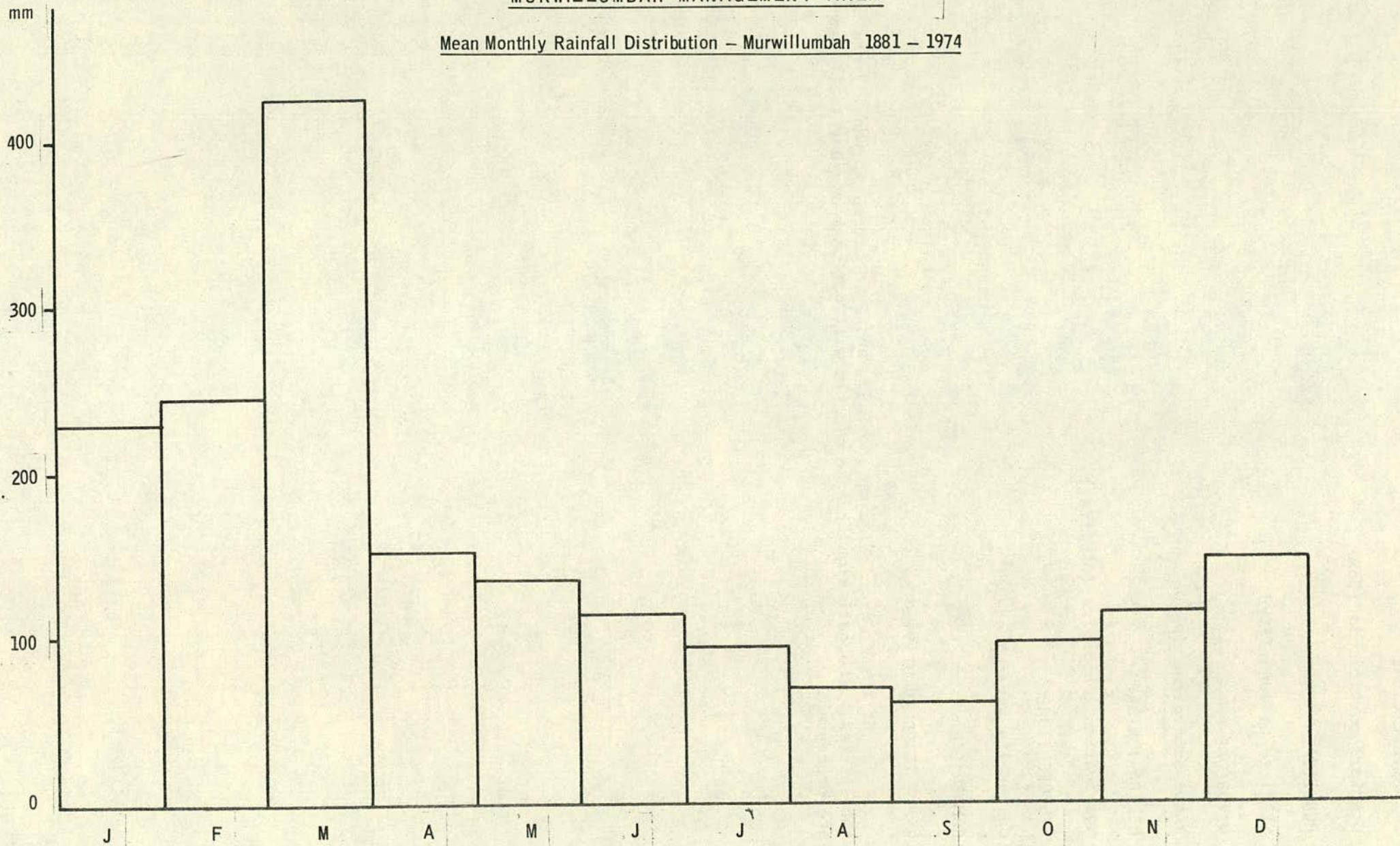
CAMAENIDAE

Still to be identified

Of these *Gyrocochlea* sp. Nov. 5., and *Gyrocochlea* sp. Nov. 7 are new sub-species. The full significance of this will not be known until all samples are processed.

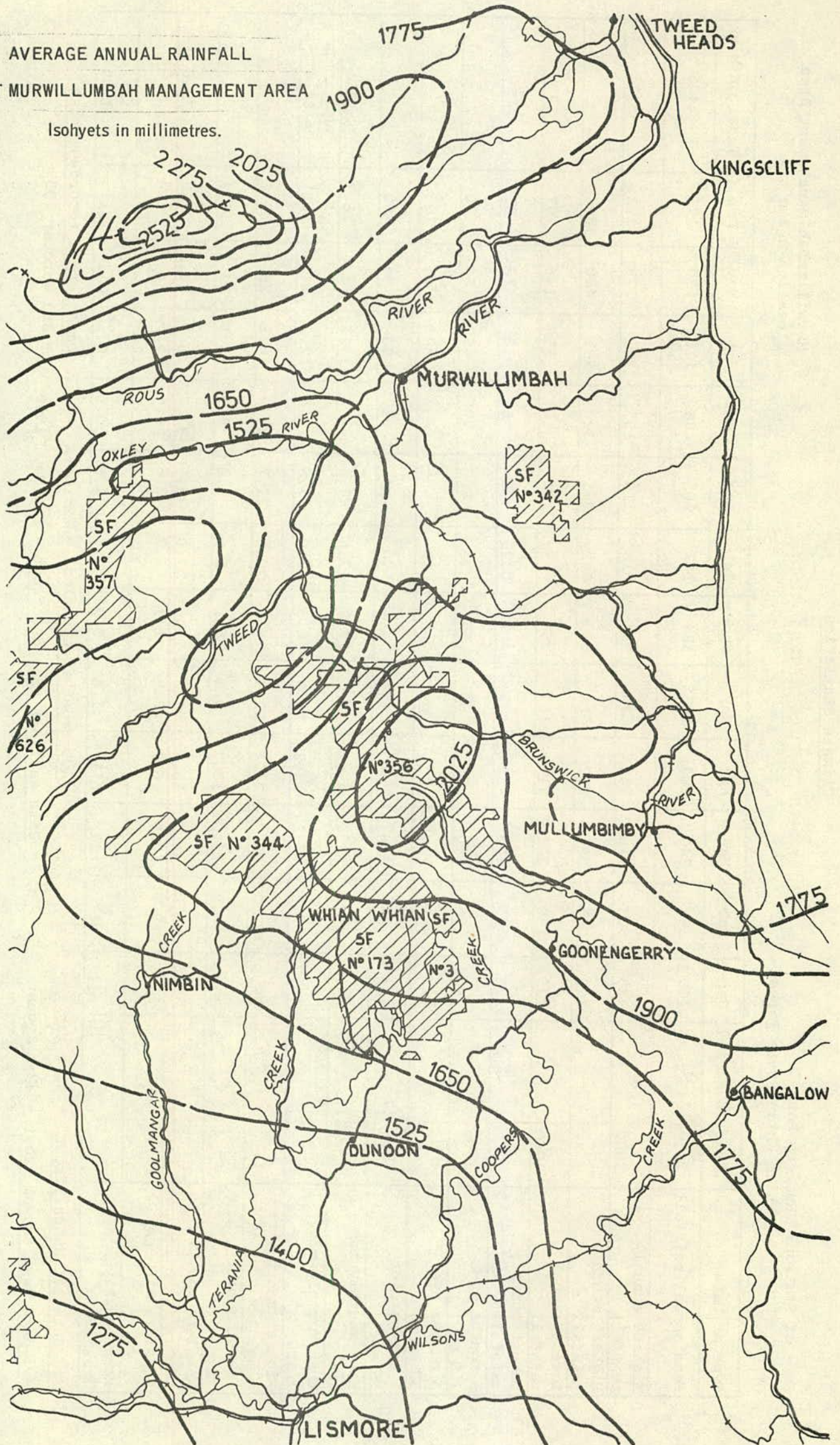
MURWILLUMBAH MANAGEMENT AREA

Mean Monthly Rainfall Distribution - Murwillumbah 1881 - 1974



AVERAGE ANNUAL RAINFALL
PART MURWILLUMBAH MANAGEMENT AREA

Isohyets in millimetres.



Climate Statistics

Name of Station: Rummery Park
Whian Whian State Forest

Murwillumbah Management Area
elevation 368 m

Appendix 9.

Type of Data	Year or Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total or Mean
Mean annual rainfall	20 years	360	388	340	202	165	184	157	105	86	116	130	172	2405
Highest annual rainfall	1950	320	503	418	245	78	534	610	119	155	291	279	192	3744
Highest monthly rainfall		760	1058	594	487	524	623	642	425	320	291	480	504	
Lowest annual rainfall	1960	135	150	203	112	157	68	73	24	16	75	140	97	1250
Lowest monthly rainfall		78	65	103	18	9	2	0.25	6	6	8	18	63	
% months over 100 mm		90	90	100	70	60	55	35	40	20	45	60	60	
% months over 50 mm		100	100	100	85	85	80	65	60	65	80	65	100	
% months over 25 mm		100	100	100	95	95	85	70	80	85	90	95	100	
Mean monthly max temp.	20 years	25.6	25.6	24.4	22.2	20.0	17.8	17.8	18.9	21.1	23.3	25.6	26.7	22.4
Mean monthly min temp.		16.7	17.2	16.1	13.3	10.0	8.3	7.2	7.8	9.4	12.2	14.4	16.1	12.4
Highest monthly max temp.		28.3	27.2	26.7	24.4	22.8	19.4	20.0	21.7	22.2	26.1	28.9	29.4	
Lowest monthly min temp		15.0	16.7	15.0	11.7	9.4	6.1	5.6	5.6	8.9	11.1	13.3	14.4	
Absolute max temp.	16 years	37.8	40.0	34.4	30.6	27.8	25.6	27.8	33.9	31.7	38.9	37.8	37.2	33.6
Absolute min temp	(1946-61)	11.1	11.7	10.0	6.7	2.2	1.7	1.7	2.8	4.4	5.6	7.2	7.2	6.0
Mean monthly frosts		nil	nil	nil	nil	1.4	3.9	7.5	4.5	0.5	0.1	nil	nil	17.9

Av. date 1st annual frost - 31st May

Av. frost free period - 227 days

Date latest recorded frost

Av. date last annual frost - 27th August

Date earliest recorded frost - 9th May, 1960

- 3rd October 1957

Extract from Water Quality in N.S.W. State Forests:

1. Whian Whian State Forest
(catchment of Rocky Creek Dam, Lismore)
unpublished report by
P. M. CORNISH
Forestry Commission of N.S.W.
November 1979.

Summary

This paper examines the effect of hardwood logging on stream Turbidity and Electrical Conductivity values in Rocky Creek, and compares these values with those in Little Rocky Creek where no logging took place during the study period, August, 1974 - May, 1976. While logging affected Turbidity values, particularly during very wet periods, water entering the Dam from both streams was of good quality most of the time.

ResultsTurbidity

Turbidity results are summarized in Table 2 below. Units are Nephelometric Turbidity Units (N.T.U.).

TABLE 2

	<u>Rocky Creek</u>	<u>Little Rocky Creek</u>
Mean	4.6	4.1
s	5.0	2.5
Range	1.3-35.1	1.0-16.7
Median	3.4	3.7

Means are not significantly different.

DiscussionTurbidity

The mean Turbidity value for each stream is below 5 N.T.U., the maximum value recommended by the World Health Organisation for treated water. Furthermore a frequency distribution of values indicates that about 78% of samples from each stream are 5 N.T.U. or less. However the mean and maximum values for Rocky Creek are greater than those for Little Rocky Creek, and this suggests that current logging operations have increased stream sediment levels somewhat in Rocky Creek during storm events.

To assess how Turbidity varied temporally during the study period the following procedure was adopted. For each sampling date the ratio of the Turbidity of Rocky Creek to that of Little Rocky Creek was calculated. The three week moving average of these ratios was then plotted versus time in Figures 4(a) and 4(b). Ratios >1 indicate Rocky Creek Turbidity is > Little Rocky Creek and vice versa. Also indicated in Figures 4(a) and 4(b) are the weekly rainfall totals and periods of logging and roading activity in Rocky Creek catchment, Figures 4(a) and 4(b), can be interpreted as follows:-

- . Sept.-Oct. 1974 - Short periods of logging and roading in R.C. (Rocky Creek). Little rain. Turbidity ratio <1 , indicating that either previous logging in L.R.C. (Little Rocky Creek) was influencing values more than present logging in R.C., or that the base flow Turbidity levels in L.R.C. may naturally be $>$ those in R.C.
- . Nov.-Dec. 1974 - Ratios increased to >1 as a consequence of the logging in R.C. in Nov.-Dec. Some machinery movement across the creek occurred at this time. Moderate rain occurred during the logging period.
- . Jan.-Mar. 1975 - Ratios basically remained >1 . There was some logging in Jan., but it only appears to have affected Turbidities after the considerable Feb.-Mar. rain.
- . April 1975 - Although rainfall was low the logging in R.C. in April affected Turbidity levels considerably.
- . May-July 1975 - A period of low rainfall. Ratios became <1 in June, although there was some logging and roading in R.C. during the period.
- . August 1975 - Ratios again became >1 during a period in which no logging or roading activity was recorded, and rainfall was low. These values are difficult to explain.
- . Sept.-Oct. 1975 - Ratios again became <1 . Rainfall was moderate and a small amount of logging and roading took place.
- . November 1975 - The logging and roading (coupled with moderate rainfall) seem to be responsible for the increased ratios.
- . Dec. 1975 - May 1976 - The two short periods of logging do not appear to have influenced the ratio greatly. Considerable rain fell in the first half of this period and seems to have had a greater effect on Turbidities in R.C. than those in L.R.C. Ratios returned to <1 in April and May when rainfall was lower.

In summary there was a tendency for Turbidities in R.C. $>$ L.R.C. when logging activities took place in R.C., and considerable rain fell. Turbidities in L.R.C. $>$ R.C. during periods of little or no logging in R.C., and when rainfall was low. There was a tendency for the baseflow Turbidity levels in L.R.C. $>$ R.C. The Turbidity levels in R.C. were considerably increased by machinery movement across the creek itself. The Turbidity levels in R.C. were in no way excessive, even during periods of logging, and compared favourably with levels observed in other logged hardwood areas of N.S.W., and in virgin moist hardwood catchments at Karuah.

Conclusions

- . Turbidity levels in both Rocky Creek and Little Rocky Creek were at or below recommended levels for treated water on 78% of the sampled weeks.
- . Logging activities in Rocky Creek during wet periods increased Turbidity levels relative to those in Little Rocky Creek.
- . These measured peak Turbidities were not excessive in either stream in comparison to logged and unlogged hardwood forest in other parts of coastal N.S.W.

- . Baseflow Turbidities tended to be higher in Little Rocky Creek due possibly to previous logging in this catchment, or, more probably, to inherent catchment differences.
- . Turbidities in Rocky Creek during logging were increased when machinery crossed the creek bed.
- . Slight differences in Electrical Conductivity values between streams can be attributed to geological differences in the catchments.
- . Electrical Conductivity values indicate low Total Dissolved Solids in water entering Rocky Creek Dam.

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* * * * *

GLOSSARY

- Brushwood: Timber-producing species that occur in rainforest or as rainforest understorey in moist hardwood forest. (q.v.)
- Closed Nutrient Cycle: The biological nutrient cycle in which plant nutrients circulate between the atmosphere, plant and soil/humus complex at such a rate that nutrients either accumulate within the system or remain at constant level.
- Crown Sawmill: A privately owned sawmill licensed under the Forestry Act 1916, which has been allocated an annual quota of sawlog timber from Crown-timber lands.
- Crown-timber lands: Lands over which the Forestry Commission of N.S.W., under the provisions of the Forestry Act 1916, has responsibility for timber resources.
- Epiphyte: A plant growing on, but not nourished by, another plant.
- Flora Reserve: Part of a State Forest set aside under the provisions of the Forestry Act 1916 for the preservation of representative ecological systems. A Flora Reserve may only be revoked by Act of Parliament.
- Forest Preserve: An area set aside and excluded from logging under the Forestry Commission's native forest preservation programme; this is often a preliminary reservation prior to notification as a Flora Reserve. (c.f. preserved area).
- Forest Type: Any group of tree-dominated ecosystems which possesses a general similarity in composition and character.
- Gross Sawlog Volume: Total volume of sawlogs (measured individually as cylinders) before any defect allowance is made.
- Hardwood: Particularly in the context of this report any of the woody-fruited myrtaceous species of trees (in this case *Eucalyptus* spp., Brushbox and Turpentine) which dominate sclerophyll forest (q.v.)
- Landing (syn. log dump): Cleared site where logs are assembled, after snigging from the stump, for loading on to log trucks for haulage to mill.
- Management Area: An aggregation of forest lands for which a single set of management objectives and a uniform management strategy apply, and which can be managed and administered as a unit and covered by a single management plan.

Management Plan: A written document systematically outlining forest management objectives and strategy and their factual basis, and aimed at achieving continuity of policy and action through prescriptions controlling activities on a management area over a period of years (the plan period).

National Forest: A State Forest under the Forestry Act 1916, or part thereof, which has been declared a National Forest by notification in the Government Gazette. These forests may only be revoked by Act of Parliament. (c.f. State Forest revocation by resolution).

National Park: Land reserved as such under the provisions of the National Parks and Wildlife Service Act 1974.

Nature Reserve: Land dedicated as such under the provisions of the National Parks and Wildlife Service Act 1974.

Nett Sawlog Volume: Total volume of sawlogs (measured individually as cylinders) less any allowance for defect, either internal defects commonly called 'pipe', or external defects due to limbs, bumps, bends etc.

Parcel Sale: An allocation of sawlogs other than annual quota, made without promise of continuity.

Prescribed Yield: The volume of sawlogs or other forest products prescribed for removal each year in the management plan for a management area.

Preserved Area: Any area of State Forest excluded from logging. This includes Flora Reserves, Forest Preserves and areas set aside from logging by management prescription.

Quota: An annual allocation of sawlog volume to a licenced sawmill on a continuing basis. Quotas are subject to annual review and may be varied by the Forestry Commission at its discretion.

Rainforest: *an accepted def'n?*
A dense community of moisture-loving trees, mainly of broadleaved, evergreen species; generally numerous species of trees are present, with the tree crowns tending to be arranged in several layers; the community also usually contains life-forms such as vines, epiphytes, palms, buttressed stems and stranglers,

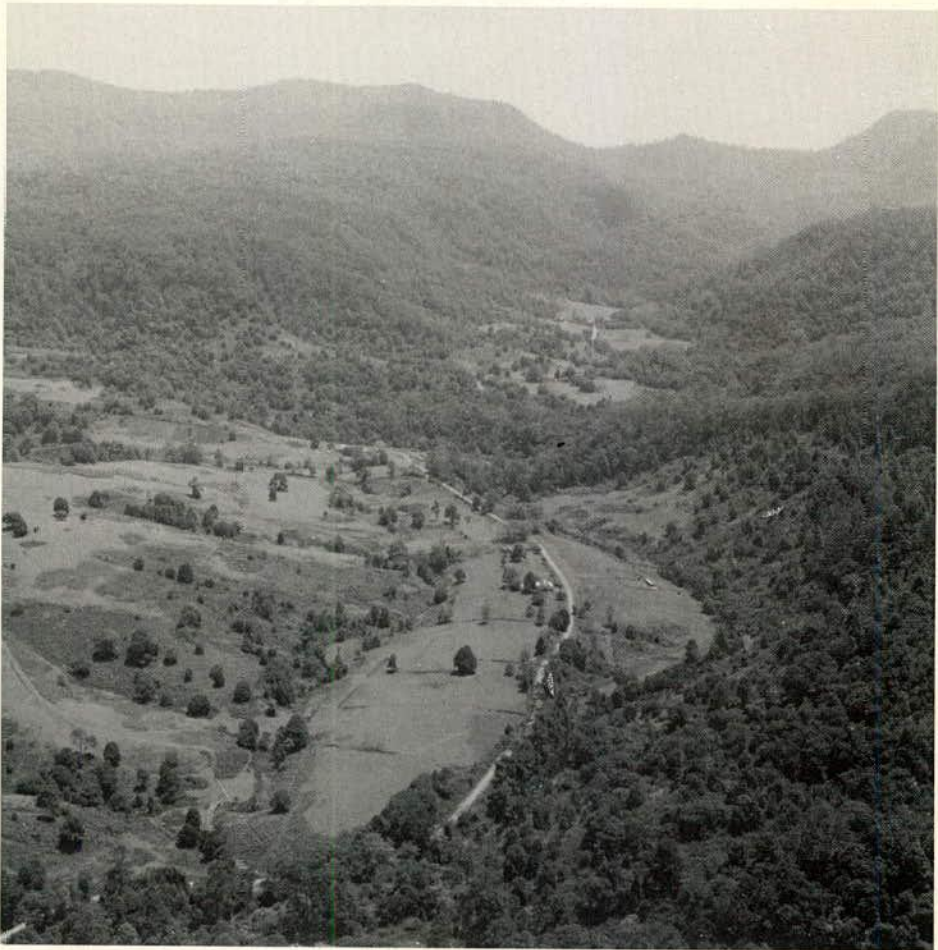
Regeneration: (1) The renewal of a tree crop, either by natural or artificial means.

also

(2) the young crop itself.

*amentation to commercial forestry
regen. can be natural & not a crop*

Sawlog:	A log suitable in terms of species, size and quality for the production of sawn timber.
Sclerophyll Forest:	Forest characterised by the prevalence of species having thick leathery leaves such as eucalypts possess.
Selective Logging:	A system of logging a forest whereby the yield is obtained by removal of trees selected in accordance with the objects of forest management.
Silviculture:	The theory and practice of controlling the establishment, composition, constitution and growth of forests. (Analogous to Agronomy).
Snigging:	Process of drawing logs from the stump to the log dump or landing.
Splash Crossing:	Open creek crossing or causeway, through a permanent or semi-permanent stream.
State Forest:	Land dedicated as such under the Forestry Act 1916. A State Forest may only be revoked by resolution of both Houses of Parliament.
Strangler:	Species of Fig which begins life as an epiphyte but later sends down roots into the soil, eventually enclosing the host plant and often killing it.
Sustained Yield:	The yield that a forest can produce continuously at a given intensity of management, without depletion of its growing stock in the long term.
Working Circle:	A defined area, comprising the whole or part of a management area, for which specific and distinct prescriptions for yield regulation and silvicultural development are laid down in a management plan. The delineation of working circles may be based upon forest types, location, topography or access or a combination of some or all of these factors.

Terania Creek Valley

1. View looking north up the valley to the Terania Creek basin with Terania Creek road and derelict farmland in the foreground.



2. View south from Terania Creek showing the forest communities.

Logging Operation



brush base
← emergents

← r.s.

3. & 4. Logdumps in coupe where logging was completed August 1979 showing relatively small area of disturbance.

Dump in "type banding"

Oblique shot to distant ~~distance~~ ~~distance~~ area washed out much of dump obscured by r.s. in foreground



Loglanding serving the above coupe.
Note high stump from 1943-1950 logging era.

Impact of Logging Operation

5. Wet sclerophyll forest - Terania Creek.
Disturbance to the forest immediately
after logging in August 1979. Heads
and branches of trees are left in the
6. forest after logs have been snigged out.



Impact of Logging

7. Environmental disturbance from selective logging of wet sclerophyll forest is distributed through the forest. Damage to understory species is transitory.

Understorey dependant in part on growth of emergents - some v.l. species may replace brush layer, but repeated logging will suppress ecol. succession



8. August 1979 logging took place in an area which had been previously logged - note the board holes in the old stump next to the fresh stump.

- in part only

Earlier Logging Impacts

9. Moist Hardwood Forest Teraria Creek basin was logged heavily in the past and has regenerated well.

*More evidence of complete regeneration
predom. bangalows - poor
aesthetic value & low
recreational amenity for
walking*



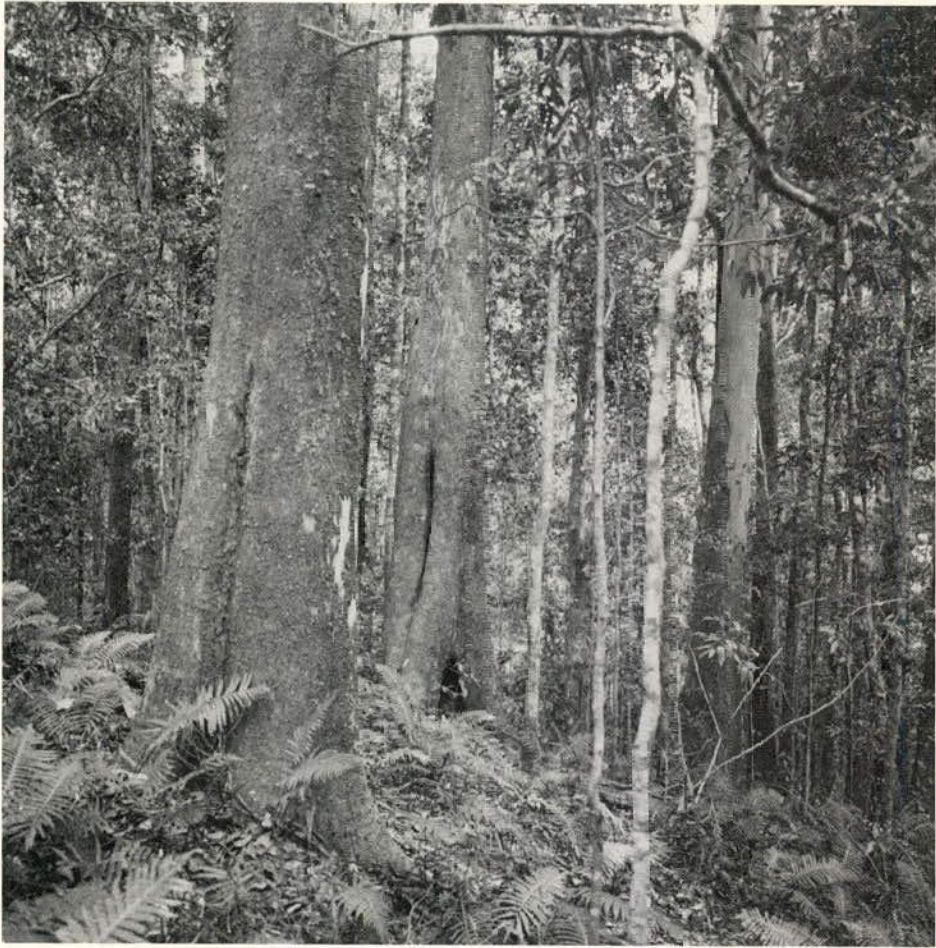
10. The old logging road in moist hardwood stands.

Log Landing Regeneration

11. Eucalyptus forest - Regeneration on log landing in adjacent Goonimbar State Forest 18 months after completion of logging. View at edges of landing below. If needed flooded gum seedlings will be planted next wet season.

12.



Forest Types - Terania Creek

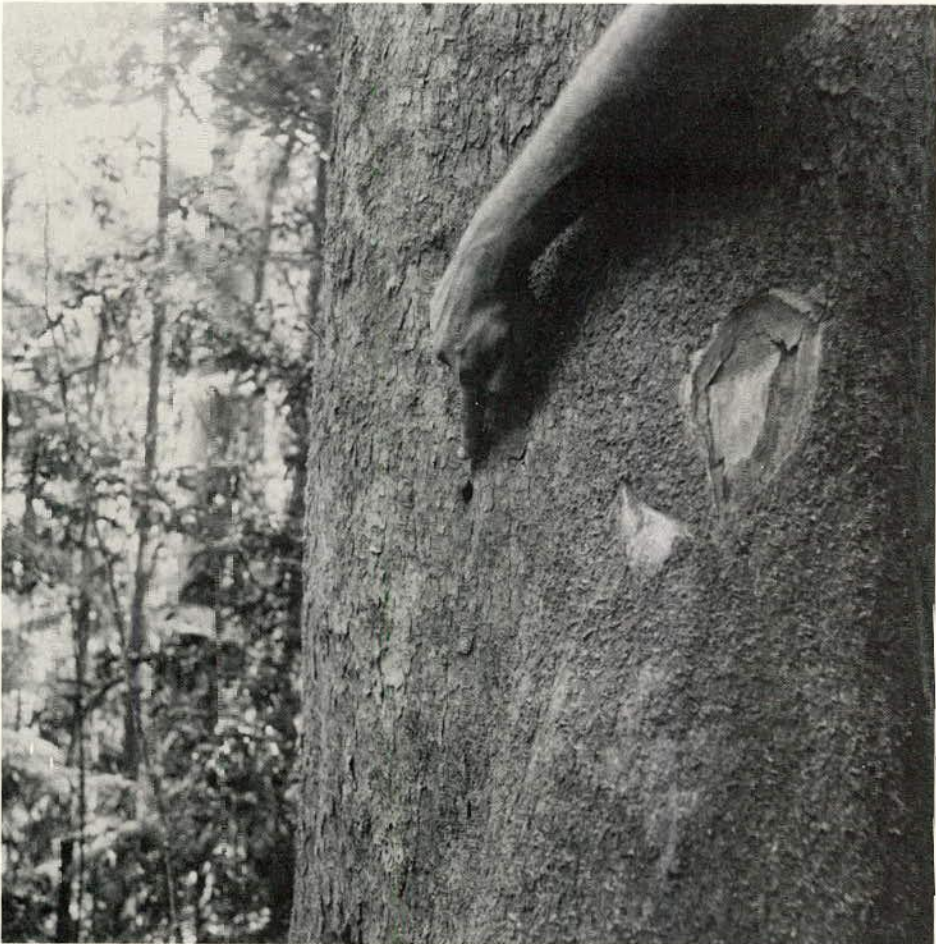
13. Wet sclerophyll forest - Terania Creek
Brushbox stand proposed to be logged
selectively.



14. Wet sclerophyll forest - Terania Creek
Flooded gum - this species will
be replanted to minimise weed invasion.

Logging Regulation

15. Brushbox tree marked (blazed) for falling and giving the direction tree is to be felled.



16. The same tree sabotaged by steel spike driven into the trunk. It is now too dangerous to fall as saw chains fly to pieces on contact.

Logging Problems

17. This group of trees have all had spikes driven deep into them and for safety reasons cannot be cut.



18. In August, 1979 other trees were sabotaged after they had been felled. Spikes were driven in and the logs were cut deeply by chain saws in many places to render them useless.

Forest Roads

19. Rainforest - Terania Creek. The forest road was first constructed in 1943. This is the re-opened road to give access.



20. Rainforest - Terania Creek. The forest road winds through the rainforest to minimise the openings in the forest canopy.

Forest Roads

21. Rainforest - Terania Creek. ? *Weed invasion? left*
 Regeneration on an old logging track since *Wolfs' r. &*
 last used in 1970. Note especially palms. *successional*
 This will be cleared again for use as *stages).*
 Logging Track No. 6.



22. Rainforest - Terania Creek.
 The road is of minimal width to reduce the
 amount of clearing necessary.

Rainforest Regeneration

23. The Rainforest in the southern section of Whian Whian State Forest adjacent to Terania Creek was subjected to an intensive logging operation in 1943-1950 era, it was subsequently burnt and it has now regenerated to rainforest.
- view of regenerated rainforest above Terania Rainforest Nursery - note Mackays Road ascending to Gibbergunyah Range close up view below.



24. Close up of regenerated rainforest on Terania Creek.

Height of
orig forest
indicated
by Bush
Box

Get shot from
higher up
valley with
trip to the
to show
lanтана!