Friday
10 July 90

John Cantrell,

Message from Carinne (?) (spelling?)
from TWS re North Washpool:

Garywest talked to Moore this
afternoon and it was confirmed
that NPWS report will be
finished by 4 weeks time (2 + 2)

Therefore minister has instructed
all roading and logging in
N Washpool is to cease until then.

Milo

Carinne can be contacted
at TWS or at home 519 6931.

i/

<< UPDATE No. 6. 18.12.1990 >>
ASSISTANTS' CONTACTS
CORKILL v. FCNSW - NORTH WASHPOOL

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Please Note:
(*) denotes professional government service officers.
They are not retained to advise, but may be or have been subpoenaed. Their presence on this list does not imply any further relationship with the case.

<< UPDATE No. 6. 20.12.1990 >>

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EXPERT ADVISORS' CONTACTS - Continued.... Page 3/3
CORKILL v. FCNSW - NORTH WASHPOOL

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Please Note:
(*) denotes professional government service officers.
They are not retained to advise, but may be or have been subpoenaed. Their presence on this list does not imply any further relationship with the case.

IN THE LAND AND ENVIRONMENT COURT OF NEW SOUTH WALES

No. 40208 of 1990

JOHN ROBERT CORKILL
Applicant

FORESTRY COMMISSION OF NEW SOUTH WALES
Respondent

A F F I D A V I T

MARILYN DALE FOX
Depondent

HILLMAN & WOOLF
Solicitors,
10th Floor,
82 Elizabeth Street,
SYDNEY NSW 2000.

TEL: 221-8522
DX: 1558
REF: BRUCE WOOLF

I, MARILYN DALE FOX, of the Royal Botantic Gardens, Mrs Macquarie's Road, Sydney in the State of New South Wales say an oath as follows:

1. I am a Research Scientist at the National Herbarium of New South Wales, Royal Botanic Gardens, Sydney and have been on the staff of the Herbarium since March 1979. Annexed hereto and marked "A" is a true copy of my curriculum vitae and a list of my scientific publications.

2. In 1981 the National Herbarium was approached by the Department of

Environment and Planning (NSW) to undertake a vegetation survey of the Washpool area. This was to enable them to assess the Environmental Impact Statement prepared by the Forestry Commission of New South Wales for the proposed logging of the State forests in the Washpool area ("the EIS"). Part of the brief was to comment on the adequacy of the vegetation section of the EIS. I directed the project and wrote the final report, and field data were collected under my supervision or at my direction by survey Technical Officers.

3. Vegetation was sampled from the area in 5 surveys between April and August 1981. The National Herbarium study sites totalled 35, 14 of which had been previously logged. The logged sites were specifically included to assess the impact of logging on the vegetation of the area. Two previous surveys had been conducted by Alex Floyd. Mr Floyd sampled 15 sites in 1978 (Willowie Scrub Vegetation Survey, unpublished internal report to the Forestry Commission of New South Wales, 1978) and 21 sites in the South Washpool area in 1980 (Rainforests of Gibraltar Range National Park and southern section, Washpool State Forest, unpublished internal report to National Parks and Wildlife Service NSW, 1980). The Forestry Commission listed 23 vegetation sampling sites in the EIS but upon analysis

15 were found to be from Floyd (1978). Only 8 additional sites were sampled by the Forestry Commission, 3 of which had been logged, and two of which were in the Gilbraltar Range National Park.

4. The report which I authored on the vegetation of the Washpool area (Fox, 1982) presented the results of the analysis of the data from the Herbarium sites and where possible Floyd's sites. The report described the scientific values of the vegetation of the area and the potential impact of the proposed logging activities. It was presented to the Department of Environment and Planning in February 1982 and two optional recommendations were made:

> "The following two options are presented, the former based on the considerable scenic, wilderness, aesthetic and scientific value of the area, and the latter conditional on the recommendation of the economic study being conducted by consultants to the Department of Environment and Planning.
>
> Option 1.
>
> That there should be no further logging in the Washpool area and that the entire area is reserved as a National Park or nature reserve. The area has been shown to have great scenic, wilderness, aesthetic and scientific values as summarized below. This option fully endorses Option 1 of the submission of the National Parks and Wildlife Service of New South Wales.
>
> Option 2.
>
> Reservation as a National Park or nature reserve of the Willowie Scrub and those areas adjacent to Washpool and Coombadjha Creeks to preserve all the

> main areas of rainforest in the Washpool area and retain the integrity of the wild rivers (Options 2 and 3 of NPWS Submission). This would allow for logging of some hardwood areas in the Redbank, Malara, Dandahra and Desert Creek areas, but only on condition that this is shown to be essential for the maintenance of supplies to the mills in the area by the independent economic survey, and further, that no rainforest trees, including Brush Box (Tristania conferta) in rainforest areas, are logged." (p. 1)

5. In 1983 the Department of Environment and Planning published "A Vegetation Survey of the Washpool Area, Northern New South Wales" which was based on the survey completed in 1981 by me and my report to the Department of February 1982. Several pages of the earlier report were omitted. Annexed hereto and marked "B" is a true copy of the said pages.

6. I have not revisited the Washpool area since 1982. To the best of my knowledge, no other vegetation survey has been conducted in the area.

7. In August 1990 the National Parks and Wildlife Service of New South Wales published a report entitled "North Washpool Natural and Cultural Heritage Conservation". The report concerned part of the area in the Desert and Malara Creek catchments which is known generally as North Washpool. In the report (which is not paginated) it is stated that:

RJ Fox

> "Eight of the sites sampled by the National Herbarium (Fox, 1983) and/or (Floyd, 1978) were in the area".

I have studied the locations of all the sites surveyed by Mr Floyd and myself in or near the area known as North Washpool. I cannot support this assertion. The only site which appears to fall within the North Washpool area was sampled by the Floyd (1978) and is referred to in the EIS as site 17 and in my report (Fox, 1983) as Floyd's site 11 on the Desert Spur trail. No other site specific flora samples appear to have been taken in North Washpool.

8. I have studied the harvesting plan for Compartment 695 of the Billilimbra State Forest. I have assumed that forestry activities will take place in North Washpool of a similar kind to those planned in Compartment 695, that is, logging of wet and dry sclerophyll forest and rainforest, roading of such forest and some burning activities in accordance with the management prescriptions set out in the harvesting plan. In my opinion, such activities are likely to have a significant impact on the floristic composition and structure of the vegetation of North Washpool. In Fox (1983), I set out the impacts which my research demonstrated would be likely to occur if such activities were to take place in the Washpool area as follows:

"The survey demonstrated changes that have occurred in similar rainforest sites following logging. The logged rainforest sites were floristically, structurally and in terms of soil chemistry, more similar to sclerophyllous communities with rainforest understorey than to undisturbed rainforest.

Computer analysis of the floristic data from the Herbarium sites clearly distinguished the logged rainforest sites from the undisturbed rainforest. It grouped logged subtropical rainforest sites with moist eucalypt sites with rainforest understorey, and with some warm temperate rainforest sites.

When only the number of each life form (tree, shrub, vine etc.) at each site was used to classify the sites, there was clear distinction between logged rainforest sites and undisturbed stands; life forms in the logged rainforest more closely resembled those in moist eucalypt sites.

Computer classification of sites using site attributes (slope, canopy height, percentage left litter etc.) separated the logged sites on the basis of visibility, logging and disturbance.

The soil from logged rainforest sites was found to differ from that from unlogged sites in a number of chemical properties. The soil chemical attributes were used to classify sites and this classification agreed well with that determined by floristic composition.

Logged rainforests are qualitatively different from unlogged stands, regardless of the time since logging. Studies that attempt to quantify the changes caused by logging, and to put a time scale on the process of regeneration, ignore this concept. There is a fundamental and qualitative change when pristine vegetation is modified in any way.

Logging alters the floristic composition, physical structure, life form composition, several site attributes and soil chemistry of a rainforest stand. All changes degrade the stand so that it

> more closely resembles a relatively depauperate association such as a moist eucalypt stand with rainforest understorey." (pp. 8-9)

In my opinion, the absence of a site specific flora survey of North Washpool (with the sole exception which I have noted) makes any assessment of impact from forestry activities speculative. The floristic composition and vegetation pattern of North Washpool has never to the best of my knowledge been described adequately and although we have a general knowledge of likely occurrences and associations my work in the Washpool area has demonstrated the complexity of the vegetation and the necessity for site specific examination before conclusions can been drawn as to impact from disturbances.

9. In my opinion, the EIS did not adequately describe or assess these impacts for the area of Washpool which it specifically addressed (that is, South Washpool) for the reasons which I set out in Fox (1983) and affirm here:

> "<u>The Vegetation</u> (<u>Section 5.2.1 of the E.I.S.</u>)
>
> The principal impact of the proposed logging activity reported in the E.I.S. would be on largely undisturbed vegetation. However, the section of the E.I.S. which describes this vegetation comprises only six pages of the report. The E.I.S. information on the vegetation is based largely on Floyd's 1978 report dealing with the Willowie Scrub. This fact is acknowledged on page 89 of the E.I.S. However, there are several anomalies between Floyd's original data and those

Bluey Fox.

reported in the E.I.S. These anomalies are itemised below.

- Floyd's report listed the abundance of each species, using a code of very common, common, occasional and rare.

- The E,I.S. lists only the species present and states "indicates species observed and noted at that site no concern was taken with abundance." (sic) (Appendix II page iii).

- Floyd's report numbered the sites 1 to 12, with three unnumbered sites.

- The E.I.S. renumbers the sites and reorders them without cross-reference to Floyd's original numbering.

- For the E.I.S. the Forestry Commission sampled an additional eight sites which were interspersed with those originating from Floyd's 1978 report. However, two of these were in Gibraltar Range National Park. In Appendix II of the E.I.S. it is noted that these sites are "outside the area under consideration".

- There are discrepancies between the species lists in Floyd's report (1978) and the species lists in the E.I.S. (Appendix II), usually with species omitted but occasionally with additional species.

- The map showing the locations of sites (Figure 8 in the E.I.S.) shows, for 10 of the sites adopted from Floyd's report, locations different from those shown by Floyd.

- Floyd's second report on the vegetation of the Washpool area (Floyd 1980) was available when the E.I.S. was being prepared but was not used.

- Three of the sites sampled by the Forestry Commission had been logged previously (Forestry Commission sites Nos. 15, 19 and 21 = site Nos. 85, 89 and 91 listed in Appendix 1 of this report). These featured three different vegetation associations

and had been logged at different times in the past. No comment was made on these in the text.

- Of the three logged sites (Forestry Commission Nos. 15, 19, and 21), one was a member of a pair of sites in Gibraltar Range National Park. According to the E.I.S., the unlogged site had only 38 species while the logged site had 50 species. A similar pair of sites sampled by the National Herbarium (Nos. 18 and 19) were found to have 90 and 72 species respectively.

- The other two logged sites sampled by the Forestry Commission (Nos. 19 and 21 = 89 and 91 in Appendix 1 of this report) featured, according to the E.I.S., only 11 and 16 species respectively.

- In Table 14 of the E.I.S., the Forestry Commission reports the percentage of each vegetation type proposed to be logged. The types to be most adversely affected by the proposed logging would be Blue Gum - Tallowwood (72% to be logged), Spotted Gum (70%) and New England Blackbutt (53%). These types were represented by two, nil and three sites respectively in the survey reported by the Forestry Commission.

<u>The Impact on Vegetation (Section 6.6.1 of the E.I.S.)</u>

On page 136 of the E.I.S., reference is made to "logged and unlogged sites in moist and dry hardwood and rainforest". These sites are not described. Neither is the methodology which results in the statement that logging "had only a minor effect on the presence or absence of plant species from small sites". This is followed by a sweeping statement that "consequently, it may be confidently predicted that the proposed logging will not lead to the elimination of any species from the forests."

The only logged sites previously referred to were the three sites originally numbered 15, 19 and 21 (Nos. 85, 89 and 91 in Appendix 1 of this report). These were in different vegetation types and had respectively 50, 11 and 16 species. Data from

these three sites could not substantiate the claims quoted in the preceding paragraph. It can only be presumed that the statements allude to sites which are not reported in the E.I.S. In the absence of details of how these sites were sampled and the results of this study, the stated conclusions cannot be evaluated.

When the percentages of each forest type proposed to be logged are calculated from the figures quoted in the E.I.S., they do not agree with those presented on page 137 of the E.I.S. The discrepancies are minor but are unacceptable in a scientific document.

The data reported on page 138 of the E.I.S. with respect to the incidence of dieback and canopy composition cannot be evaluated as the methodology is not described.

In general, this section (6.6.1 of the E.I.S.) is more thorough than the section dealing with the vegetation (Section 5.2.1). However, the failure to adequately describe methodology precludes assessment of the conclusions." (pp. 134-136)

11. In my opinion, no description or assessment of these matters for North Washpool was attempted in the EIS or, to the best of my knowledge, since its publication.

Sworn at Sydney before me)
)
this 17th day of September 1990) _____
Deponent

_____
Solicitor/~~Justice of the Peace~~

IN THE LAND AND ENVIRONMENT

COURT OF NEW SOUTH WALES

No. 40208 of 1990

JOHN CORKILL

Applicant

FORESTRY COMMISSION OF NEW SOUTH WALES

Respondent

AFFIDAVIT

Deponent:
PAUL ADAM

I, PAUL ADAM, of 3, Benvenue St, Kingsford in the State of New South Wales, Senior Lecturer, make oath and say as follows:

1. Annexed hereto and marked with the letter "A" is a report which I have prepared on aspects of logging operations in the North Washpool area.

2. Annexed hereto and marked with the letter "B" is my Curriculum Vitae.

Sworn by the Deponent)
on the 13day of September)
1990 at Sydney)
Before me:)

P. Adam.

.....

B. Woolf

.....

BRUCE WOOLF
Solicitor

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THIS AND THE FOLLOWING FOUR PAGES IS THE ANNEXURE MARKED "A" REFERRED TO IN THE AFFIDAVIT OF PAUL ADAM SWORN AT SYDNEY ON THE 13th DAY OF SEPTEMBER, 1990.

BEFORE ME: .....

REPORT ON SOME ASPECTS OF LOGGING OPERATIONS IN THE NORTH WASHPOOL AREA

Paul Adam
M.A., Ph.D.

This report is based on a study of the available documentation on the flora and vegetation of that area referred to as North Washpool. I have not had the opportunity of visiting the area, although I have visited sites within Washpool National Park to the south. During 1984, I was involved in the nomination of the New South Wales rainforests for inclusion on the World Heritage. In order to prepare the nomination, it was necessary not only to document the exceptional features of those properties included within the nomination but also to place them within their wider context of the forests of temperate/sub-tropical eastern Australia. This entailed an extensive literature survey supplemented by some field inspections.

In addition to having carred out this synthesis of forest biogeography and ecology, I have had a long involvement with vegetation survey and classification in a range of vegetation types.

The area known as North Washpool consists of parts of Billilimbra and Washpool State Forests.

In 1980, The Forestry Commission of New South Wales exhibited an Environmental Impact Statement for proposed logging operations in Washpool. The area covered by the EIS encompassed that area now incorporated in Washpool National Park and virtually all the area now referred to as North Washpool.

Information on the vegetation of North Washpool

Little detailed information appears to be available on the North Washpool area. A forest type map has been prepared by the Forestry Commission. Typing, predominently on the basis of air photo interpretation, was carried out before publication of the first edition of "Forest types in New South Wales" (Forestry Commission of NSW Research Note 17), but it is possible to accommodate the types mapped within the types recognised in Research Note 17 (Environmental Impact Statement).

Apart from this overview, there is little site specific, or more detailed information. In 1978, A G Floyd reported to the National Parks and Wildlife Service on the "Willowie Scrub Vegetation Survey".

Most of the area covered by this report is now in Washpool National Park but with some extension into the Desert Creek and Malara Creek catchments in the North Washpool area. In 1980, a further report by Floyd (Rainforests of the Gibraltar Range National Park and the Southern Section of Washpool State Forest) described rainforest to the south of the Willowie Scrub. While contributing to the regional assessment of vegetation, Floyd (1980) does not add to the information on North Washpool.

The EIS in 1980 drew heavily on the information in Floyd (1978). Of the sites for which species lists are available in the EIS only four (4, 11, 17, 23) would appear to have been from the North Washpool area and the data from these sites are qualitative (presence/absence) only.

The most detailed study of vegetation in the region is that by Fox [Fox, M D (1983). A vegetation survey of the Washpool area, northern New South Wales. Department of Environment and Planning, Sydney]. This report again concentrates upon the area which is now Washpool National Park and does not add to the information in the EIS as far as North Washpool is concerned.

The submission to the Director, National Parks and Wildlife Service from the Armidale Branch of the Wilderness Society (Carr *et al.* 1988) provides a broad overview of the vegetation of North Washpool and composite, rather than site specific, species lists.

The report by the National Parks and Wildlife Service (North Washpool. Natural and Cultural Heritage Conservation, August 1990) also provides an overview of the vegetation and indicates that limited sampling had added to the list of species known to the area.

Adequacy of vegetation studies

It would appear that the only overview of the vegetation of North Washpool are at the level of forest type. There has been no systematic sampling of vegetation or flora. Site specific floristic data are available for only a few of the forest types within the North Washpool and species lists are for vascular plants only (flowering plants, gymnosperms and ferns). The fact that recent limited sampling (NPWS 1990) had added significantly to the known list of flowering plants suggests that existing information is inadequate to document the flowering plants. Nothing is documented about non-flowering plants which contribute significantly to the total diversity of plant life. (It is worth noting that the 1981 Forestry Commission EIS for proposed rainforest logging operations, Hastings Catchment did include reference to non-vascular flora.)

The vegetation cover of an area is an important aspect of its environment. Not only is it of intrinsic interest but it reflects (and integrates) the physical environment and it provides habitats for the fauna.

While vegetation varies continuously (in both space and time) it is possible in most circumstances to delimit plant communities (vegetation types) which are relatively homogeneous. Recognition of plant communities facilitates the task of providing a description of an area. It also provides a basis for comparison between areas (provided that similar criteria have been used for community recognition). On those occasions when detailed studies have been carried out on various aspects of a community, recognition of the same community elsewhere permits extrapolation (as a first order hypothesis) between the studied and the new site. This predictive value of community classification is an important reason for seeking to describe and classify vegetation.

The forest type classification is a special purpose classification which permits assessment of areas for timber harvesting. Knowing that a particular site is classified as a certain forest type allows prediction of the canopy composition, at least in so far as commercially exploitable species are concerned. Commercially exploitable species, although normally (but not always) making up the majority of stand biomass, will be a small proportion of the total species diversity. In most types, there is considerable variation in the full species composition. Knowledge for forest typing provides little information about the total flora unless it is supplemented by field sampling. The intensity of detailed field sampling to supplement the forest typing in North Washpool is so low as to provide no basis for discussion of the presence or absence of unusual, rare or endangered species in the area, or for an assessment of the total habitat value of the forests.

Vegetation studies at a more detailed level than forest types are required to understand the relationships between communities (and individual species) and the environment, and the dynamics of communities. This level of understanding may be necessary to predict the impacts of various levels and forms of disturbance on the vegetation. The EIS (p.89) admitted to difficulty in explaining the patterns of variation in the vegetation of Washpool. These difficulties may, in large part, relate to the very coarse approach to vegetation classification adopted in the EIS.

Adequacy of valuable information on the flora and vegetation for the assessment of impacts of the proposed logging

Logging, and associated activities, will cause disturbance to the area. The effects of this disturbance will operate for many years.

At the forest type level of vegetation organisation there is considerable empirical information on post logging recovery, and a number of studies modelling the process. (For example, Horne, R. & Gwalter, J. 1982. The recovery of rainforest overstorey following logging. 1. Subtropical rainforest. Australian Forest Research 13, 29-44. Horne, R. & Gwalter, J. 1987. The recovery of rainforest overstorey following logging. 2. Warm temperate rainforest. Forest Ecology and Management, 22, 267-281. Shugart, H.H., Hopkins, M.S., Burgess, I.P. & Mortlock, A.T. 1980. The development of a succession model for subtropical rainforest and its application to assess the effects of timber harvest at Wiangaree State Forest, New South Wales. Journal of Environmental Management, 11, 243-265.) This information concentrates upon the commercially exploitable overstorey species. In the case of modelling studies which project future growth, the model output must be regarded as working hypotheses and not a guaranteed outcome. There are no existing data of which I am aware on post logging recovery in North Washpool but the generalised projections from elsewhere are probably applicable. While the general predictions would be of recovery of the commercial species, even at this level, it would be postulated that there may be changes in the balance between species and that even over the long term the size distribution of trees will differ from that of the original unlogged forest (see Horne & Gwalter 1987, ibid). The forests of North Washpool are old growth forests (and as such are described as "overmature" in, for example, the Harvesting Plan for Compartment 679, Billilimbra State Forest). Even if the forests were placed on a sustainable yield basis (in terms of commercial species) the size (age) class distribution and structure will be altered.

There are very few studies anywhere in the world which document the effects of logging on the total flora, rather than just commercial species, and there is insufficient information on the biology of the non-commerical species for the development of predictive models. In the case of North Washpool, there are insufficient data on the present structure and composition of the stands to be logged for any predictions to be made even if models were available.

In any community, there will be some species which are sparsely distributed, and there is a possibility that some of these species will be rare over their whole range as well as locally. Even if prediction

as to the course of changes in the generality of a community's composition could be made, the behaviour of these rare elements may require especial consideration. In the case of North Washpool, there is a lack of information on the occurrence and distribution of species which may be of concern. In the absence of such data, it is not possible to predict the impact of the proposed logging on such species.

As well as the impacts related to the initial logging community structure and composition and the occurrence and distribution of individual species may be affected by the longer term management regime, particularly changes to the fire regime. Absence of information about much of the vegetation makes it difficult both to predict the possible impacts and to suggest methods of mitigating any adverse impacts.

Heritage values of Washpool

Washpool National Park is included on the World Heritage List as part of the Eastern Australian sub-tropical and temperate rainforest listing.

Washpool National Park was nominated for a number of attributes including the extent of warm temperate rainforest. The largest stand of warm temperate rainforest is the Willowie Scrub which extends into North Washpool. Warm temperate rainforest is one of the major rainforest forms in Australia which has developed within the Continent from the original Gondwanan rainforest stock. The core area for this rainforest type is from central New South Wales to southern Queensland - Washpool is central to this distribution.

The relationships between rainforest and wet sclerophyll forest are exceptionally well displayed in Washpool. The relationships are highly dynamic, and are of considerable interest (discussed in detail in the World Heritage nomination). The mosaic of rainforest and wet sclerophyll forest extends into North Washpool where in addition there are dry sclerophyll communities which are less well represented in Washpool National Park.

Many of the features of exception value in Washpool Nature Park (features recognised by inclusion on the World Heritage List) are found in the north of the Park extending into North Washpool. Changes in the management of North Washpool, in particular changes to the fire regime, have the potential to transgress the Park boundary and to have impacts upon the Park.

IN THE LAND AND ENVIRONMENT COURT OF NEW SOUTH WALES

No. 40208 of 1990

JOHN CORKILL

Applicant

FORESTRY COMMISSION OF NEW SOUTH WALES

Respondent

AFFIDAVIT

Deponent:

ALEXANDER MARSHALL GILMORE

Applicants address for service:

HILLMAN & WOOLF
SOLICITORS
10th Floor
82 Elizabeth Street
SYDNEY NSW 2000
DX: 1558 SYDNEY
TEL: 221 8522
FAX: 223 3530
REF: BSW 2489/0

A.M. Gilmore

I, ALEXANDER MARSHALL GILMORE, of Federal in the State of New South Wales, do solemnly and truly affirm and declare as follows:

1. I am a wildlife ecologist with extensive experience of forest wildlife in south east Australia including Northern New South Wales. I have worked in Victoria for the Museum of Victoria and Department of Conservation Forests and Lands carrying out research on habitat requirements & population densities of vertebrates in various vegetation types, mainly forest associations, for the period late 1972 to late 1979, and September 1988 to July 1990. For seven years commencing May 1980 I worked as a scientific officer for the Northern Region of the National Parks and Wildlife Service and as an environmental consultant. The majority of this work involved characterizing the fauna of various vegetation types, mainly forest associations. This included a report for the NSW National Parks and Wildlife Service on the "Nature and Conservation of the Vertebrate Fauna in New South Wales Rainforests".

2. I am of the opinion the proposed roading and logging of North Washpool (by which I mean North Washpool as described in paragraph 2 of the affidavit of Bruce Stephen Woolf sworn 7th September 1990, will have a significant impact on the environment and in particular on various species of vertebrate fauna, including arboreal mammals, bats, owls, parrots and cockatoos, rat-kangaroos bandicoots, reptiles and amphibians. Some of these impacts may take long periods of time to manifest themselves, due to the slow rate of change of some known or presumed critical habitat attributes, such as the equilibrium density of trees with large hollows as remnant old growth trees die, following the logging during the hundreds of years to re-establish large hollow branches.

3. I am of the opinion that the Environmental Impact Statement "Proposed Forest Operations in the Washpool Area ("the EIS") is a grossly inadequate document for assessing the impact of the proposed logging in the North Washpool Area, in particular on the vertebrate fauna. The EIS fails to describe adequately the existing forest environment because it does not include any specific factual information based on surveys and research on vertebrate fauna within North Washpool. I agree with the Department of Environment and Planning's conclusion in its Environmental Impact Assessment of the EIS proposal that:

"...the mammals were not surveyed, the avifauna is described on the basis of suspected occurrence generally from standard references, expected occurrences for reptiles and amphibians are appended, the invertebrates have not been surveyed and the aquatic fauna is not considered. The description on fauna in the EIS is based on the assumption (not supported) that the area and its fauna are currently in equilibrium with no long-term decline of either forest types or faunal species." (p.30)

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4. I am of the opinion that research on forest dependent species and their critical habitat requirements in combination with surveys and quantitative projections of those habitat requirements are a prerequisite to understanding the existing environment, rational planning for multiple use and objectively based assessment of impact. The EIS does not supply this essential information.

5. The EIS also focusses on short term impacts without quantifying changes in the age, size and density of comparatively long lived trees. It should have provided a prediction of the regeneration and loss of habitat using a dynamic habitat simulation model, for periods of time up to the life span of the longest lived trees so as to assess adequately the long term environmental impact on faunal populations.

6. I am of the opinion, based on survey work carried out in the Washpool area by five different investigators, and my own observations, that the following species of national and statewide significance listed in Schedule 12 (Endangered Fauna) of the National Parks and Wildlife Act 1974, have been recorded, or would be expected to occur in the area proposed for habitat manipulation (roading, logging and associated perturbations):-

(a) Fauna of Special Concern - Platypus, Spotted-tailed Quoll, Eastern Pygmy Possum, Feathertail Glider, Koala, Large-footed Myotis, Carpet Python, Rose-crowned Fruit-Dove, Emerald Dove, Glossy Black-Cockatoo, White-throated Needletail, Cicadabird, White's Thrush, Crested Shrike-tit, Rufous Fantail;

(b) Vulnerable and Rare Fauna - Common Planigale, Parma Wallaby, Major Skink, Pacific Baza, Peregrine Falcon, Wompoo Fruit-Dove, Powerful Owl, Sooty Owl, Rufous Scrub-bird;

(c) Threatened Fauna - Long-nosed Potoroo, Stephen's Banded Snake.

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Recent information on the comparatively high carrying capacity for arboreal mammals of some wet sclerophyll forests on the North Coast of New South Wales and the importance of warm temperate rainforest as habitat for Rufous Scrub-bird, Spotted-tailed Quoll and Wompoo Fruit-Dove means that a significant effort needs to go into surveying the vertebrates of these forest types.

7. I am of the opinion that the EIS, apart from its other shortcomings , is now out of date in the light of additional information on species distributions; and the discovery and description of new species within the region meaning that to assess adequately the impact of logging in North Washpool will need significant amendments to the appendices. In summary the appendices of the EIS are now out of date on the basis of currently available information.

8. I am of the opinion that roading, apart from harvesting, although it directly disturbs only a relatively small area, has the potential to cause drastic changes in community structure, through altering different processes that affect various plant and animal populations. I am of the opinion that the EIS does not adequately address problems of spatial pattern of habitat fragments induced by roading, logging and associated perturbations. The consequences of reducing populations to smaller and more isolated populations should have been specifically researched. A geographic information system should have been used to generate patterns of distribution of rare, threatened and forest dependent vertebrate species through space under different harvesting alternatives.

The EIS should have reviewed the following information on the impacts of roading dense forests:-

(a) permanent canopy breaks have been postulated to lead to degradation of the seral status of rainforests;

A. M. Gilmore

(b) the influence of roads to assist colonization by non forest dependent species; and

(c) the consequences for various prey species of roads facilitating ingress of predators including Dingos, Foxes, Cats, snakes, Goannas, Kookaburras and Tawny Frogmouths.

9. I am of the opinion that although the EIS makes mention of changes to hydrology and water quality attributes as a consequence of logging it does not adequately review the consequences for amphibian or fish species (even if it identifies them, which it does not) of the changes which are likely to occur in low order small catchments, which potentially could have a high proportion of their vegetation converted from old growth to regrowth forest with consequences including reduced dry season stream flows, changes to organic debris and detritus input and the filling of stream bed interstitial space with fine sediment washed from roads and tracks.

10. I am of the opinion that the tabulation of vertebrate classes from separate areas on the North coast (Appendices 12 & 13 of the EIS) is of little value due to different sampling methods and effort used in surveying those areas. These tabulations of species occurrence can only be used to make decisions if backed up with information on population densities and degree of isolation of populations and projected changes in populations. As an aid to assessment it is invalid because it ignores the fact that within any particular area and vegetation type habitat is dynamic, particularly in the case of forests subject to harvesting. Critical habitat variables such as availability of hollow trees, density of prey species, rates of predation or colonization by competitors are in a continual state of change largely reflecting the potential carrying capacity of various combinations of cohorts

A.M. Gilmore

of trees within a particular forest type. Thus habitat dynamics, planned or reasonably projected, in the areas for which species are tabulated, also needs accounting for. This is of particular importance for plant and animal species dependent on old growth forest habitat attributes. Since this proposal is principally to harvest over-mature hardwood stands for maximum economic utilization, and in view of the high carrying capacity of forest types 47a (Tallowwood - Sydney Blue Gum over 40m) and 62a (Grey Gum - Grey Ironbark - White Mahogany over 30m) for old growth dependent species whilst unlogged and particularly since these forest types have been subject to widespread harvesting, an assessment of this proposal would need to show the age class distribution of stands within these forest types, to fully assess the regional and national significance of this proposed impact.

11. I am of the opinion that the EIS does not show how the North Washpool area interacts with adjoining lands, other forest areas and other regions. It does not describe which of the vertebrate species are migratory and which land use categories, regions and vegetation types elsewhere could be influenced through an impact on the densities of migratory faunal species. Nor does it show how it will or could potentially influence dispersal or recolonization of species populations which extend beyond the boundaries of the area under consideration, both now and in the future under various forest management scenarios. It thus fails to address the issue of the perturbation of North Washpool as part of a more extensive impact on regional populations of vertebrate wildlife.

12. I am in agreement with the Forestry Commission's own biologists, who following a study of birds in similar wet sclerophyll forest types among others in the Upper Hastings Valley (Shields, J.M., Kavanagh, R.P. and Rohan-Jones, W.G. (1985) Forest Avifauna of the Upper hastings River, pp 55-64, in Keast, A.,

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Recher, H.F., Ford, H. and Saunders, D. (Eds) Birds of the Eucalypt Forests and Woodlands: Ecology, Conservation, Management. Surrey Beatty & Sons Pty Ltd and R.A.O.U., Sydney) concluded "To develop detailed land management principles it will be necessary to evaluate the functional strategy that birds employ to exploit forest resources in northern New South Wales" and "the extent and distribution of retained vegetation necessary for the conservation of birds depends on the intensity of logging, site characteristics and the reproductive and foraging requirements of the resident bird community."

13. In addition to birds, mammals, reptiles and amphibians need to have their reproductive and foraging requirements studied before environmental impact can be assessed, before future populations can be predicted and thus planning for multiple use management founded on a rational procedure and an objective information base. None of these tasks are undertaken in the EIS.

Sworn
~~Affirmed~~ by the Deponent)
)
on the 17th day of September)
)
1990 at LISMORE)
)
Before me:)

A.M. Gilmore
.....

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A.M. Gilmore

Amended Standard Erosion Mitigation Conditions
for Logging in New South Wales
- June, 1984.

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1. GENERAL

(i) These Conditions for mitigation of erosion shall apply to all logging and forest operations controlled by the Forestry Commission of New South Wales. The Forestry Commission of New South Wales exercises control of these operations on Crown timber lands under provisions of the Forestry Act, 1916.

(ii) Notwithstanding the following Conditions, in catchments of major water storages and in areas where the erosion hazard so warrants, restrictions on the method and intensity of all forest operations may be imposed by the Forestry Commission of New South Wales.

(iii) No logging or clearing operations shall take place within 100 metres of the top water level of any major water storage.

(iv) No tree shall be destroyed, lopped or topped within 20 metres of a prescribed stream as defined under the Water Act, 1912, without prior authority of the Catchment Areas Protection Board.

2. CONDITIONS FOR LOGGING

2.1 Roading

Roads and minor roads shall be located where practicable on ridges. They shall not intrude into filter strips beside streams except where the road crosses the stream.

2.1.1 Roads

(i) Roads shall be properly formed, and they shall be gravelled if the density of traffic so warrants and this is specified.

(ii) All batters shall be constructed to a stable slope. Consolidation may be necessary on fills to minimize subsequent slumping and erosion of fill batters. Revegetation of batters may be required on some roads, and this shall be carried out when specified.

(iii) Adequate pipe drainage shall be provided in roads consistent with sound engineering practice so that erosion of the road surface and table drains is minimized. Pipes should discharge water onto undisturbed vegetation.

(iv) The use of borrow pits for the provision of extra material during road construction should be kept to an absolute minimum. Where use of a borrow pit is unavoidable, topsoil shall be stockpiled and subsequently replaced to aid revegetation. The bottoms of pits should be graded and levelled, sides should be battered and shaped to conform to the surrounds and the replaced topsoil fertilized and seeded where necessary to establish a vegetative cover.

(v) Maximum grades on roads shall be kept below 10 degrees.

(vi) Bridges and culverts on roads shall be designed to transmit peak discharges consistent with the standard of road. Bridge approaches shall be stabilized and revegetated where necessary following construction. Culvert outlets should be located or designed to minimize scour and erosion.

(vii) Immediately after operations have ceased on roads which have been damaged and on which use is to be permanently or temporarily discountinued, the damage shall be repaired by re-grading, or if conditions are too wet for this to occur, temporary cross banks shall be constructed. In this latter instance, regrading shall occur as soon as conditions allow.

(viii) Maintenance grading shall be carried out only where necessary and disturbance to vegetation should be minimized.

2.1.2 Minor Roads

(i) Operations shall be planned systematically so that the number of roads open at any one time will be kept to a minimum.

(ii) Wherever the type of operations permit and as far as practicable, minor roads should be constructed with cross fall drainage.

(iii) Immediately after the logging operation has ceased in any section (even if it is planned to use the road at any time in the future) the road shall be drained by cross banks unless otherwise specified. The channels of these banks must be constructed with a minimum gradient sufficient to ensure that there is adequate lateral drainage onto the surrounding vegetation. Cross banks must not direct water directly onto other tracks or roads. The exits of these banks must allow water to escape readily from the road. The spacing of these banks will depend on the grade of the road and on the erosion hazard. Unless otherwise specified, bank spacings to be employed are those in the Table under 2.4(ii).

For any operation the height of the cross banks shall be specified.

(iv) Immediately after operations have ceased on minor roads the surface material shall be replaced as far as practicable, and the roads shall be drained by banks unless otherwise specified. Seeding and/or fertilizing of minor roads shall be specified where necessary.

(v) The use of borrow pits should be kept to an absolute minimum, and if employed, should be dealt with as under 2.1.1 (iv).

(vi) Minor roads shall not cross streams which are running unless a causeway, bridge or pipe culvert designed to transmit peak flows has been provided. They may cross stream beds which are dry via causeways, temporary culverts or temporary log crossings provided there is minimal disturbance to the surrounds. At the completion of operations, the sites of temporary crossings shall be restored as closely as possible to their original condition.

(vii) "Blading-off" on minor roads shall be permitted only where damage is minimal and subsequent drainage and repair is possible. Each "blading-off" operation must be specifically approved.

(viii) The use of minor roads shall be minimized during wet weather. They should carry no traffic at times when there is runoff from the road surface.

2.2 Filter Strips

A filter strip shall be retained on a stream or drainage line where its catchment area exceeds (at most) 100 hectares. Both the width of filter strip and the catchment area may be varied if, in the opinion of the Forestry Commission, shape, erosion hazard or stream conditions so warrant, in which case width and area shall be specified.

2.3 Felling

(i) No tree shall be deliberately or negligently felled into a stream within a filter strip, except as provided in 2.3 (ii).

(ii) In conifer filter strips, trees may be felled into a stream when approved by the supervising officer, so as to avoid possible later windthrow. Approval will only be given where the tree can be removed with minimal disturbance to the stream.

(iii) Crowns of conifer trees felled into streams must be removed and such removal must result in minimal disturbance to the bed and banks of the stream.

(iv) Trees may be felled into or within a filter strip, with the exception of those planted within the filter strip after 25th May, 1983. Extraction machinery shall not enter a filter strip to remove logs, except that in conifer plantations with conifer filter strips, extraction machinery may enter the filter strip to within 5 metres of the bank of the stream with the authorization of the supervising officer. This authorization shall only be given where machinery is not likely to cause damage to the soil surface of the filter strip and the bed and bank of the stream.

(v) Logging operations shall be carried out so that there is minimal disturbance within any drainage line.

(vi) In conifer plantations, wherever possible slash shall be retained on extraction tracks and harvesting machinery shall operate over it.

2.4 Snigging and Timber Extraction

(i) As far as practicable snigging and timber extraction shall be uphill. In any event, downhill movement of timber shall not be practised in areas with high erosion hazard or as specified.

(ii) The drainage of snig or timber extraction tracks shall be carried out in the same way as for minor roads. The height and spacing of the cross banks shall be specified. The following table shows the maximum bank spacing required for each grade and degree of erosion hazard. These maximum spacings may be varied where difficult or inappropriate drainage disposal areas are encountered. Any variation requires the concurrence of the Regional Forester or his representative.

Grade of Snig Track, Extraction Track or Minor Road (Degrees)	Maximum Spacing of Banks along Track or Road	
	Average Erosion Hazard	High Erosion Hazard
Less than 15	60 metres	50 metres
15 - 20	40 metres	30 metres
20 - 25	20 metres	15 metres
25 - 30	15 metres	

Where there is a high erosion hazard, the grades of snig tracks, extraction tracks and minor roads shall be limited and shall be specified according to the erosion hazard, and in any event shall not exceed 25 degrees. Where the erosion hazard is less, the grade shall exceed 25 degrees only where specified.

(iii) As far as is practicable, slash shall be retained on extraction tracks, timber extraction by walk-over techniques shall be used, and the construction of snig tracks shall be minimized. In any event the use of a blade shall only be permitted for removal of soil from a snig or timber extraction track during initial track construction and during track drainage. "Blading-off" shall be permitted only where track damage is minimal and subsequent drainage and repair is possible. Each "blading-off" operation must be specifically approved.

(iv) Where there is high erosion hazard, snigging and extraction of timber from areas with slopes over 30 degrees shall not be permitted if track construction is required. Where there is less erosion hazard, snigging and extraction of timber from areas with slopes over 35 degrees shall not be permitted if track construction is required. Where specifically approved by the supervising officer, tracks may be constructed on slopes in excess of these limits where it is necessary to traverse these slopes for short distances to enable timber to be extracted from areas of lesser slope.

(v) Snig or timber extraction tracks shall not cross the beds of streams without application of the same conditions which apply to minor roads.

(vi) Snig or timber extraction tracks shall not intrude into filter strips, except as provided for in 2.3 (iii), 2.3 (iv), and 2.4 (v).

(vii) The use of snig or timber extraction tracks in wet conditions shall be minimized.

(viii) As far as practicable surface material shall be returned to the track immediately after logging ceases on that track to aid in revegetation, and at the same time crossfall drainage shall be re-established. In circumstances where it is considered necessary the method of revegetation shall be specified.

(ix) In the case of "outrow" extraction tracks in plantations, drainage shall be carried out when necessary and as specified.

2.5 Logdumps

(i) Log dumps shall be located as far as practicable in accordance with an uphill extraction pattern. They shall not be located closer than 10 metres from a filter strip or drainage line.

(ii) When ungravelled dumps are constructed and unless otherwise specified, topsoil is to be stockpiled in a recoverable position, and either -

(a) upon temporary termination of logging, where further logging is contemplated in the near future, the dumps are to be levelled unless otherwise authorized, drained so that runoff is directed onto surrounding vegetation and ripped where specified, or

(b) upon completion of logging the dumps are to be levelled unless otherwise authorized, drained so that runoff is directed onto surrounding vegetation, and the topsoil spread evenly over the dump. The dump shall be revegetated and/or ripped where specified.

(iii) Gravelled dumps shall be drained during and upon completion of logging so that runoff is directed onto surrounding vegetation.

FORESTRY COMMISSION, N.S.W.

COFFS HARBOUR REGION
RO 1504 JB:TW

Rufous Scrub Bird - Washpool MA

As can be seen from the attached papers, the Rufous Scrub Bird has become popular again, at least as far as Washpool is concerned (also Blackbutt Plateau/Jerusalem Mountain).

There was some work done in Port Macquarie Region in the early 1980's, and I think that it was co-ordinated by the OIC, Wauchope Research. (Then Taree Research, and under the control of Garry King.)

Would you please get whatever information you can from Wauchope, and talk to me about survey techniques.

JOHN BRUCE
Regional Forester

29.11.1989

The OIC
RESEARCH

Copy for your information.

JOHN BRUCE
Regional Forester

29.11.1989

The District Forester
CASINO
MURWILLUMBAH

40206-91

EXHIBIT V

Coram: HEMMING J.

Cahill v. Forestry Comm

Return to Hillman + Woolf

Associate

S.O. 2883

23.590

FORESTRY COMMISSION OF N.S.W.

CASINO DISTRICT
464 PETER PAUNOVIC:AM

Proposed Amalgamation of Casino West and
Casino Management Areas
R.O. 296

In reply to the points raised in H.O. 9660 (9653) MPD 9/10/89.

1 & 2 Pole Working Circle

The reason no attempt was made to justify the proposed elimination of the Pole W.C. is that the management strategy of the Working Circle is no longer acceptable, environmentally, aesthetically or productively.

A strategy that advocates the harvesting of trees other than potential poles for silvicultural reasons will result in a stand of all small trees of pole or below sizes (2.1.2. of Casino M.P.). As virtually all trees pole size and above are now not only saleable but sought after, any tree of pole size that does not have the potential to produce a pole would be removed for silvicultural reasons.

If this interpretation of the strategy is not correct and trees of growth potential other than poles are to be retained in the Pole W.C., the Pole W.C. and the Sawlog W.C. would be managed in an identical manner as the harvesting prescriptions of both are identical (2.2.3.2. and 2.3.3.2.). If the stands are to be treated in the same way it negates the reason to have separate working circles.

Casino like other districts on the North Coast sells a whole range of sizes of logs. Quota as such is loosing its importance as our main product. Stands are being logged on a cutting cycle removing trees of all sizes that have little potential. At the same time trees of all sizes with potential are being left except for poles which are being harvested when they reach saleable sizes. These poles come from all stands regardless of whether they are in the Pole or Sawlog W.C.s and even come from blackbutt stands.

The Pole W.C. strategy has not been used in the past which has resulted in the stands in the W.C. having a high proportion of sawlogs. This has been demonstrated in the recent Casino assessment.

I believe that if stands regardless of the working circle they are in, are managed on a cutting cycle, the production of poles will not be compromised. The production of other products up to large sawlogs in stands that have the potential to produce them, will also be possible, as has happened.

The public will not accept management practices that will result in half the Casino Management Area converted to a pole size forest. The public want and demand large trees and even habitat trees, in stands that do not have them present. Management under a cutting cycle as proposed can achieve a forest acceptable to the public.

../2

M.P.D. are also concerned over the possible loss of large sizes in the Stand TAble for the Casino M.A. (H.O. 682 MPD 6-3-90). If the Pole W.C. was managed according to the Management Plan it would definitely eliminate large trees on half the management area.

For the reasons covered above it is recommended that the Pole/Sawlog Working Circles be amalgamated and definitely not extended to the Casino West Management Area.

3 & 4 Sawlog Working Circle

Current management practices i.e. logging on a cutting cycle basis for both the Casino and Casino West areas are the same. The forest types, rather than being different, are part of a continuum and no difficulties are seen in their descriptions or silvicultural management. If the management prescriptions of the old Casino West Plan are compared with that of Casino, no great differences occur.

The proposed amalgamation of the two M.A.s is seen as the most convenient and efficient way of handling the management of total area.

5 Preserved Areas Working Circle

I cannot see any problems in extending the Preserved Areas Working Circle to cover the proposed amalgamated area.

Recommendation

1) That the Casino and Casino West M.A.s be amalgamated.

2) That the Pole and Sawlog Working Circles of the Casino Management Plan be amalgamated.

3) That the Casino Preserved Areas Working Circle be extended to cover all preserved areas in the combined area.

4) That the breakup of the amalgamated area be:

a) Casino Working Circle consisting of all but the preserved area of the old Casino M.A. and the Richmond Range W.C.

b) Ewingar Working Circle consisting of the Ewingar Harvesting Series and the Billilimbra Harvesting Series.

c) Casino Preserved Areas Working Circle.

P. PAUNOVIC,
District Forester,
Casino.

23rd May, 1990

The Regional Forester,
Coffs Harbour.

24/5

29.5.90

FORESTRY COMMISSION, N.S.W.

COFFS HARBOUR REGION
RO 1921 DGR:TW

Casino Management Area - 1988 Assessment
Determination of Yields
HO 682 (MPD)

Basic to the above assessment is that the area will be managed on a cutting cycle basis. The cycles will be 25 years.

Assessed Volumes

Each tree assessed was classified as to log type it would produce - its merchantability class - and in what cutting cycle it would be utilized - its harvesting status. Thus assessed volumes can be divided into potential log type available for each of the three cutting cycles considered. The attached Appendix 1a to 1e list assessed volumes of potential quota logs, small logs, salvage logs, poles and miscellaneous timber available for the first cutting cycle. Appendix 2a to 2d list the second cutting cycle volumes and Appendix 3a & c those for the third cycle. These data are summarised below:

	Cutting Cycle			
Product	1	2	3	Total
Quota log	853442	151012	24843	1029297
Small log	271114	210889	109214	591217
Salvage log	95035	-	-	95035
Pole	29126	3670	-	32796
Miscellaneous	142533	2532	182	145247
	1391250	368103	134239	1893592

- the basic data for quota and smalls have been amalgamated and then sub-divided as small logs = <50 cm dbhob, quota logs = <50 cm dbhob.
- "cutting cycle 3" include all trees left after cutting cycle 2.
- assessed veneer logs have been placed in quota or smalls depending on size.

Incremented Assessed Volumes

To calculate a basis for determining yields these volumes were incremented as follows:

Cutting cycle 1 tree - 12.5 years
Cutting cycle 2 trees - 37.5 years
Cutting cycle 3 trees - 50 years

/2 .....

The increments applied, based on growth plot data from the area, vary with assessed tree crown quality and assessed tree dominance. They are:

Crown	Dominance Class (cm/year)			
Quality	Dominant	Co-dominant	Sub-dominant	Suppressed
Good	0.35	0.45	0.41	0.17
Fair	0.43	0.31	0.34	0.17
Poor	0.34	0.25	0.20	0.09

Appendix 4a to 4e list incremented assessed volumes of potential quota logs, small logs, salvage logs, poles and miscellaneous timber for the first cutting cycle. Appendix 5a to 5d list the second cutting cycle incremented volumes and Appendix 6a to 6f those at the beginning of the third cycle. These data are summarised below:

	Cutting Cycle			
Product	1	2	3	Total
Quota log	1141246	762477	596605	2500328
Small log	235354	41915	687694	964963
Salvage log	108302	-	1385	109687
Pole	46941	58616	1224	106781
Miscellaneous	183065	61691	18959	263715
	1714908	924699	1305867	3945474

Adjusted Incremented Assessed Volume

The above table shows a decrease in assessed available quota volume with time. To overcome this situation trees assessed for removal during the first cutting cycle have to be retained. This was achieved by amending the harvesting status of assessed dominant cutting cycle one trees with good crowns (the good form trees) with DBHOB 70 cm and over being allocated to cutting cycle two and those with DBHOB less than 70 cm to cutting cycle three.

Appendix 7a to 7e list adjusted incremented assessed volumes of potential quota logs, small logs, salvage logs, poles and miscellaneous timber for the first cutting cycle. Appendix 8a to 8e list the second cutting cycle adjusted incremented volumes and Appendix 9a to 9f those at the beginning of the third cycle. These data are summarised below:

	Cutting Cycle			
Product	1	2	3	Total
Quota log	945396	873060	769743	2588199
Small log	234622	41915	687694	964231
Salvage log	92788	13178	11041	117007
Pole	33840	58616	30045	122501
Miscellaneous	169941	61691	43782	275414
	1476587	1048460	1542305	4067352

/3 .....

These give a much better availabilities of volume over time. Also retaining the larger good form trees helps to sustain stem frequency in the large diameter class over time. The stand tables following the adjustments are:

	Merchantable Trees Stand Table (Stems per ha)		
Year	1988	2013	2038
Cutting Cycle	0	1	2
CBHOB Class			
40-50	12.5	8.6	10.8
50-60	7.0	5.3	5.6
60-70	2.8	2.4	1.4
70-80	1.3	.8	.6
80-90	.5	.4	.6
90-100	.2	.2	.2
100+	.3	.2	-
	24.6	17.9	19.2

Yield Calculation

1 Quota Logs

The total assess volume following incrementing and adjustment for the first two cutting cycles is 1818456 m^3 which gives a basic 36369 m^3 per year for the fifty year period. (Adopting this conservative figure for the first cycle will retain further volume for future cycles.)

2 Small Logs

Thinning of small logs is a silvicultural operation and a basic aim is to maximise yield over a cutting cycle. Trees were so assessed and the result is a large available volume for the first cycle. It is obvious the trees assessed to stay following the second cycle far exceed requirements and if an even yield flow is required over time third cutting cycle trees can be cut during the second cycles.

The assessed adjusted first cutting cycle available volume is 234622 m^3 which gives a basic 9385 m^3 per year for the twenty five years.

3 Salvage Logs

There is no intention to set a sustained yield. The indicated annual yield is 3700 m^3.

4 Poles

The adjusted assessed first cutting cycle available volume is 33940 m^3 which gives an annual yield of 1354 m^3 for 25 years.

/4 .....

5 Miscellaneous

This product is cut as post, sleeper, etc.

The indicated yield is 6797 m^3 pa. It is not proposed to determine a yield.

Determination of Yields

a) Quota

The assessed annual yield has been calculated as 36369 m^3.

It is considered the following factors should be applied to determine a practically available annual volume:

1) A decrease of 5% for death, windthrow, fire and logging damage.

2) A decrease of 5% for errors in merchantability assessment of older trees, and quota leakage in log sales to non quota sawmills.

3) A decrease of 5% error in merchantability assessment because of changing utilisation standards for poles, particularly desaps.

4) A decrease of 1000 m^3 per year for short length girder and pile trees assessed as logs.

Assessed annual yield			36369 m^3
less 1)	losses etc	5%	
2)	merchantability errors	5%	
3)	Pole utilisation standards	5%	
		15%	5455 m^3
4)	Included girders and piles		1000 m^3
			29914 m^3
Determined practical yield			29900 m^3 pa

b) Small Logs

The assessed annual yield has been calculated as 9385 m^3. It is considered the following factors should be applied to determine a practically available annual volume.

1) A decrease of 5% for death, windthrow, fire and logging damage.
2) A decrease of 20% error in merchantability assessment because of changing utilisation standards for poles, including desaps.
3) A decrease of 1000 m^3 per year for short length girder and pile trees assessed as logs.

/5 .....

Assessed annual yield		9385 m³
Less 1) Losses etc	5%	
2) Merchantability error	20%	
	25%	2346 m³
3) Included girders & piles		1000 m³
		6039 m³
Determined practical yield		6000 m³

c) Poles

The assessed annual yield has been calculated as 1354 m³. To this the following can be added to determine a practically annual volume:

1) 5% of assessed quota volume	1818 m³
2) 20% of assessed small log volume	1877 m³
3) Piles and girders assessed as logs	2000 m³
Determined practical yield poles	5000 m³
Determined practical yield piles and girders	2000 m³

The determined pole yield can be further subdivided into:

Natural round/treatment poles	4000 m³
Desap poles	1000 m³

Summary

The determined first cutting cycle yields are:

Quota logs	29900 m³
Small logs	6000 m³
Poles - rounds	4000 m³
- desaps	1000 m³
- girders	2000 m³

Additionally the following have been assessed:

Salvage	3700 m³
Miscellaneous	6800 m³

Current Commitments

Quota logs	8800 m³
Small logs	5430 m³
Poles - rounds	3800 m³
- desaps	800 m³
- girders	500 m³
Salvage	3000 m³
Miscellaneous	3000 m³

/6 .....

The determined quota log yield is significantly higher than current commitments. The following should be considered in determining the utilisation of the uncommitted 21000 m^3.

1) Allocations were modified in association with the production of the current management plan.

2) 2430 m^3 of current quota allocations is in logs less than 40 cm cdub which were assessed as small logs.

3) A proportion is of veneer log quality. Maybe up to 4000 m^3.

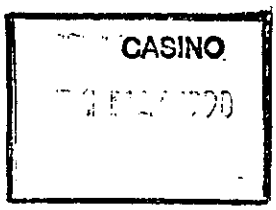
4) The recently completed Richmond Range Working Circle assessment (part of Casino West MA) indicates a significant uncommitted quota volume.

5) Part of the Casino West MA is not on sustained yield.

6) There is a proposal to amalgamate Casino and Casino West Management Area.

Recommendation

It is recommended that the determined first cutting cycle yields listed above be adopted.



JOHN BRUCE
Regional Forester

Per:

29.05.1990

THE SECRETARY

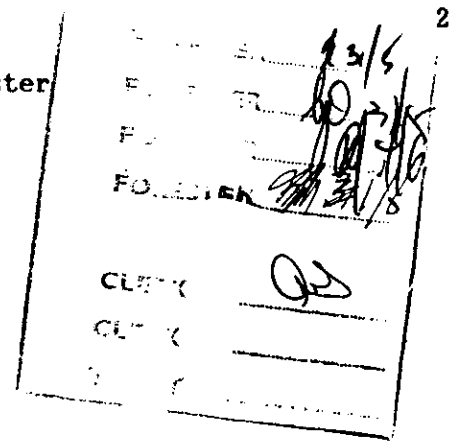
Copy for your information.

JOHN BRUCE
Regional Forester

Per:

29.05.1990

The District Forester
CASINO



1504

WASHPOOL / BILLILIMBRA COSTS

31 AUG 1990

ROYALTY A) 97000 gross HWD (TO GRAFTON).
@ $23.00 / m^3 (INCLUDES POLE + GIRDERS)
= $2,231000.
LESS MARKETING COSTS. $~~145500~~ 142590 ($1.47/m^3).
NET ROYALTY = $~~2085500~~ 2088410

B) 38000 gross HWD (TO CASINO)
@ $25.00 / m^3 (INCLUDES POLES + GIRDERS)
= $950000
LESS MARKETING COSTS $55860 ($1.47/m^3).
NET ROYALTY = $894140

C) 14500 gross BWD (TO GRAFTON)
@ $\frac{1}{4}$ × $42.40 + $\frac{3}{4}$ × $29.60 = $32.75
= $474875
LESS MARKETING COSTS $21315
NET ROYALTY = $453560

D) TOTAL NET ROYALTY = $3436110
+ ROYALTY ALREADY RECEIVED $100,000 APPROX.
= $3536110.

ROADING COSTS.

TO DATE	DESERT RD.	$219500
	BERRY RD	$85000
	LIONSVILLE UPGRADE.	$143000
	DESERT RD FEEDERS	$60000
(13 km at $28000)	BILLILIMBRA RD	$364000
(26 km at $3000)	BILL. FEEDERS	$78000
		$949500

RF
DRF
RAO
DAO
REV
P

[signature] 31/8/90

21·9·89

copy **FORESTRY COMMISSION OF N.S.W.**

CASINO DISTRICT
464 PETER PAUNOVIC;AM

Hardwood Management Plans
Casino District

The hardwood areas in Casino District are currently covered by two Management Plans which are based on the two old Districts - Casino and Casino West. Now that the District is one the plans should also be combined when the Casino West Plan is revised.

To combine the two areas various changes are proposed. These are listed below.

1) Plans

Combine Casino M.P. and Casino West M.P. into the Casino M.P.

2) Subdivision of Plans

The Casino M.P. has currently two working circles, the Sawlog and Pole W.C. The Casino West M.P. also has two working circles, Richmond Range and Ewingar. The proposal is to combine both of the Casino Working Circles and the Richmond Range Working Circle into one Working Circle - Casino W.C.

The Ewingar W.C. is to remain but this Working Circle has currently three harvesting series, General, Hewetsons and Billilimbra Harvesting Series. The proposal is to combine the General and Hewetsons series and this has the agreement of the mills concerned.

Therefore the result will be.

Casino M.P.
- Casino W.C.
- Ewingar W.C.
  - General Harvesting Series
  - Billilimbra Harvesting Series

3) Mill Supply Zones

Currently four mills - Duncans, Notaras, Slys and Hurfords obtain quota wood from the Casino M.A. and Duncans and Hurfords from the Richmond Range W.C. of the Casino West M.A. It is proposed that these mills will still obtain their quota wood from their traditional areas with attempts made to minimise the haul distance to the respective mills allowing for the varying qualities of timber available.

Duncans currently obtain logs from both the General and Hewetsons Harvesting Series and with the amalgamation of these Series the situation will remain.

../2

21/9

21/9

Duncans, Notaras and Allen Taylors are scheduled to obtain wood from the Billilimbra Harvesting Series and the situation will remain.

The mills have been spoken to regarding these proposed changes and as long as they are not disadvantaged are agreeable to the proposal. The main area of concern is missing out on better quality logs which will not happen.

4) Flat Rate Royalties

There is no proposal to change these at present.

5) Allocations

Two assessments have been completed, that covering the Richmond Range Working Circle in 1986 and the Casino Management Area in 1988.

Allocations based on these assessments should be finalised before the revised plan is completed.

Approval is requested to continue the revision of the Casino West Management Plan which will include the current Casino Management Plan as set out above.

P. PAUNOVIC,
District Forester,
Casino.

The Regional Forester,
Coffs Harbour.

21st September, 1989

Proposed Amalgamation of Casino West and Casino Management Areas R.O. 29/9/89

A. General

The reasons for separation of areas into Harvesting Series, Forest Groups, Working Circles (and Management Areas) may be summarised as those of convenience; or efficiency of description, prescription, or administration; under the following headings:

1. Silvicultural/management prescriptions

At least broad forest type groups or geographic Forest Groups: or more formally for convenience in presentation, Working Circles.

2. Logical supply zones for industry for yield regulation

Management Areas are usually defined to suit logical areas for long-term sustained yield supply and regulation, but Working Circles or even Harvesting Series under special circumstances may be logical areas for long-term sustained yield supply and regulation.

Harvesting Series are normally used to cover the separate supply zones and commitments which have evolved to suit individual industries, and which are generally expected to disappear as they can be absorbed into the broader more logical supply zones defined as Management Areas (or Working Circles) by determination and/or negotiation with industry, as facilitated by industry (and to some extent by Forestry District) amalgamations.

3. Convenience in presentation

Generally applies to ease of description in Part 1 of the Plan to achieve a better understanding of the Area as a basis for prescription in Part 2.

Only separation into forest type groups or geographic Forest Groups can be justified for this reason alone. Working Circles and Harvesting Series must derive more directly from the need for formal presentation of silvicultural/management prescriptions and for yield regulation to cover defined supply zones to meet commitments.

Convenience in administration

Separation into Forestry Districts is generally based on the same or similar considerations to those which determine logical separation into Management Areas, and boundaries can usually be adjusted to conform with forest management requirements. But Management Areas may be separated only as a matter of administrative convenience to avoid the complications arising from joint administrative control of the one MA, and without much support from other considerations.

On the other hand, other considerations may justify maintainance of separate Management Areas within the one Forestry District even within the same broad species group (Broadleaved, Cypress, Softwood Plantation).

B. Proposed Casino West/Casino MA Sub-division

1. Ewingar Working Circle

OK

As a consequence of licensee industry amalgamations there is no longer any purpose to be served in separation of the General and Hewetson Harvesting Series in the Ewingar Working Circle, so that maintenance of this Working Circle divided only into a General and Billilimbra Harvesting Series is approved.

2. Proposed combined Richmond Range Working Circles

i.e. Present Richmond Range Working Circle, Casino West MA; combined with Sawlog and Pole Working Circles, Casino MA.

(Casino MA Preserved Areas Working Circle should be expanded to include all preserved areas in the whole MA).

a) Pole Working Circle

No attempt whatever has been made to justify the proposed elimination of the Pole Working Circle. On the face of it, there is no justification for elimination of this separation based firmly on the logic of silvicultural/management prescriptions (see A. General and 3 above) and maintained through two successive management plans since 1977. On the contrary, there would appear to be some justification for its expansion to include areas (such as Fullers SF) in the present Richmond Range Working Circle in Casino West MA which conform with the criteria for inclusion set out in Sections 2.1.2 and 2.3.1 of the Casino Plan, in a combined Richmond Range Pole Working Circle.

b) Amalgamation Casino MA Sawlog Working Circle and Richmond Range Working Circle of Casino West MA (exluding any transfer of areas to an expanded Pole Working Circle)

The Region should consider and determine the manner in which Casino MA Sawlog Working Circle broad forest type and forest group descriptions and silvicultural/management prescriptions (see A. General 1 and 3 above) should be included within the proposed combined Richmond Range (General) Working Circle (i.e. excluding the Pole Working Circle), to satisfy themselves and demonstrate/ certify to approving officers that any practical difficulties can be satisfactorily overcome.

This should not be any great problem but should nevertheless be demonstrated and certified not to be.

c) Preserved Areas Working Circle

This is still a convenient and efficient means (for the whole MA(s) as finally determined) for prescription (see General 1, 2, 3 above), but can be determined in final drafting if there is any difficulty. Nevertheless intentions/comments should be discussed now.

d) Supply Zones and Yield Regulation within proposed combined Richmond Range Working Circle

(i.e. proposed combined Casino MA Sawlog and Pole and Casino West MA Richmond Range Working Circles).

There can be no logical objection to amalgamation of these supply zones for yield regulation and allocation purposes provided that it is formally recognised and accepted by Crown quota sawmill licensees and Marketing Division that amalgamation implies future quota sawlog allocations and entitlements as an equitable share of the combined Working Circles; as against the present basis of separate equitable shares of the current Casino MA (Pole and Sawlog Working Circles); and Richmond Range MA of the Casino West Management Area; as separate and district supply zones.

It would therefore be prudent to have the yield reviews based on recent assessments in the Richmond Range Working Circle of Casino West MA, and in the Pole and Sawlog Working Circles of the Casino MA, completed and yields approved by the Commission before finalising this.Yield reviews would best be submitted to the Commission in the context of concomitant consideration of likely future yield prospects in the Ewingar Working Circle (to be included in the Management Plan

revision) and proposed amalgamation of the present Richmond Range WC and Casino MA supply zones as the basis for future yield regulation and allocation, for overall approval.

C. Action Required

Action now required toward revision of the Casino West and Casino Management Plans is therefore:

1. Acceptance that separation of a Pole Working Circle will be continued, based on the logic and justification outlined under B2(a) above.

2. Broad determination of the nature and extent of any expansion of the Pole Working Circle necessary for consistent application of the criteria for inclusion set out in Sections 2.1.2 and 2.3.1 of the Casino Plan, to form the Richmond Range Pole Working Circle should the two Management Areas be amalgamated. (B2(a))

3. Consideration and determination of the manner in which Casino MA Sawlog Working Circle broad forest type and forest group descriptions and silvicultural management prescriptions (see A.1 and 3 above) should be included within the proposed combined Richmond Range Sawlog Working Circle, and demonstration/certification that any practical difficulties can be satisfactorily overcome. (B2(b))

4. Consideration and determination of whether the proposed amalgamation of the Casino West and Casino MAs on this basis is the most convenient and efficient basis on which to proceed.

5. Brief consolidated formal submission and recommendation as the basis for Commission approval to the preferred course of action, incorporating the considerations 1-4 listed above. Intentions/comments with respect to a proposed combined Preserved Areas Working Circle should be included.

The proposals for Ewingar Working Circle (B1) are approved, and any other difficulties with supply zones and yield regulation which may arise can be handled in conjunction with Plan revision irrespective of whether or not amalgamation is proceeded with.

Any recommendation from the Region for abandonment of the Pole Working Circle will have to be comprehensively and closely argued on the basis of the considerations outlined under B2(a). It doesn't seem to have any particular relevance one way or the other to the proposed MA amalgamation, except possibly the additional work occasioned under 2. above, and this possible inexpediency should be outweighed by the overall expediency of the proposed amalgamation.

Assuming amalgamation of the MAs is recommended and approved along the lines outlined, formal submission from the Region in favour of amalgamation of the current Richmond Range and Tabbimobile Accounting Units into a combined Richmond Range Accounting Unit (i.e. elimination of the separate CBTMB AU and incorporation into the existing CBRMB). Approval from commencement of the next financial year could be anticipated.

(Ewingar AU CBEMB should be retained at least until completion of initial harvesting (including in the Billilimbra Harvesting Series). Maintenance of a separate Accounting Unit for this Working Circle could then again be considered, in the light of the place of the Working Circle in the overall sustained yield strategy of the Management Area).

7. Submission of a separate report in conjunction with recommendation under 5. above, assuming it is in favour of amalgamation of the MAs along the lines outlined; for Management and Marketing Division consideration and appropriate advice to the Commission, foreshadowing the intention to seek formal recognition from Crown quota sawlog licensees and Marketing Division that future quota sawlog allocations and entitlements will be based on a supply zone constituted by the proposed combined Richmond Range Sawlog Working Circle (including the current Richmond Range and Casino Sawlog Working Circles from Casino West and Casino MAs respectively), supplemented by the proposed Richmond Range Pole Working Circle (as expanded from the current Casino MA Pole Working Cirle).

which would otherwise have been required

This proposal will avoid any necessity for separate Harvesting Series, within the proposed Richmond Range Sawlog Working Circle (and perhaps even within the proposed Richmond Range Pole Working Circle!) to correspond with previous separation into Casino MA and Casino West MA supply zones.

8. Completion of yield reviews based on recent assessments in the current Richmond Range Working Circle of Casino West MA, and in the current Pole and Sawlog Working Circles of the Casino MA, and submission of recommended yields for approval of the Commission. This must be done in the context of concomitant consideration of likely future yield prospects in the Ewingar Working Circle (to be included in the Management Plan revision), and the foreshadowed amalgamation of the present Casino West MA Richmond Range Working Circle and Casino MA supply zones into one supply zone (to be constituted by the proposed Richmond Range Sawlog Working Circle as supplemented by the proposed Richmond Range Pole Working circle)

j. In conjunction with but separately from the submission outlined under 7, recommendation as to allocations for disposal of the approved yields, for consideration by Management and Marketing Division and the Commission.

G.B. POPLE
Chief, MPD

09 October 1989

DEPUTY CHIEF, MPD — 9/10 — The submission from District & Region follows phone discussion between Chief MPD & R/F Coffs Harbour, then subsequent discussion between Mr Squire & Region re Accounting Unit amalgamation as 826 - You should look at the file in conjunction with your statement

Chief MPD 9/10

MR SQUIRE - For appropriate advice to Region, and organisation with the Regional Forester of the actions progressively required and listed under that heading, as the basis for plan revision to meet scheduled targets.

12/1 + 3/4

Response initially, with my memo 10/10/89 re 826 on that file, to Commission (A. Nelson) for INFORMATION 10/10

RO. 296, DO. 464.

Please review requirements as noted above, and provide recommendations flowing therefrom. It is noted that there has been a long delay in forwarding this to Regions: it was hoped that more progress would have been made by now with (a) Grevillea plan, (b) Whporie plan (c) Casino West Rich Ra. WC yield review and (d) Casino assessment and yield review. This is not the case. The 4 would seem to be inextricably involved with requirements outlined above.

Management Office
3-4-90
JF Yarwood
Secretary

For action please.

Regional Forester
COFFS HARBOUR

Casino West Management Plan
Annual report 1987/88
H.O. 9660 (MPD)

A copy of the 1987/88 annual report for the Casino West Management Plan received from the District Forester Casino is attached. Further comments are:

2.2 Richmond Range Working Circle

2.2.3 Yield Regulation

2.2.3.1 Quota Sawlogs

The determined yield is 12275m³ Net
The cut for 13 months was 16,636m³Net
The demand was high with millers cutting a high proportion of their 1988 allocations early in the calender year.

2.2.3.2 Poles

Interim allocations independant of Casino M.A. were made. The 2,587m³ cut represents part 1987 allocation of 2,000m³ and part 1988 allocation of 3,000m³ and is not a real indication of demand which was high.

2.2.3.3 Other Timber and Products

The cut for the year was:

Small Logs (Parcel sales)	- 2033m³g
Small Logs (qaota ops.)	- 102m³g
Salvage logs	- 1873m³g
Ex-quota Minimum Rate Logs	- 260m³g
Sleepers etc.	- 281m³g
Fencing	- 897m³g
Firewood	- 3 tonne
Hoop Pine	- 98m³
Poles	- 62

...../2

Yields for the last 5 years are:

Product	Yield	83/84	84/85	85/86	86/87	87/88
Quota Logs	12275	13469	11987	10216	12188	16636
Poles	2000 (87)				1000	2587
	3000 (88)					
Small Logs					1939	2135
Salvage			589	1652	1210	1873
Sleepers etc.		2138	2202	299	224	281
Fencing		699	417	481	732	897

2.2.4 Commercial Operations

2.2.4.3 Order of Working

The order of working has been approved.

2.2.5 Cultural Operations

A start was made on an enrichment planting programme. Annual plantings should now be made.

Yield Monitoring

Initial monitoring indicates that the area is yielding as assessed. Little credit should be given to these early results.

2.3 Ewingar Working Circle

2.3.3 Yield Regulation

2.3.3.1 Quota Sawlogs

Brushwoods

The determined yield is 3000m³g.

The cut was 1187m³g. Again the purchaser had no incentive to maximise the cut.

Hardwood

The determined yield is 21,000m³ Net.

The cut was 22,239m³ Net. The demand was high.

2.3.3.3 Other Timber and Products

Ex-quota minimum rate	-	1400m³ gross
Small logs	-	206m³ gross
Brushwood (Specialty)	-	302m³ gross

Sleepers etc - 173m³ gross
Fencing - 21

Yields for the last 5 years are:

Product	Yield	83/84	84/85	85/86	86/87	87/88
Quota Logs						
HWD	21000	23237	19826	21025	17386	22239 (N)
BWD	3000 (g)	3897	4988	2616	2196	1187 (g)
Ex-quota MR		836	1808	1153	492	1400
Small logs			113	406	131	206
Sleepers etc.		430	148	365	359	173
Fencing		11	9		41	21
Brushwood (Speciality)			495	205	235	302

2.3.4 Commercial Operations

2.3.4.1 Special Prescription Areas

Suggested Plan amendments should be forwarded in near future.

2.3.4.3 Order of Working

The order of working has been approved.

Yield Monitoring

Again the year's monitoring has not changed previous conclusions. Actual yields have been very close to the assessed. However it is becoming increasingly evident that on many occasions the logging has been conservative and often compartments have not been completely logged. Old growth will be available for 2nd cutting cycle yields.

Management Accounts

Details for the last five years are:

Richmond Range	1983/84	1984/85	1985/86	1986/87	1987/88
Net Revenue	296 444	392 522	291012	380 967	609 048
Costs	328 398	348 556	289 973	377 081	380 810
Surplus/Loss	-31 954	43 966	1 034	3 886	228 238
Ewingar					
Net Revenue	451 517	475 922	456 634	446 643	565 555
Costs	330 947	281 522	390 879	497 144	664 796
Surplus/Loss	120 570	194 400	65 755	-50 501	-99 241

Richmond Range had a significant surplus following an increase in revenue. However Ewingar has road depreciation and maintainence costs, not the same oportunity to increase income and receipts are not keeping up with costs.

Summary

A normal year with demand high.

JOHN BRUCE,
Regional Forester.

Per:

20th January, 1989

The Secretary.

N. D. F.
Casino

FORESTER
FORESTER
FORESTER
FORESTER
CLERK
CLERK
TYPIST

CASINO
24 JAN 1989

CHAPTER 20

Habitat Requirements of a Rare Species, The Rufous Scrub-bird

Simon Ferrier[1]

The Rufous Scrub-bird, *Atrichornis rufescens*, is a small ground-dweller, at present confined to upland forests of northeastern New South Wales and far southeastern Queensland.

The habitat requirements of the species were studied in subtropical rainforest at Wiangarie and open eucalypt forest at Gloucester Tops. In each area, multivariate habitat comparisons were made between plots centred on male song territories and plots located at random throughout unoccupied forest. The critical factors determining whether or not habitat was suitable appeared to be identical in the two areas, despite broad differences between the forest types occupied. The major requirements were extremely dense cover 2-50 cm above the ground, moderately dense cover 50-100 cm above the ground, a moist microclimate at ground level, and abundant leaf litter. These requirements closely resembled those of the Noisy Scrub-bird, *A. clamosus*, in Western Australia.

Selective logging increased habitat suitability in the rainforest, yet lowered suitability in the eucalypt forest. Suitable habitat within eucalypt forest seemed to be associated with an intermediate seral stage of post-fire succession. The effects of logging and prescribed burning on habitat suitability need to be considered in planning the management of this species.

INTRODUCTION

THE SCRUB-BIRDS (family Atrichornithidae) represent one of the most interesting and scientifically important elements of the Australian forest avifauna. Although these distant relatives of the lyrebirds were probably more widespread during the Tertiary and Pleistocene, they are today restricted to a few small relic populations (Smith 1977).

The Noisy Scrub-bird, *Atrichornis clamosus*, is at present known to occur only at Two Peoples Bay in southwestern Australia. This population has been the subject of intensive research and management (Smith and Robinson 1976; Davies *et al.* 1982). The Two Peoples Bay area was declared an 'A' Class Reserve in 1966, primarily for the purpose of conserving the Noisy Scrub-bird.

The Rufous Scrub-bird, *A. rufescens*, is confined to moist forests of northeastern New South Wales and far southeastern Queensland. Although more abundant than the western species, the Rufous Scrub-bird has nevertheless been the cause of considerable concern. Since European settlement it has become extinct in all lowland areas of its range and is now restricted to five isolated upland populations (Ferrier 1982, 1983). Both species of scrub-bird are included in the Red Data Book list of endangered birds compiled by the International Council for Bird Preservation (King 1981).

The following study of Rufous Scrub-bird habitat requirements is presented as an example of the research needed to ensure preservation of these fascinating species. Further information concerning research on the Rufous Scrub-bird is given in Ferrier (1984), while the results of research on the Noisy Scrub-bird can be found in Smith (1976a, 1977, 1979), Smith and Robinson (1976), Robinson and Smith (1976), Smith and Forrester (1981), and Davies *et al.* (1982).

The impression obtained from previous descriptions of Rufous Scrub-bird habitat (e.g. Smith 1976b; Pizzey 1980) is that the bird is restricted to areas of dense undergrowth within rainforest or contiguous sclerophyll forest. While qualitative descriptions

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Pages 241-48 *in* BIRDS OF EUCALYPT FORESTS AND WOODLANDS: ECOLOGY, CONSERVATION, MANAGEMENT ed. by A. Keast, H. F. Recher, H. Ford and D. Saunders. Royal Australasian Ornithologists Union and Surrey Beatty & Sons.

such as this provide a valuable starting point for the study of habitat, detailed quantitative information is desirable for the purposes of habitat management (see Conner and Adkisson 1976; Rotenberry 1981). Those factors determining whether or not habitat is suitable for the Rufous Scrub-bird need to be precisely identified.

Previous research has suggested that birds often select habitats on the basis of factors not immediately connected with their survival. These proximate factors are probably used as easily recognized guides to ultimate factors directly connected with survival (Partridge 1978; Rotenberry 1981). For example, vegetation structure may be used as a proximate factor indicating the availability of food. However, vegetation structure may also act as an ultimate factor by providing cover for protection from predators. In most cases careful experimentation is needed to distinguish between proximate and ultimate factors. For the purposes of this chapter, both will be viewed simply as "critical habitat factors"; those variables determining, either proximately or ultimately, the suitability of habitat for the Rufous Scrub-bird.

METHODS

Details of the methods used are given in Ferrier (1984). Most of the habitat research was conducted at two localities: 1. Wiangarie State Forest (28°25'S, 153°05'E) 20 km northeast of Kyogle, and 2. Gloucester Tops (32°05'S, 151°35'E) 35 km west of Gloucester, lying partly within Barrington Tops State Forest and partly within Barrington Tops National Park. Altitudes ranged between 700 m and 1100 m for the Wiangarie study area and between 900 m and 1300 m for the Gloucester Tops study area. These areas were chosen because they represented the extremes of both latitudinal range and habitat type for the Rufous Scrub-bird. The Wiangarie area consisted mostly of subtropical rainforest with a few small patches of cool temperate rainforest dominated by *Nothofagus moorei*. The Gloucester Tops area consisted mainly of open forest dominated by *Eucalyptus fastigata* and *E. obliqua*, interspersed with cool temperate rainforest. Scrub-birds at Wiangarie were found mostly within subtropical rainforest whereas those at Gloucester Tops occurred mostly within open forest.

Eighteen kilometres of transect line were mapped in each area. The transects were walked 18 times between August 1981 and October 1982. Male scrub-birds heard singing within 150 metres either side of the transect line were mapped by triangulation of compass bearings taken on the source of sound. The song produced by males is loud and penetrating, and provides the only useful means by which scrub-birds can be detected.

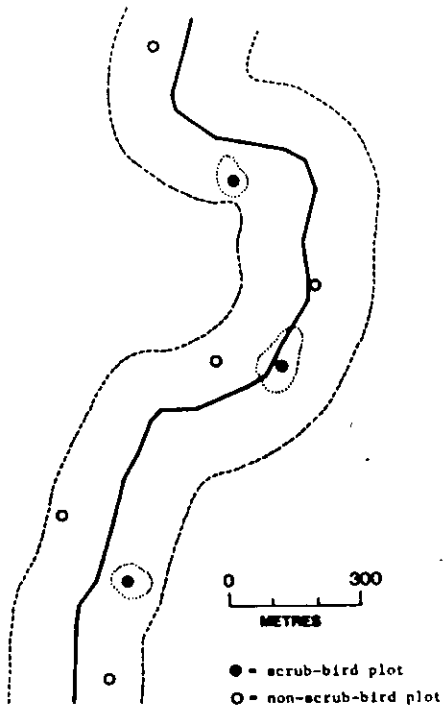

Fig. 1. A typical section of transect strip used in the study of Rufous Scrub-bird habitat (Wiangarie State Forest). The boundaries of scrub bird territories are indicated by dotted lines. Each symbol indicates the centre of a habitat plot.

Accumulated detections of singing males after 18 transect walks formed distinct clusters. Detailed study has suggested that these clusters represent the territories of individual singing males.

In order to compare the habitat in male scrub-bird territories with habitat in nearby, unoccupied areas, two types of plots (30 metre radius) were established (see Fig. 1). Plots of the first type were centred on the activity centres of male territories (22 scrub-bird plots in each study area). Plots of the second type were located at random throughout the 300 metre wide transect strips; the only condition was that these plots did not overlap scrub-bird plots (40 non-scrub-bird plots in each study area).

Seventy habitat variables were measured in each of the 124 plots. These variables covered a wide variety of habitat features including vegetation structure and floristics, topography, soil surface characteristics, microclimate, and proximity to neighbouring scrub-bird territories.

Less detailed investigation of Rufous Scrub-bird habitat was also made at subsidiary sites scattered throughout the range of the species: Mt. Barney, Lamington Plateau, Gibraltar Range, Ebor-Dorrigo area, Hastings Range. A total of 174 territories was located during the study.

RESULTS AND DISCUSSION

Critical Habitat Factors

Did the habitat of scrub-bird plots differ from that of non-scrub-bird plots? Because many of the habitat variables were correlated with one another, it was difficult to assess overall habitat differences by looking at variables individually. For this reason, discriminant analysis was used to combine all of the habitat variables into a single index, the discriminant function, in a way that maximized the separation between scrub-bird and non-scrub-bird plots. Details regarding the use of discriminant analysis in studying avian habitats can be found in Conner and Adkisson (1976), MacKenzie and Sealy (1981), and Titus and Mosher (1981).

In Figure 2, scrub-bird and non-scrub-bird sites are plotted along the discriminant functions for Wiangarie and Gloucester Tops. By combining all of the variables in this way, complete separation of scrub-bird and non-scrub-bird habitat was achieved for both study areas.

What were the critical factors determining whether or not habitat was suitable for the Rufous Scrub-bird? A backward elimination procedure was used to reduce the number of variables in each discriminant function. This involved eliminating, one by one, those variables that did not contribute significantly to the separation of scrub-bird and non-scrub-bird sites, over and above the separation achieved using all other remaining variables. The functions were thereby reduced to include only those variables that were most important in the separation of scrub-bird and non-scrub-bird habitat. These were regarded as critical habitat variables. While such variables may not represent the exact factors used by scrub-birds in selecting habitats, they are nevertheless the best approximations available based on the variables measured.

The critical habitat variables identified at Wiangarie and Gloucester Tops are summarized in Table 1. Note that different variables have been identified for the two areas. This does not necessarily mean that scrub-birds in these areas have different habitat requirements. The availability of each requirement within an area appears to have played a large part in determining whether or not that requirement was identified. For example, dense cover 2-50 cm above the ground was quite common at Gloucester Tops and therefore failed to be identified as a critical component of scrub-bird plots. It was only at Wiangarie, where ground cover was generally sparse, that this variable emerged as an important factor limiting the suitability of habitat.

A similar situation was revealed for the variables relative humidity and leaf litter volume, which were identified as critical factors only at Gloucester Tops.

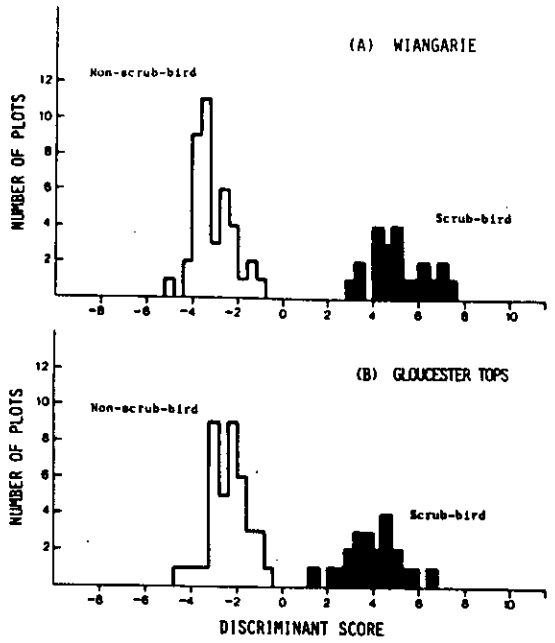

Fig. 2. Frequency distribution of discriminant scores for scrub-bird plots (solid histograms) and non-scrub-bird plots (open histograms) at Wiangarie and Gloucester Tops. The discriminant scores are derived from a combination of 70 habitat variables.

At Wiangarie, both requirements were satisfied throughout most of the rainforest, and therefore failed to be identified.

The distance between a plot and the nearest neighbouring scrub-bird territory was identified as a critical factor at Gloucester Tops but not at Wiangarie. Suitable habitat at Wiangarie occurred as small, isolated patches beneath gaps in the rainforest canopy. Social spacing mechanisms appeared to be of little importance as patches of habitat were already well spaced and each patch was usually too small to accommodate more than one territory. Suitable habitat at Gloucester Tops generally occurred as long strips within eucalypt forest fringing the edge of rainforest. Here, social spacing mechanisms seemed to play a critical role in preventing scrub-birds from taking up territories close to existing territories in what may otherwise have been ideal habitat.

The Rufous Scrub-bird appeared to have the same habitat requirements at Wiangarie and Gloucester Tops despite broad differences between the forest types occupied in these two areas. The basic requirements of dense ground cover, moist microclimate, and deep leaf litter, closely resemble those of the Noisy Scrub-bird in Western Australia (Smith 1979; Davies *et al.* 1982).

Guidelines for the identification of Rufous Scrub-bird habitat are included in Table 1. Suitable habitat occurs in a variety of situations within a diversity of forest types including subtropical, warm temperate

Table 1. Critical factors determining the suitability of habitat for the Rufous Scrub-bird.

Habitat Factor	Significance[a] Wiangarie	Gloucester Tops	Minimum Requirement (30 metre radius plot)
1. Cover 2-50 cm above ground[b]	***		55% projected cover
2. Cover 50-100 cm above ground[b]	***	***	40% projected cover
3. Relative humidity 5 cm above ground[c]		**	Moss index = 1.4
4. Leaf litter volume		***	8,000 $cm^3 m^{-2}$
5. Distance to nearest neighbouring scrub-bird territory (plot centre to territory centre)		**	250 metres

[a] Significance of the variable in a discriminant function after removal of non-significant habitat variables, ** $p < 0.01$; *** $p < 0.001$, in all cases scrub-bird means were greater than non-scrub-bird means.

[b] Cover was measured using the light meter technique described by Fox (1979). For the purposes of rough assessment the required minimum has been converted to a percentage projected cover.

[c] This variable required complex standardization in the present study. The required minimum has therefore been given in terms of a moss index found to be closely correlated with the humidity variable. The index is an average rating of the amount of moss below 50 cm on tree trunks greater than 20 cm diameter. O = moss absent or inconspicuous, 1 = moss very conspicuous, 2 = thick mossy covering to most of lower trunk.

and cool temperate rainforests, and adjoining eucalypt forests. The required ground cover may consist of either living material such as ferns, shrubs, sedges and vines, or non-living material such as logs and other debris.

Over the last few decades the Rufous Scrub-bird has rarely been found below an altitude of 600 metres, despite the fact that it was once relatively abundant within lowland rainforests such as the Big Scrub near Lismore (Chisholm 1951; Smith 1977). The cause of this upward retreat is unknown. Both the Wiangarie and Gloucester Tops study areas lay above 600 metres, and therefore the present study could not determine the influence of altitude-related factors.

The results discussed above have concerned the habitat within a 30 metre radius of each male's territory centre. In order to estimate the area of habitat required by a pair of scrub-birds, information is needed on the size of a male's territory and the location of the female relative to the male. Detailed mapping of selected territories at Wiangarie and Gloucester Tops has shown that males do 95% of their singing within an average area of 1.13 hectares (based on 22 territories and a total of 417 mapped singing points). Territory shape varies, but is generally elongate. Males usually roost just outside the singing territory (up to 30 metres beyond its boundary). Females vocalize much less than males and therefore yield little information. They seem to occupy a distinct home range which only partly overlaps the male's territory. If we assume the female's area to be no larger than the male's, then the total area of habitat required by a pair is probably in the order of two hectares.

Effects of Forest Management Practices

The effects of some land use practices on scrub-bird habitat are obvious. For example, there is little doubt that the conversion of forest to farmland by clearfelling creates habitat totally unsuitable for the species. However, the influence of other activities may not be as obvious and can only be determined through careful research.

1. Logging

Both the Wiangarie and Gloucester Tops study areas included a mixture of logged and unlogged forest.

Multiple regression analysis was used to investigate relationships between logging and scrub-bird habitat suitability on the 124 sample plots described earlier. Each plot's discriminant function score was used as a measure of habitat suitability for that plot. The basal area of trees greater than 20 cm diameter at breast height was used as a measure of logging intensity. (Basal area is the sum of the sectional areas of trees at breast height). Logging was the major cause of variation in basal area within the two study areas. The time since logging and other factors such as altitude, aspect, proportions of tree types in the canopy, and proximity to important features (e.g. gullies, forest type boundaries, neighbouring scrub-bird territories) were also included in the analysis.

Within the rainforest at Wiangarie, basal area and time since logging explained over 40% of the variation in habitat suitability. Basal area was negatively correlated with habitat suitability suggesting that logging probably promoted the development of scrub-bird habitat (see Fig. 3). However, it should be emphasized

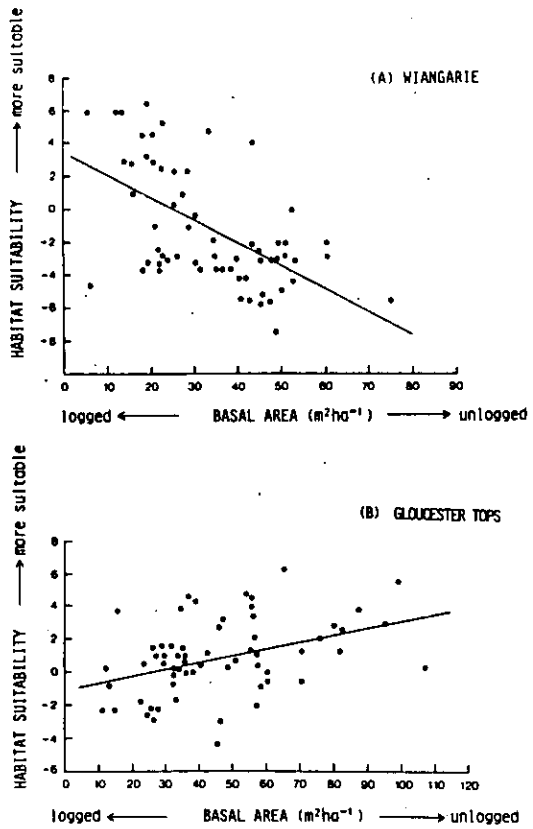

Fig. 3. The relationship between habitat suitability and basal area of trees over 20 cm d.b.h., in rainforest (Wiangarie) and eucalypt forest (Gloucester Tops). Basal area provides an indication of logging intensity. Discriminant scores are used as a measure of habitat suitability. These have been adjusted to remove the influence of other variables included in the multiple regressions. Each point represents a habitat plot.

Regression line for Wiangarie: Y = 3.5-0.14X: r = -0.57.
Regression line for Gloucester Tops: Y = -1.0 + 0.04X: r = 0.39.

that the forest at Wiangarie was selectively logged (50% canopy reduction) and that the observed relationship between logging and habitat suitability cannot be extrapolated to heavier types of logging. Selective logging created gaps in the canopy, allowing more light to reach the ground and thereby promoting the development of dense ground cover, which was otherwise scarce within the rainforest. The effects of selective logging resembled those of natural tree falls, with which scrub-birds were also associated. The effects of heavier rainforest logging on habitat suitability are not known. While heavier logging also creates dense ground cover (Pattemore and Kikkawa 1975), it may have detrimental effects on the availability of leaf litter and the microclimate at ground level, both of importance to the Rufous Scrub-bird.

Habitat suitability at Wiangarie declined with time since logging. The regeneration of trees gradually reduced the amount of light reaching the ground and thereby the ground cover. The most recently logged sites studied had been logged five years previously and therefore little is known about habitat suitability less than five years after logging. Pattemore and Kikkawa (1975) have shown that one year after logging at Wiangarie the density of ground cover is low, resembling that of unlogged forest. Therefore it seems that habitat suitability is probably low immediately after logging, but increases at some stage within five years following logging, and then gradually declines. The suitability of selectively logged rainforest after five years can be predicted from the regression equation:

$$\text{Habitat suitability} = 3.47 - 0.14\,(\text{basal area of trees over 20 cm d.b.h. in } m^2ha^{-1}) + 126\,(\text{Years since logged})^{-2}$$

Plots with suitability scores greater than 1.0 can be considered suitable for the Rufous Scrub-bird. In order to predict long term habitat changes following removal of a known basal area, the subsequent recovery of basal area over time needs to be taken into account.

At Gloucester Tops, logging explained less than 10% of variation in the suitability of habitat. This suggested that logging had less influence on habitat suitability within eucalypt forest than in rainforest. The effects of logging at Gloucester Tops were also quite different from those described for Wiangarie. Basal area was positively correlated with habitat suitability, suggesting that logging probably had a detrimental effect on scrub-bird habitat (see Fig. 3). This effect appeared to result not from changes in ground cover density, but rather from a reduction in leaf litter volume and humidity at ground level. The suitability of habitat increased with time since logging, in close correlation with the recovery of basal area. Logging at Gloucester Tops was relatively selective. The effects of heavier logging on habitat suitability within eucalypt forest are not known. While such practices would probably promote regeneration of dense ground and shrub vegetation (Recher *et al.* 1980), this influence may be counteracted by a reduction in litter volume and humidity due to loss of overstorey vegetation.

The overall impact of logging on the Rufous Scrub-bird will be a product not only of long term habitat changes to the general areas involved, but also of short term effects on existing territories. Logging within an existing territory is likely to have deleterious effects on the occupants of that territory, regardless of the long term influence on habitat. Management of the Rufous Scrub-bird in relation to logging therefore needs to fulfil two aims. Firstly, the protection of existing territories from logging. Secondly, the management of remaining areas in order to provide adequate habitat for the future maintenance, if not expansion, of present populations. The first aim has already been fulfilled by the Forestry Commission of New South Wales, which has undertaken to exclude all known scrub-bird territories from logging. The importance of the

second aim should not be underestimated. Many existing territories are susceptible to habitat changes caused by natural phenomena such as fire and forest succession. The provision of suitable habitat in currently unoccupied areas may provide insurance against the loss of existing territories.

2. Fire

Fire seems to have played a major role in shaping the Rufous Scrub-bird's present distribution and, in particular, its close association with rainforest. However, the influence of current fire management policies on the species and its habitat are difficult to ascertain. As in the case of logging, two aspects of the problem need to be considered: 1. Short term effects on the occupants of existing territories, and 2. Long term effects on the suitability of habitat.

Almost a third of the 174 territories located during the present study were situated in eucalypt forest. Most of these displayed evidence of past fire (e.g. charred tree trunks) suggesting that there was at least some likelihood of burning in the future. The fire management policy most commonly adopted throughout the range of the Rufous Scrub-bird is one of low intensity prescribed burning aimed at preventing the occurrence of high intensity wildfires. Part of the Gloucester Tops study area was subjected to prescribed burning in September 1981, following a period of below average rainfall. Three territories were situated in eucalypt forest within the burnt area. The fire burnt up to, but not beyond, the boundary of each territory. All three males were heard singing from within their territories during and after the fire. The territories were apparently moist enough to escape burning. However, high intensity wildfires have been known to destroy territories elsewhere in the Gloucester Tops area (E. L. Hyem pers. comm.). While prescribed burning probably has little direct influence on existing territories it may provide a surrounding buffer zone against the effects of potentially destructive wildfires. In many cases, territories are also naturally buffered from such fires by surrounding patches of rainforest. Rufous Scrub-bird territories in eucalypt forest are rarely found further than 300 metres from the nearest rainforest.

The long term influence of prescribed burning on habitat suitability is a complex problem. Suitable habitat in eucalypt forest is probably associated with a particular seral stage of post-fire succession (Hodgson 1969; Ashton 1981; Christensen *et al.* 1981). The frequency of fire must therefore be an important determinant of habitat availability. Research on the Noisy Scrub-bird in Western Australia has suggested that burning at intervals of less than three to five years may not allow regeneration of suitable habitat, whereas burning at intervals greater than 30 years may allow successional changes to render areas unsuitable for that species (Smith 1977). The relationship between fire frequency and habitat suitability is probably similar for the Rufous Scrub-bird, although details concerning optimal burning intervals are yet to be established. At Gloucester Tops, habitat suitability 10 months after prescribed burning was found to be extremely low in terms of cover available, leaf litter volume, and humidity at ground level. At the other end of the successional scale, eucalypt forest adjacent to rainforest in New South Wales tends to develop into rainforest if fire is excluded for a long period (Turner 1976; Smith and Guyer 1983). Habitat suitability is probably lowered during this transition due to a reduction in ground cover density.

Fire management of eucalypt forest in relation to the Rufous Scrub-bird needs to ensure sufficient availability, at all times, of an intermediate seral stage suitable for the species.

GENERAL BIOLOGY: A SUMMARY OF CURRENT KNOWLEDGE

The following information on the general biology of *Atrichornis clamosus* and *A. rufescens* has been summarized from Chisholm (1951), Smith (1976a, 1976b, 1979), Smith and Robinson (1976), Davies *et al.* (1982), and Ferrier (1984).

1. *Social Organization*

Breeding males occupy permanent territories defended with loud and penetrating song. Singing activity is most intense during the breeding season. Ephemeral (non-breeding) males may defend short-term territories at the onset of the breeding season, usually within sub-optimal habitat. In general, only one female is associated with each breeding male.

2. *Territories*

Males do over 80% of their singing from within an area of one hectare. Roosting sites are usually situated near the boundary of this core singing area. The female occupies a small nesting area on the periphery of the male's territory.

3. *Density*

Within areas of optimal habitat: 10 male territories per km^2 for *A. clamosus* and six male territories per km^2 for *A. rufescens*.

4. *Feeding*

Scrub-birds are incapable of sustained flight and spend most of their time feeding on the ground. Their diet consists mainly of leaf litter invertebrates.

5. *Breeding Season*

From April to October for *A. clamosus* and from September to December for *A. rufescens*.

6. *Breeding Biology*

The female alone is responsible for nest-building, incubation, and feeding the chicks. The nest is a domed structure lined on the inside with a cardboard-like substance. Clutch size is one for *A. calmosus* and two for *A. rufescens*. The incubation period is about 36-38 days. The young leave the nest three to four weeks after hatching, but continue to be fed by the mother for at least a further three weeks. Breeding generally takes place only once a year.

7. *Longevity*

Territory turn-over data for *A. clamosus* suggest that territorial males may live for at least 10 years.

THE FUTURE

The scrub-birds at present fulfil only minor roles in the ecology of Australian forests. They are nevertheless of great importance both as records of the past and as alternative components providing ecosystems with the flexibility needed to cope with future environmental change (see Main 1982).

In discussing the problem of scrub-bird conservation, Smith (1977) wrote:

> "If they (the species) are restricted in distribution and rare because changes in the climate and vegetation continue to take place then their preservation will need major management efforts involving large sums of money, which society may not consider justified. On the other hand, decline due to man-made effects can be halted and sometimes reversed with very little cost to society."

The rarity of the scrub-birds has resulted from a combination of natural and human causes. Both species have probably been declining in status since the Tertiary as a result of long-term climatic trends towards a drier environment. Habitat alteration by Europeans has simply increased the rate of this decline. Conservation efforts should aim to halt and, where possible, reverse this human influence.

Halliday (1978) has described two approaches to the conservation of rare species. Passive conservation entails the reservation of land and the prevention of harmful influences. Active conservation involves direct intervention by manipulating various elements of a species' biology. The Noisy Scrub-bird has required active management in order to ensure its future survival. Efforts have been made to breed birds in captivity (Smith 1979; Davies *et al.* 1982) and recently both males and females were successfully translocated from the Two Peoples Bay population to a nearby area of unoccupied habitat (D. V. Merton pers. comm.). The Rufous Scrub-bird is not sufficiently endangered to warrant this type of management. Passive conservation is more appropriate. Information on the species' habitat requirements, such as that presented in this chapter, can help in the identification and selection of areas requiring reservation. Over 90% of the territories found to date already lie within State Forests and National Parks. Unfortunately, reservation of land does not necessarily guarantee preservation of suitable habitat. The species generally occupies forest at an intermediate successional stage following disturbance through fire or opening of the canopy. In order to maintain sufficient areas of scrub-bird habitat, authorities need to consider the influence that prescribed burning and logging have on a forest's natural disturbance regime. This chapter has presented only preliminary answers to these problems. Future research will hopefully provide a better understanding of the relationship between forest management practices and scrub-bird habitat suitability.

ACKNOWLEDGEMENTS

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EXHIBIT P

Coram: **HEMMINGS J.**

Corkill v. Forestry Comm

Return to Hillman & Wolf

Associate

S.O. 2883

FORESTRY COMMISSION OF N.S.W.

HARVESTING PLAN - CASINO DISTRICT

MANAGEMENT AREA: Casino West - Ewingar Working Circle

STATE FOREST: Billilimbra State Forest No. 815

COMPARTMENT: 695 (395 hectares)

1. PRODUCT TO BE HARVESTED. IF PRESENT.

		Estimated Volume
i)	Hardwood quota	18 000m³ gross
ii)	Hardwood salvage	1 500m³ gross
iii)	Brushwood quota	2 000m³ gross
iv)	Brushwood salvage	200m³ gross
v)	Poles, Piles & Girders	200m³ gross
vi)	Hardwood - Smallwood	-

2. TREE MARKING CODE

Yellow - Trees marked for retention not to be damaged.
Red - Trees marked for removal (axe blaze can be used).

3. AREA MARKING CODE

Blue - Compartment Boundary
White - Dump Site
Orange - Road or Track Location

4. DRAINAGE LINE PROTECTION

4.1 Filter Strips - Filter strips shown on map are 20 metres each side of watercourse.

4.2 Restrictive Strips - Restrictive strips shown on map are 10 metres each side of watercourse.

5. EROSION MITIGATION

The soils of this compartment have been placed in the HIGH erosion class.
Cross Drain Spacing on Snig Tracks

Track Slope	~~Average~~ HIGH. Erosion Class
Less than 15	50m
15 - 20	30m
20 - 25	15m
25 - 30	10m

The soils are Biotite Adamellites, created from materials formed during the Upper Permiam period. (Grafton 1:250 000 Geological Map)

6. ORDER OF WORKING AND WET WEATHER AREAS

Harvesting operations should commence on those sections of the compartment which do not have direct access onto Berry Road.
General access to the area during periods of wet weather will be a problem and as a result there are not really any true wet weather areas.
However given that access is possible, all log dumps adjoining Berry Road would be able to be worked first during periods of light rain.
Areas not directly accessible off Berry Road will be logged after further roading is completed.

7. FOREST TYPE DESCRIPTION AND STAND CONDITIONS

The Compartment contains the following forest types:-

a) Type 2/3 - Yellow Carabeen/Crabapple - Sassafras - Corkwood - Silver Sycamore - (41 hectares)

b) Type 23/26 - Myrtle/Viney Scrub - (68 hectares)

c) Type 47a - Tallowwood - Sydney Blue Gum - High site quality - (113 hectares)

d) Type 47b - Tallowwood - Sydney Blue Gum - Low site quality - (165 hectares)

e) Type 53 - Inland Brushbox - (27 hectares)

f) Type 62a - Grey Gum - Grey Ironbark - White Mahogany - High site quality - (11 hectares)

g) Type 62b - Grey Gum - Grey Ironbark - White Mahogany - Low site quality - (6 hectares)

h) Type 163b - New England Blackbutt - Low Site Quality - (15 hectares)

STAND CONDITIONS

All forest types are in an overmature condition. Generally hardwood occurs on the more exposed, rocky ridge tops while the more protected areas i.e. depressions and gullies, have a cover of rainforest trees.

Areas of rainforest, with their closed canopy, generally have ferns and palms on the forest floor with some regeneration in gaps in the canopy.

The stands of hardwood on the other hand, with their more open nature, have an understorey of regeneration and other native grasses and low shrubs.

The bulk of the compartment shows no signs of previous logging operations. However, most of the rainforest type, which adjoins Berry Road, has been harvested over a period of about fifteen years. Initially, some areas were harvested, prior to the construction of the newest section of Berry Road. The balance of these areas were logged in conjunction with the recent construction works and the associated "salvage logging" of the roadside timber.

The following species are present in the hardwood types:- Blue Gum, Tallowwood, Grey Ironbark, Grey Gum, New England Blackbutt and Brush Box.

Species present in the rainforest are:- Crabapple, Sassafras, Rosewood, Pigeonberry Ash, Corkwood, Red Cedar and Flame Tree.

Present in the under storey can be be found: Walking Sticks Palms, Cabbage Tree Palms, Tree Ferns, Stinging Trees, Cordyline, Maiden Hair Ferns, Birds Nest and Elkhorn Ferns, Grass Trees, with various Orchids being

found on trees and rocks.

8. UTILISATION STANDARDS.

1)	Hardwood Quota	- Min length	- 2.4m
		- Min centre diam	- 40cm
		- Min toe	- 25cms

(Defect as specified by Casino Districts Schedule of Compulsory Utilisation Standards)

2)	Hardwood Salvage	- Nil
3)	Hardwood Poles	- as per Australian Standard 2209 - 1979 (Standard Straightness)
4)	Brushwood Quota	- Min length - 2.4m
		- Min Centre diam - Coachwood - 30cms
		- Other Brushwood - 35cms
		- Min toe diam - 25cms

9. TREATMENT PRESCRIPTIONS

All harvesting operations will be tree marked for removal PRIOR to the commencement of operations.

These trees will be marked either by red paint and/or an axe blaze.

Harvesting operations will generally not be integrated, i.e. Brushwood logs and Hardwood logs will be harvested separately.

During Hardwood operations scattered poles will be removed at the same time as the sawlogs.

In the Hardwood, tree marking shall aim to retain the more vigorous and better formed stems in all size classes at a spacing that will encourage growth on retained stems. Stems which have a specialty end use such as poles, piles or girders may be removed when they have reached a suitable size for their end use.

In the Rainforest, tree marking shall aim to retain a 50% canopy cover. Only trees judged capable of producing quota logs shall be marked.

If present, at least two habitat trees per hectare are to be retained. Also to be retained are any obvious "feed trees" used by koalas or other arboreal mammals.

10. BOUNDARIES

The southern boundary of the compartment is a ridge top which forms part of the Gibraltar Range. The western boundary is initially a major tributary of Main Creek, then a section of the State Forest/Private Property boundary until it reaches Main Creek. Main Creek then forms the northern boundary. The eastern boundary is another tributary of Main Creek and its extension back towards the Gibraltar Range.

All boundaries except the Private Property/State Forest section are obvious and require no additional marking. The Private Property section will need to be marked before harvesting operations commence in the vicinity.

All boundaries will be shown to the contractor before logging operations commence in the area.

11. SPECIAL PRESCRIPTIONS AND SPECIAL EMPHASIS AREAS

The entire compartment has a P.M.P. classification of 1:1:1 i.e. Multiple Use Natural Forest - General.

An inspection of this compartment by a Bundjalung elder from Baryulgil, has confirmed that the area has no special significance to the Aboriginal people. If however during harvesting operations, there appears any sign that the area IS of special significance to the Aboriginal people, logging will cease immediately pending further investigation.

12. ADDITIONAL INFORMATION

a) All harvesting operations shall comply with all conditions contained in Timber, Contractors and Operators Licences plus the Coffs Harbour Region Code of Logging Practices.

b) Care shall be exercised to ensure that NO damage is caused to retained stems.

c) Bark from harvesting operations shall not be left on dump sites but shall be dispersed down snig tracks (away from retained stems).

d) All litter is to be removed from the logging area.

e) All minor roads, trails and tracks used during the harvesting operation shall have suitable erosion control structures placed on them that will allow four wheel drive vehicular access without the structures failing. If there is any doubt about the exact requirements, check with the Supervising Forester or Foreman.

f) No tree heads or other logging debris is to be left on roads, fire trails or boundary tracks.

13. PREPARED BY

GARRY DOUGLAS
FORESTER
DATE 7.08.90

SIGHTED BY

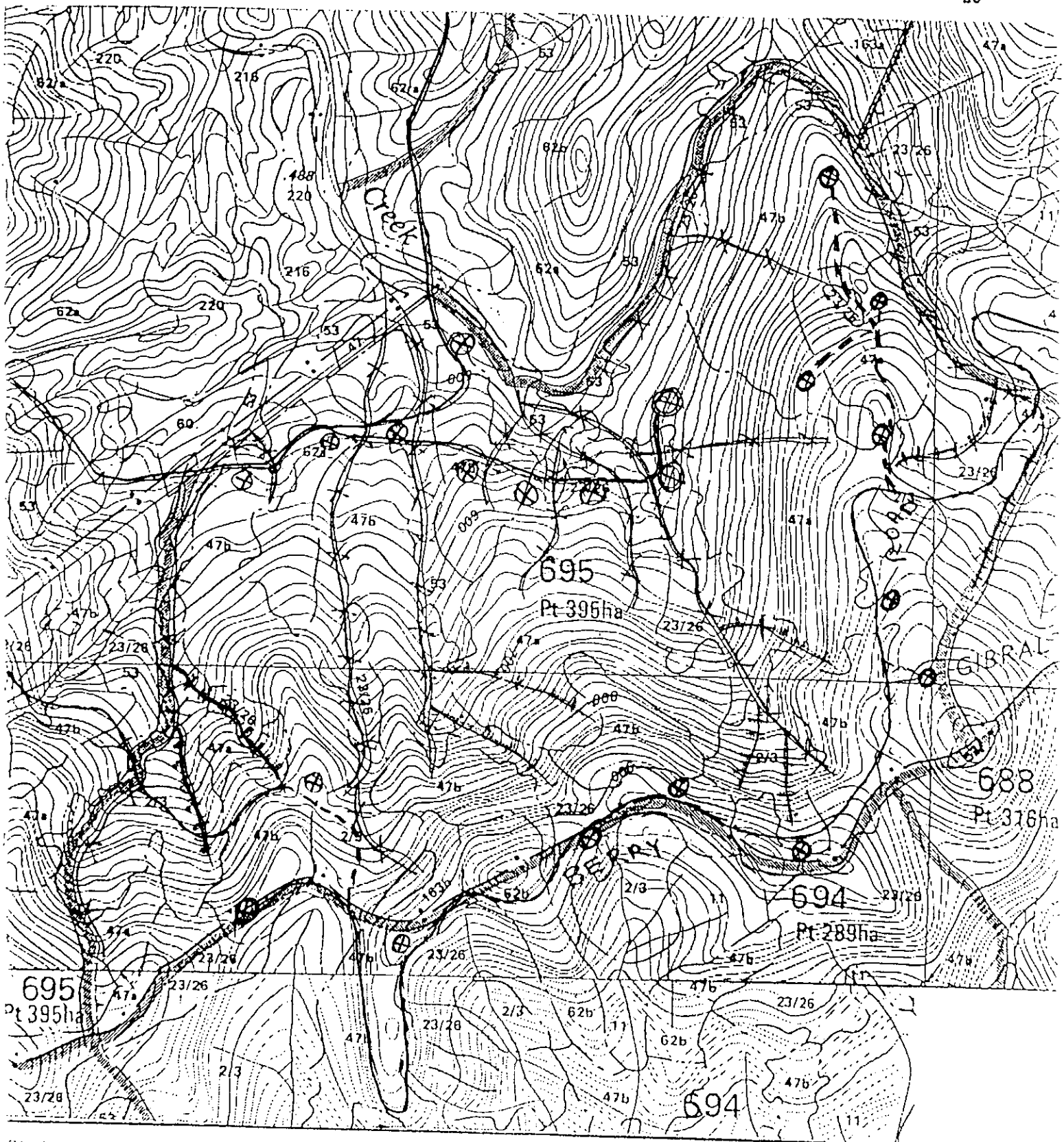
PETER PAUNOVIC
DISTRICT FORESTER
DATE 10.08.90

COMPARTMENT : 695

STATE FOREST : BILLILIMBRA No 815

Scale 1:15,000

Km 0.5 1.0



State Forest Boundary

Compartment Boundary

Fence

Filter Strip

Restrictive Strip

Feeder Road, Dump Site

Special Emphasis Area

Forest Type

Wet Weather Dumps shown in Red

Reserved from Logging

40208-90

EXHIBIT B

10/9/90

Coram HEMMINGS J.

Corkill v. Forestry Com.

Return to Hillman & Woolf

Associate

S.O. 2883

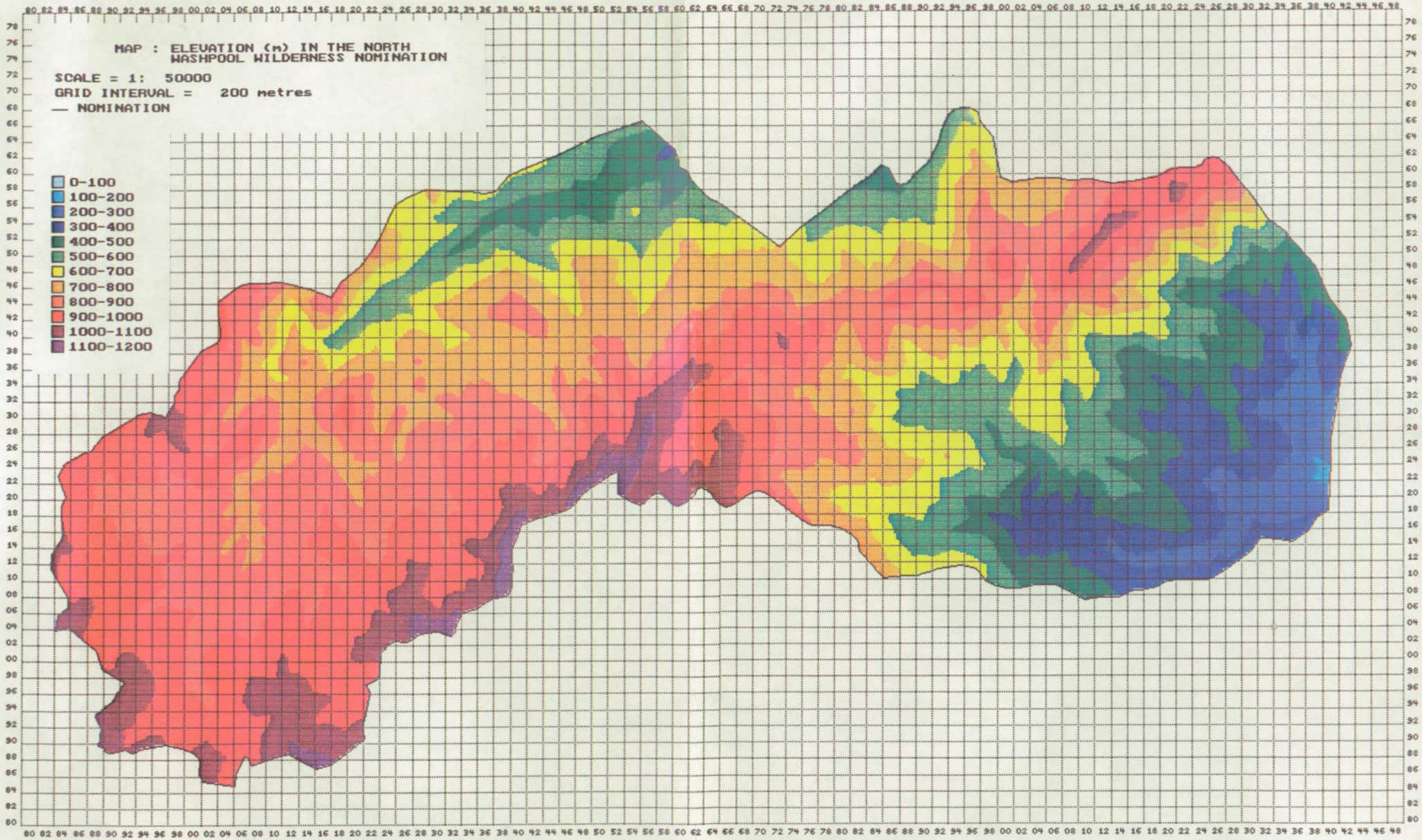
MAP : VEGETATION IN THE NORTH
WASHPOOL WILDERNESS NOMINATION

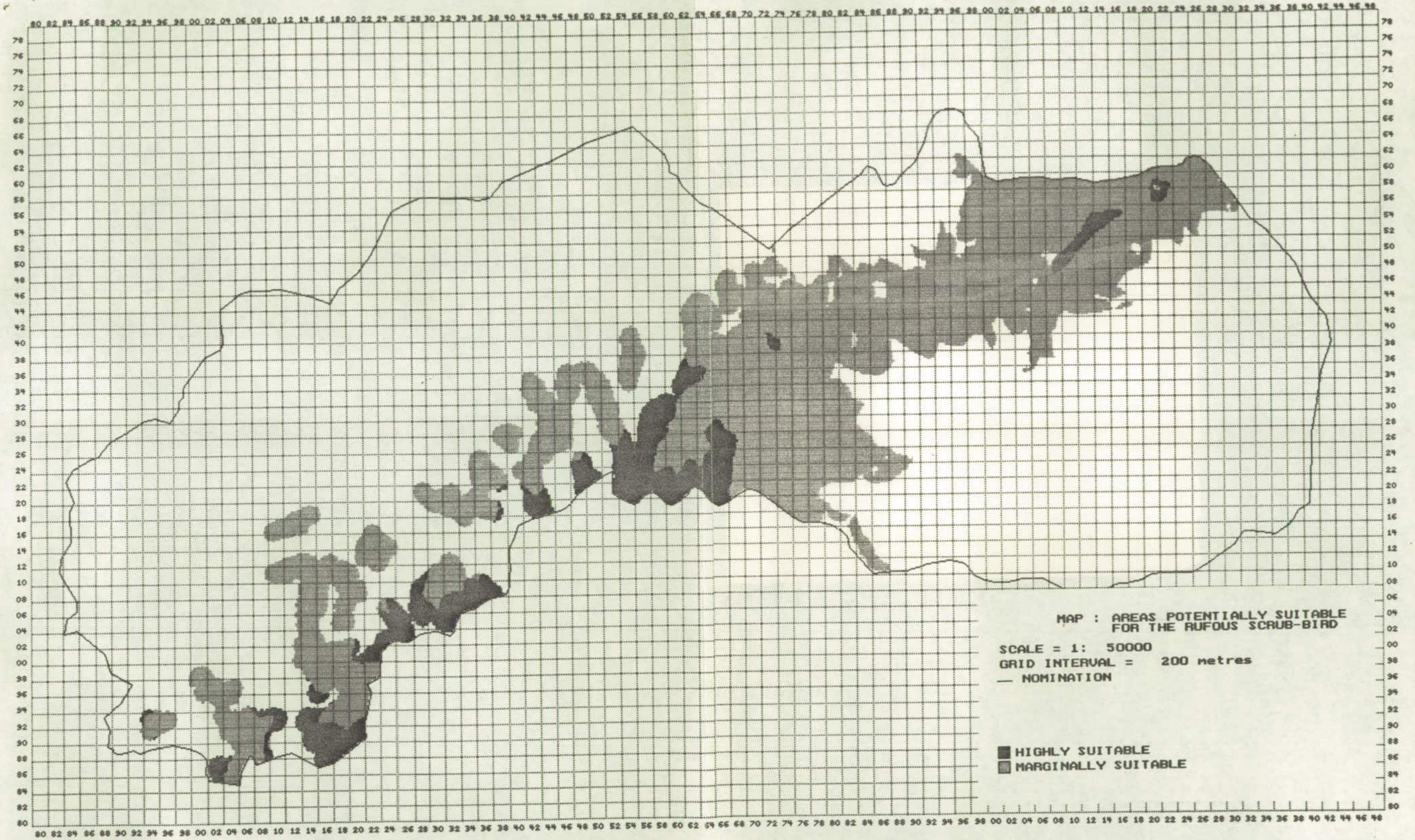
SCALE = 1: 50000
GRID INTERVAL = 200 metres
— NOMINATION

RAINFOREST
EUCALYPT OPEN FOREST

MAP : ELEVATION (m) IN THE NORTH
WASHPOOL WILDERNESS NOMINATION

SCALE = 1: 50000
GRID INTERVAL = 200 metres
— NOMINATION




MAP : AREAS POTENTIALLY SUITABLE
FOR THE RUFOUS SCRUB-BIRD
SCALE = 1: 50000
GRID INTERVAL = 200 metres
— NOMINATION
HIGHLY SUITABLE
MARGINALLY SUITABLE

E

FORESTRY COMMISSION OF N.S.W.

SO 308

H.O. No. _____

Harvesting within North Washpool

I refer to the Commissioner's memo of 7 September 1990 and advise that I have carried out the requested review as outlined below.

1. I have reviewed the following documents:

   * 1980 EIS for Proposed Forest Operations for Washpool
   * NPWS Submission to EIS
   * DEP Assessment Report, March 1981
   * Faunal Study by Osborne and Masala
   * National Herbarium Flora Study (M. Fox)
   * Forestry Commission's Determination, 1982
   * Report by T. Donnelly on Aboriginal Sites Investigations, 1990
   * NPWS Wilderness Area Report, 1990
   * Casino West Management Plan, (1979) as Amended (1988).

2. I have considered the present relevance of the 1980 EIS and associated documents and subsequent determinations having in mind the factors specified in Clause 56 and the matters referred to in Clause 57 of the Environmental Planning and Assessment Regulation.

3. My review of relevant events and factors has noted the following:

   (a) The determination provided for the majority of the area to become National Park. Three areas, identified as low priority by the NPWS were retained as State Forest for logging following Cabinet consideration.

   (b) Activities within this area retained as State Forests since determination of the EIS have included construction of over 40 km roads, logging of 25% of the area, grazing and periodic burning. These activities have been in accord with the 1982 determination and until 1990 their legality has not been challenged.

   (c) While the determination provided for maximum utilisation of quota logs the Commission subsequently determined that the operations be modified so all rainforest harvesting should retain at least 50% rainforest canopy, thereby reducing the impact on the environment.

(d) In consultation with the NPWS a buffer zone which excludes logging has been established within Billilimbra State Forest adjoining the National Park boundary.

(e) From consideration of the Aboriginal site investigation report and subsequent consultation with local Aboriginal communities and the NPWS, the Commission has determined that an Aboriginal Place (under the NPW Act) shall be established over the whole of Desert Creek catchment with all forest operations excluded from a core area of 1 100 hectares, as agreed with the Aboriginal Community to protect all identified sites.

(f) Wilderness values were explicitly considered in the 1980 EIS and associated documents, in consideration by Cabinet and in subsequent determination in 1982. The 1990 NPWS wilderness report contained no new information not already considered in the documents and determinations above, other than

* effects on adjoining World Heritage area

* possible existence of the plant species, Dodonaea megazyga.

(g) The species Dodonaea megazyga possibly occurring in the area is a species considered to be rare. Briggs and Leigh (1988) give it a classification 3RCa i.e. rare, with a range over 100 km, not currently considered vulnerable or endangered and adequately conserved in reserves. The species is favoured by disturbance and accordingly not likely to be threatened by harvesting.

(h) In accordance with the determination of the EIS the views of the NPWS have been sought and taken into account in respect of impact on the rufous rat kangaroo and the long-nosed potoroo.

(i) Further survey has been carried out in particular for the rufous scrub-bird within immediately scheduled logging areas. No scrub birds have been reported and surveys will continue prior to any operations in other areas. No species not considered in the 1980 EIS determination, endangered or otherwise, whose populations might be threatened by harvesting, have since been identified in the area.

(j) Further surveys for Aboriginal sites have been carried out in immediately scheduled areas and no sites have been identified.

(k) The social and economic impacts of logging were comprehensively examined in the EIS and associated documents and the subsequent determination had a severe inpact, as anticipated. Sawlog quotas from the area were reduced by 40%. The resource available for supply of these quotas would be reduced by 20% with further socio-economic impact, if the area made available for logging by the determination were not now to be logged.

4. My review indicates that the essential nature and objectives of the proposed activity have not changed in any significant manner to that contemplated by the 1982 determination except to reduce the extent, intensity and impact of harvesting.

5. Consequent on the 1982 determination about 75% of the then State Forest in the EIS area was dedicated as National Park and subsequently inscribed on the World Heritage list. Most was designated to be managed as a wilderness area. I have reviewed possible impacts of proposals as outlined in the 1980 EIS in respect of their potential effects on the adjoining World Heritage area. Such effects have been minimised by the selection in 1982 of clear catchment boundaries between National Park and State Forest. Proposed roading within the North Washpool area has been modified so as not to intrude into the National Park or any part of its catchment. A buffer strip was excluded from logging within Billilimbra State Forest along the boundary with National Park. Proposed activities have some potential for modifying the wildfire regime within the National Park, and for increasing the presence of exotic species of flora and fauna in the vicity. Neither of these potentials constitute a likely significant effect.

6. The nature of the activity, its effects and justification are essentially no different from that contemplated by the 1982 determination based on the 1980 EIS, associated documents, and subsequent considerations by Government. The determination (copy attached) which followed consideration and decision by the Government (commonly referred to as the "Rainforest Decision"). Subsequent investigations have only served to confirm the assessment of these impacts, and subsequent modifications to operations have served only to reduce them. Furthermore, there is no relevant change in the proposed activities which would significantly increase the impact, nor any new information available which suggests an impact which was not anticipated. Substantial logging and roading works have already occurred, in conformity with the determination. The proposed activity is a continuation of recent activities.

It is therefore submitted that there has been substantial compliance with Section 111 of the EPA Act and that the 1980 EIS and subsequent determination remain valid, relevant, and adequate as a basis for a decision to proceed with the presently proposed activity.

Accordingly, it is recommended that operations as prescribed in the 1982 determination and modified as outlined above be now approved to recommence.

Att. copy of 1982 determination.

R.H. SQUIRE
Management Officer

10th September, 1990

CHIEF, MPD

Endorsed

Chief,
Management & Planning Division
10/9/90

Seen 10/9

10/9/90

THIS IS THE ANNEXURE MARKED "E" OF THE PRECEDING 3 PAGES
REFERRED TO IN THE AFFIDAVIT
OF RODNEY HUGH SQUIRE
SWORN AT SYDNEY
THIS 20th DAY
OF September 1990
BEFORE ME

40208-90

EXHIBIT J

HEMMINGS J.

Coram .....

Corkill v. Forestry Comm

Return to .....

.....

Associate .....

S.O. 2883

D

FORESTRY COMMISSION OF N.S.W.

SC 306

H.O. No. _____

HARVESTING WITHIN NORTH WASHPOOL

Following its consideration of the report on wilderness values in the North Washpool area, prepared by the Director of the National Parks and Wildlife Service the Minister has conveyed to me Cabinet's decision that the area should remain as State Forest, available for, inter alia, timber production.

Accordingly, as discussed, would you please complete your thorough review of existing approvals, documents (in particular the abovementioned report of the National Parks and Wildlife Service now available) and other matters relevant to the assessment of environmental impacts involved with continued activity in the area, in accordance with Part V of the EPA Act, and provide a report to me by the morning of 10th September, 1990, recommending whether or not such documents, approvals and considerations are adequate to enable a decision that operations be resumed.

Part
EJ

H. DRIELSMA
Commissioner for Forests
7th September, 1990

CHIEF ~~MPD~~
Management Office
MR SQUIRE

For your review please, as requested.

Chief
Management Planning Division
7/9/90

THIS IS THE ANNEXURE MARKED "D"
REFERRED TO IN THE AFFIDAVIT
OF RODNEY HOCH SWORN AT SYDNEY SQUARE
THIS 20th DAY
OF SEPTEMBER
1990
BEFORE ME
JP.

OLD GROWTH FOREST OF NORTH EAST STATE FORESTS OF CONCERN

The following areas of unlogged old growth forests are threatened by roading and logging proposals in the next 12 months.

1. Chichester SF, Dungog FMA, (Whispering Gully area)
   Compartment Nos. 60 - 68
   Adjacent Karuah River Rd off Berrico Rd off Buckett's Way;

2. Spirabo SF, Tenterfield FMA,
   Compartment Nos. 229 - 232, 234, 311 - 317, 319 - 330;
   Adjacent Wattle Creek Rd off Farnell Rd off Spirabo Forest Way;

3. Dalmorton SF, Grafton FMA,
   Compartment Nos. 108 - 145, 152, 155 - 159
   Adjacent Old Barney Fire Trail off Blacksmith's Shop Rd;

4. Boorook SF, Tenterfield FMA,
   Compartment Nos. 80 - 84
   Adjacent Boonoo Boonoo Falls Rd off Lindseay Highway;

5. Mount Marsh SF, Casino West FMA,
   Compartment Nos. 428 - 434
   Adjacent Mt Neville Rd off Fullers Rd off Old Lawrence Rd;

6. Nulla Five Day SF, Kempsey FMA,
   Compartment Nos. 104 - 122

   Styx River SF, Kempsey FMA,
   Compartment Nos. 12, 16 - 23
   Adjacent Five Day Creek Rd;

Washpool exhibit for Court.

   Washpool SF, Casino West FMA,
   Compartment Nos. 686 - 694, 697 - 699
   Adjacent Washpool Rd;

   Billilimbra SF, Casino West FMA
   Compartment Nos. part (148 ha) 679, 695, 696, 700 - 711
   Adjacent Berry Rd of Billilimbra Rd.

State Forest, FMA = Forest Management Area)

PLEASE NOTE

This list is indicative and not exhaustive.

40208-90

EXHIBIT A

10/9/90

Coram HEMMINGS J.

Corkill v. Forestry Commission

Return to .....

.....

Associate .....

S.O. 2883