Forestry Commission

of

New South Wales

FORESTRY OPERATIONS IN

MISTAKE STATE FOREST

Environmental Impact Statement

Assessment Report

&

Determination

August 1992

Proposed Forestry Operations

Mistake State Forest

Environmental Impact Statement

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&
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Prepared pursuant to Clause 64 of the

Environmental Planning and Assessment

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Forestry Commission of New South Wales

Mistake State Forest EIS
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EIS ASSESSMENT

Proposed Forestry Operations Mistake State Forest

EIS Report 1992

1. Introduction:

The Forestry Commission proposes to continue forestry activities, including logging, in Mistake State Forest. Operations such as those proposed have been conducted for many decades and comply with the 1978 management plan for the Macksville Management Area. The Macksville management area is in the process of amalgamation with several other management areas to form the combined Urunga Management Area.

On 8th May, 1989 Mr Justice Hemmings declared in the Land and Environment Court, in the application of Bailey v. Forestry Commission of NSW, that it was not reasonably open to the Forestry Commission to conclude that logging and associated works within nominated compartments of Mistake State Forest was not an activity that is likely to significantly affect the environment within the meaning of section 112 of the Environmental Assessment and Planning Act. He further declared that the Forestry Commission had failed in its obligation under section 111 of the Act to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of logging and associated works within the compartments.

The Commission undertook to obtain, examine and consider an environmental impact statement (EIS) in respect of the nominated compartments and to refrain from logging or other works on any slopes in excess of 25° in any of these compartments until the EIS was prepared, examined and considered.

An EIS was prepared by the Forestry Commission in conformity with the Environmental Planning and Assessment Act 1979 and placed on exhibition between 19th August and 20th September 1991 at the following places: Forestry Commission Head Office, Port Macquarie Regional Office, Urunga District Office, Kempsey District Office, Nambucca Shire Council, NSW Government Information Centre, NSW Environment Centre and the Department of Planning Head Office and Grafton Regional Office.

Fourteen submissions were received in response to public exhibition. Copies were forwarded to the Department of Planning on 31st October 1991 and on 22nd November the Department advised that it was appropriate for the Commission to determine the proposal.

Following the introduction of the Timber Industry (Interim Protection) Act in March 1992, there was some uncertainty whether the Commission or the Department of Planning should assess and determine the Mistake State Forest EIS.

The Commission wrote to the Director, Department of Planning and was advised in a letter dated 24th June 1992, that the Mistake State Forest EIS does not fall within the scheme of the TI(IP) Act (this letter is enclosed as part of attachment 2). Therefore it is still appropriate for the Forestry Commission to determine the EIS.

In response to several submissions including that of the National Parks and Wildlife Service (NPWS), the Commission initiated a review of the impacts of proposed activities on endangered fauna. The review found that the proposed operations may significantly affect the local environment of a number of endangered species. To ensure compliance with section 112(1B) of the recently amended Environmental Planning and Assessment Act, the review addressed all the matters set out in section 92D of the National Parks and Wildlife Act and the requirements of the Director, NPWS.

The Commission currently holds a section 120 General Licence in relation to endangered fauna. The licence was issued by the NPWS and extends until 1st December 1992.

The Forestry Commission has examined and considered the EIS and any additional information as required by Section 112 (1)(a) and (b) of the Environmental Planning and Assessment Act and the representations made pursuant to Section 113 (2), both in accordance with comments received in conjunction with the advice from the Director, Department of Planning.

2. Examination and Consideration of the EIS:

In preparing the EIS, the Commission has taken into account the deliberations of Bailey v. the Forestry Commission in the Land and Environment Court, the reasonable requirements of the National Parks and Wildlife Service in respect of an EIS for Mistake State Forest and the requirements of the Director, Department of Planning, all in the context of Part V of the Environmental Planning and Assessment Act and Clauses 57 and 58 of the Regulation.

The report examines compliance by the EIS with Department of Planning guidelines for the content of an EIS.

2.1 Full Description of the Proposed Activity:

The proposal is described at length mainly in Chapter 4 of the EIS. The location of activities is described, broadly by way of satellite imagery, and on a 1:125,000 scale map. Areas not affected directly by the activity are also shown clearly on maps. This would have been improved by having all maps of the one scale, or ideally by production of map overlays. However, the material provided is usable. The activity is located wholly within State Forest dedicated under the provisions of the Forestry Act, 1916.

It is impractical to present the precise detail of every aspect of forestry operations in the EIS. Examples of such detail are presented as harvesting plans as an appendix to the EIS. However, the EIS does describe a practical level of detail including a precis of the management regime applicable to forests within the Macksville Forestry Management Area, silvicultural strategies, nature of forest stands and proposals for logging, expected products and yields.

The EIS describes that of the total area of 9 620 hectares, 1 800 hectares (18.7 %) is comprised of mature/overmature trees and is proposed to be logged, 5 000 hectares (52 %) is regrowth to be logged and 2 820 hectares (29.3 %) is not proposed to be logged due to accessibility, non-merchantability or for conservation of rainforest.

The cyclical nature of logging is described. An estimated 3 100 hectares is proposed to be logged over a five year minimum period. Logging operations would then be minimal for up to 40 years. Logging is described in mature/overmature stands, mixed sized stands and regeneration stands. The first mentioned are the most likely to be significantly affected and are described in greatest detail. Less than half of the existing tree cover will be removed in these stands overall, although up to 80% of tree canopy may be removed in particular places. Care will be taken to retain trees suitable for present and future wildlife habitat, as well as trees for future harvesting.

Log haulage is described. On average three truck movements per day are expected (occasionally 5) for 200 days per year.

Prescribed burning is described. It is expected to cover about 1% of the forest area per year and is used to minimise the likely damage of wildfires and to improve the efficiency of regeneration in some forest types.

2.2 Objectives of the Proposed Activity:

The primary purpose of the proposal is to harvest timber according to the sustained yield strategy for the Macksville Management Area. This objective is clearly stated in the EIS (Chapter 2), together with the other objectives of management in the Management Area. This statement of broad objectives goes beyond the stated requirements for an EIS but is considered of importance by the Forestry Commission as it places timber production in the overall context of multiple use forest management.

It could be argued that the EIS should concentrate on the activities for which it was prepared, namely; roading, logging and prescribed (or controlled) burning. The objectives of roading are to provide access primarily for harvesting, but also for fire protection and for silvicultural care and for recreational use. These objectives are spelt out throughout the document.

Harvesting objectives serve a local and regional demand for wood products, produced in a sustainable manner, as an integral part of the Macksville Management Area.

Prescribed burning objectives are fuel management for fire protection and, to some extent, to increase the efficiency of natural regeneration. Both of these objectives are subject to environmental constraint, as described in various parts of the document.

2.3 A full description of the existing environment likely to be affected by the proposed activity:

In complex ecosystems there will always be difficulties in determining what is a full description. The Forestry Commission has taken into account the requirements of the Land and Environment Court and arranged for detailed soil investigations as part of this EIS. These were undertaken by the consultants, Veness and Associates, of Coffs Harbour who have extensive experience in this type of work for environmental assessment. The results of this work are included in Chapter 3, Description of the Environment, and are given in detail in Appendix 4 of the EIS.

The Commission carried out flora and fauna investigations in conjunction with the independent observations of D. Milledge. The flora and fauna surveys that were conducted are not definitive. To achieve this level of investigation would be more costly than the net value of short-term forest production (i.e. 5 years) They must be seen in the context of their reasonableness in enabling a judgement as to significant effects and in the context of on-going assessment and monitoring.

To account for the fact that the surveys are not definitive, the Forestry Commission and its consultants have applied the "Precautionary Principle" to fauna assessment. This principle has been adopted by considering the impacts of the proposed activities on both the species known to occur and others expected (ie. no confirmed sightings but similar habitat) to be found in the study area. There is a substantial amount of work being done by the Forestry Commission, the NPWS and the CSIRO on north-coast ecosystems and far more will be known within one or two years which will improve the predictability of occurrence of flora and fauna and its various sensitivities to forestry activities.

Each harvesting area is inspected before logging by experienced Forestry Commission personnel who can recognise any important variations in habitat. Having an EIS does not remove the responsibility of the local forester for making decisions based on Section 111 of the Environmental Planning and Assessment Act.

The EIS makes particular reference to one rare species of plant, *Bosistoa floydii* and thirteen animals listed in Schedule 12 of the National Parks and Wildlife Act. Somewhat surprisingly the koala is not on this list, as it might be expected to occur in this area and is more likely to be directly disturbed by operations than some other animals listed.

The cultural environment has been described. Consultation with the Bowraville Local Aboriginal Land Council, including field inspection, is reported in the EIS.

The socio-economic environment likely to be affected by the activity has been described in terms of timber production. The effect of proposed activities on adjoining landholders has not been specifically addressed in this section but has received adequate treatment in other sections - hydrology, soils, landscape and in the chapter dealing with the description of the proposal (log haulage).

2.3.1 Additional Information:

It was apparent following exhibition of the EIS that further investigations were required to enable a proper consideration of the impacts on the environment.

The Commission responded to these concerns by initiating the following additional investigations which are attached to this report.

- A review of the impacts of proposed activities on endangered fauna and the preparation of a fauna impact statement (FIS) as required by Section 112(1B) of the Environmental Planning and Assessment Act. This report was prepared by the environmental consultant, Rick Webster. Since the EIS was released Schedule 12 of the National Parks and Wildlife Act has been revised by a scientific committee. The fauna impact statement accounts for changes in Schedule 12 and lists nineteen endangered species as known or expected to occur in Mistake State Forest. The koala is included amongst these species (see attachment 3).

- Unlogged hardwood forest in Mistake State Forest has been identified and presented on a 1:25,000 scale map (see attachment 4). A total area of 1025 hectares of previously unlogged hardwood forest has been identified. Unlogged areas by forest type that will not be logged and therefore do not form part of the proposal are shown on the map and given below.

Forest Type	Area (Hectares)
37a	38
37b	39
47	12
53	154
62a	1
62b	87
163	8
TOTAL	339

The results of this investigation are discussed in section 3.3.7.

- An investigation of the distribution and extent of *Bosistoa floydii* was conducted with the intention of locating a suitable population of the species for preservation as a flora reserve. The findings and recommendations of the study are detailed in section 3.3.2.

2.4 Interaction with the environment and measures taken to minimise impacts:

Characteristics of the environment likely to be affected are identified by the EIS as:

a) steep slopes and a propensity for ground slumping in some areas, with consequent erosion and increased stream turbidity if this material entered water courses.

b) stands of mature and overmature sclerophyll forest in which the structure will be changed by the removal of 50 trees per hectare on average.

c) removal of a proportion of sclerophyll trees, suitable for denning, nesting and feeding by a range of native (protected) animals and birds.

d) the reliance of the regional timber industry on continued access to the sustainable timber products of the area.

e) any archaeological sites, if present in areas to be logged, would be likely to be disturbed by exposure of soil or changed water flows due to snig tracks and dumps, usually to the detriment of the site, if not specifically protected.

The EIS notes that short-term increases in the run-off of rainfall can be expected following logging and prescribed burning over a period of two to five years. Accelerated soil erosion and increases in water turbidity will be reduced by the application of the Standard Erosion Mitigation Conditions. The impact is expected to be minor, short-lived and non-cumulative. The impact on the water yield of large streams and rivers will be insignificant because of the disaggregation of operations and the relatively small part of each catchment affected.

The EIS calculates that using the yields of sawlogs and sleeper logs from Mistake State Forest, the forest-based industries can generate a total annual turnover of $1.65 million (1989/90 values). Based on this turnover, the following payments are expected to be made each year:

- $285 100 in wages;
- $215 700 in timber revenues and other charges earned by the Forestry Commission;
- $145 700 in other payments to the public sector; and
- $653 300 in other payments to the private sector.

On a pro-rata basis, this activity is likely to maintain 25 of the 179 forestry positions in the industry using the timber resources of the Macksville Management Area. In addition this commercial activity would be indirectly responsible for supporting employment levels and stimulating turnover in other sectors of the regional economy. This additional benefit is likely to be substantial.

2.5 Justification of the proposed activity:

The justification in the EIS of the proposed activity is based on the positive social and economic impacts mentioned above. The proposal provides resources to viable industries on a sustainable basis. These industries generate regional economic output, provide employment, directly contribute revenue to the public and private sectors, and indirectly contribute to community stability and prosperity and the provision of services in rural areas. Safeguards have been developed designed to minimise short term adverse impacts on the cultural values of forests and the viability, diversity and productivity of natural ecosystems.

2.6 Measures to be taken in conjunction with the proposed activity to protect the environment and an assessment of the likely effectiveness of those measures

These measures are referred to throughout the EIS and, in the main, consist of environmental safeguards already in place, with some additional measures required in relation to track construction in steep areas prone to soil slump.

The EIS does not specifically refer to future monitoring. However, publicly available annual management plan reports review all operations, and following the recently issued pollution control licence from the Environmental Protection Authority, monitoring programs are being developed for water quality. Regular field inspections will determine the effectiveness of avoiding track-making in slump prone areas.

2.7 Details of the energy requirements:

This aspect is adequately dealt with by the EIS under the heading "Energy", Section 4.2.6. The conclusion is reached that the total consumption of fossil fuels in relation to the activity would be insignificant compared with other primary production. The EIS could have pointed to the much higher consumption of energy required for industrial processes that are alternatives to timber production.

2.8 Feasible alternatives to the carrying out of the proposed activity:

The EIS considers the alternative of confining the activity to slopes under 25° and concludes that this would result in a reduction of 35% of the area to be logged. The positive effects of reduced stream turbidity and less disruption to flora and fauna communities are considered to be minor. On the negative side, the reduction would adversely and significantly affect the regional economy by reducing the availability of forest products. This would be reflected in a possible direct employment reduction of ten positions with flow-on negative effects on the regional economy. The full effects of this alternative are discussed in section 6.2 of the EIS.

2.9 The consequences of not carrying out the proposed activity:

The alternative of not logging any of the forest stands in the Mistake State Forest avoids most of the environmental impacts on the natural environment discussed in Section 5 of the EIS but has a major socio-economic impact. The current timber inputs to the forest-based industries from crown-timber lands in the Macksville Management Area would have to be reduced. The size of this impact is equal and opposite to the economic benefits attributed to the availability of timber resources from Mistake State Forest, described in Section 5.8 of the EIS.

The consequences of not carrying out the proposal are substantial because the socio-economic impacts would occur to an existing industry. The impacts would be actual losses caused by a cessation of activities rather than losses of potential benefits from activities yet to commence.

2.10 Evaluation of the EIS:

The EIS is presented in a very clear and comprehensive manner, without neglecting adequate scientific presentation of relevant consideration - see Appendix 5 of EIS - Soil description.

The EIS has adequately described the proposed activity, in as much detail as is reasonably available. Mr Justice Hemmings in Bailey v. Forestry Commission in the Land and Environment Court referred to the programmatic nature of forestry operations and the need for on-going environmental assessment. It is stressed that while this EIS has been compiled with the use of all available data and represents the best estimate of what will happen, further reconnaissance and monitoring is required as the proposal progresses and may result in additional environmental safeguards.

The EIS, together with additional reports, has considered sufficient information on flora and fauna that is required for objective consideration relative to decision making.

The EIS importantly notes that the proposed operations may increase the occurrence of slumping at some locations if tracks are constructed across steep side-slopes, and proposes locating tracks to avoid sites that are predisposed to slumping, as far as practicable, and employing techniques involving drainage and slope benching to reduce the likelihood of destabilisation.

The EIS makes it quite clear that damage or changes to pure rainforest stands would be very minor and short-term. The EIS says that, in general terms, the proposed management regime would maintain the relative extent of forest types and the uneven-aged structure of the forest as a whole. However, the number of large trees would be reduced and replaced by large numbers of regenerating trees.

The EIS concludes that no species of plant is likely to suffer a serious population decline due to the activity. The only rare plant identified, *Bosistoa floydii* is not considered by scientists to be endangered or vulnerable in a regional or national context, being adequately represented in proclaimed reserves. The species occurs at the southern limit of its known range in Mistake State Forest. The fact that its main occurrence in Mistake State Forest is in rainforest will protect it from logging damage or ecological disturbance due to logging. Even in the event of individual specimens being damaged, it is most unlikely that the species will be significantly affected.

The EIS considers that logging disturbance may cause a temporary decline in the number of individuals of some species of fauna but that local populations will not be threatened.

Many of the species are associated with habitats that would not be disturbed by forestry operations. For the others, data on logging impacts is incomplete. Except for some species, such as those which are dependent on tree hollows, there is no reason to believe that significant adverse impacts would occur to fauna species as a result of the proposed forestry operations. Evidence presently being assembled suggests that for the great majority of species, there is no statistically significant differences between logged and unlogged forest.

A group of species that is sensitive to the potential impact of logging operations is the arboreal marsupials. The critical habitat requirement for these animals is the availability of trees with hollows for nesting and denning (habitat trees). Management to maintain a minimum of three habitat trees per hectare should minimise logging impacts on arboreal marsupials and would assist in maintaining populations at existing levels.

The fauna impact statement attached to this report provides a detailed consideration of the impacts of the proposal on the fauna known and likely to occur on Mistake State Forest.

The EIS canvasses the possibility of archaeological sites being disturbed and outlines a procedure for action required before logging.

. Ongoing consultations with the Bowraville Local Aboriginal Land Council (BLALC) would be sought in order to further identify the existence, location, boundaries and significance of the mythical sites and the Bora ground referred to in Section 3.10 of the EIS;

. All identified sites will be notified to NPWS and protected as they require in consultation with the BLALC;

. Field staff would be made aware of the types of Aboriginal sites that might be encountered in the forest and provided with training to develop skills in recognising Aboriginal sites or artefacts;

. BLALC would be provided with detailed maps of areas proposed for future harvesting to encourage and facilitate field investigations.

3. Responses to the EIS:

Fourteen responses were received. One indicated that a further response would be made but this has not been received. A precis of letters received is given in attachment 1 of this report.

All responses were forwarded to the Department of Planning and, in a letter dated 22 November 1991, the Director indicated that it is appropriate for the Commission to determine the matter, after satisfying itself on a number of matters raised in submissions to the EIS (see attachment 2). The Director summarises these matters and this summary is used below to structure this report.

The Commission has acknowledged receipt of submissions and will send a determination report to each respondent.

3.1 Soil Erosion:

3.1.1 Suitability of the Standard Erosion Mitigation Conditions (SEMC):

Erosion mitigation conditions for the proposed operations, particularly in areas where slope is greater than 25 degrees, are queried in a number of submissions.

The Standard Erosion Mitigation Conditions are at present being reviewed by the Soil Conservation Service and the Forestry Commission. This is not expected to change the standard of conditions applied so much as clarify implementation and ensure proper execution and monitoring. The reviewed conditions will not be available before determination of this EIS but it goes without saying that operations will be subject to any future amended conditions.

The Standard Erosion Mitigation Conditions for clearing and logging in New South Wales were prepared by the Soil Conservation Service and the Forestry Commission as a set of guidelines for all such operations in New South Wales. The SEMC are practical guidelines with prescriptions seeking to minimise or mitigate soil erosion and other effects resulting from logging and associated road construction. The prescriptions are the minimum to be applied and additional erosion mitigation practices may be necessary in some areas.

Conditions relevant to the EIS include those applicable to minor roads, filter strips, felling, snigging and timber extraction, and log dumps.

It is pertinent that application of the SEMC requires an assessment of "erosion hazard" which is defined as the susceptibility of an area of land to the prevailing agents of erosion; a combination of climate, landform, soil erodibility, landuse and land management. Soil erodibility is regarded as the most important factor; it is related to the geological parent material of the soil. Mr Justice Hemmings in his judgement as to the need for an EIS for the activity on Mistake State Forest said that "the Forestry Commission should have been concerned at the incompleteness of knowledge of the soils in the area and particularly the existence of sodium clays in the catchments". He went on "I would expect an environmental impact statement to provide data which would enable the Forestry Commission to assess properly the extent of highly dispersible sub-soils in areas proposed for logging activities".

To this end a survey was commissioned and its results documented in the EIS. All soil types were classisfied as average erosion hazard class. The most relevant soil landscape unit was described as the Hanging Rock LU, No.2., characterised by steep, concave sideslopes with long, narrow ridge lines. Parent materials are dominantly siltstone and siliceous siltstone. Localised sheeting and rilling was observed in recently logged areas. The report concluded that such erosion is minor in nature and can be effectively mitigated through adherence to the SEMC. The consultant recommended that care be taken in the location of snig tracks and the maintenance of adequate ground vegetation and tree cover for this soil landscape unit.

The report states that "dispersion percentage results indicate a slight to moderate erodibility of soil materials within this unit. The absence of any high clay contents ensures that soils within this unit have only a slight erosion potential, providing the aspects outlined above are given due consideration".

The report separately refers to the proneness of this landscape unit to erode through mass movement processes otherwise known as mass wastage, landslips or slumps. These are observed to be predominantly the result of past roading activity. The report says that if further major roading is not necessary, future erosion related to mass movement processes should not occur. If such roading is warranted, the report recommends that a further study be undertaken "to map existing mass movement examples and their corresponding geological relationships, and locate major roads accordingly".

It must be recognised that the remaining roads proposed for Mistake State Forest are minor roads required to access log dumps. These roads require a much smaller amount of earthworks than existing roads and there is considerable flexibility in their location. Minor roads will be temporary and only used for the duration of the particular logging operation. After logging is completed they will be drained according to the SEMC and managed to facilitate revegetation.

In specifically addressing the adequacy of the SEMC, the report by Veness and Associates noted that conditions applying to filter strips in the Hanging Rock LU" will need to apply to some flowlines having relatively smaller catchments" (than specified in the SEMC).

The report does not indicate which flowlines or the size of the catchment to which such conditions should apply. However, the recommendation is not inconsistent with the SEMC requirements. The SEMC set a minimum standard to be applied and it is anticipated that these may be made stricter in some situations. The application of filter strips to catchments smaller than 100 hectares in the Hanging Rock LU will be considered, and implemented if necessary, at the time of harvesting plan preparation.

The report supports the SEMC requirement that 35° is a suitable upper limit for snig track construction and harvesting.

The District soil conservationist, Mr R.S. Saul, is of the opinion that side cutting could be undertaken on slopes up to 30°, but should be kept to a minimum, and only undertaken on areas with nil to low risk of mass movement. He has further reservations about logging areas with slopes over 30°, suggesting the use of winching methods in these areas.

Mr Saul states that snig tracks should not exceed a grade of 27° because slopes greater than this cannot be adequately drained with cross banks. The SEMC only allows snig track grades to exceed 25° for average erosion hazard where specified.

The comments of Mr Saul need to be balanced against the existing SEMC prescriptions and the report of the specialist soil consultant. The Soil Conservation Service has been a major contributor to the development of the SEMC and is involved with its periodic review. In conducting a soil landscape survey, the consultant was specifically required to report on the effectiveness of the SEMC in relation to limiting any accelerated erosion and land degradation due to forestry operations. This report included extensive field sampling and laboratory analysis for particle size distribution and for dispersion percentage. In comparison, Mr Saul's comments are not substantiated or supported by a detailed examination of the environment.

In conclusion, the current prescriptions of the SEMC are appropriate for all areas of Mistake State Forest. However, adequate attention must be given to considering additional erosion mitigation conditions especially in the Hanging Rock unit.

3.1.2 Monitoring the implementation of the SEMC:

This heading comprises two separate concerns:

a) monitoring the implementation per se:

The EIS clearly demonstrates the line of command and responsibility in respect of use of the SEMC. The District Forester is responsible to the Regional Forester and the Commission for ensuring that staff and contractors under his/her control are familiar with the SEMC and its operation. Each new operator is instructed by the relevant Commission foreman and the contractor supervisor as to the various requirements for road construction, felling and snigging. Furthermore the District Forester is responsible for providing harvesting plans for individual areas of about 200 hectares. These prescribe the height of cross-banks, intervals between banks and slope limits for logging.

All such instructions will continue to be monitored by supervising staff.

The Forestry Commission holds pollution control licences from the Environmental Protection Authority which, as a condition, enforce compliance with the SEMC.

b) monitoring the effect of the implementation of SEMC:

Monitoring the results of implementation shall be by means of annual management reports which will comment in quantitative terms on the area of landslip which appear to be due to logging. Any reports of turbidity or bedload movement reasonably attributed to logging shall be investigated and reported in Annual Management Reports which shall be publicly available after being received by the Commission.

3.1.3 Impact of the proposed operations on slopes greater than 25°:

The testimony of expert witnesses in Bailey v. Forestry Commission and the report of Veness and Associates for the EIS reiterate that slope is one of a number of contributing factors to soil erodibility, the most important of which is soil material. Nevertheless it is conceded that in this case, in spite of the only moderate erodibility of the soil material, slope has a considerable bearing on significance of impact. Given the demonstrated propensity of some areas for slumping, adequate attention must be given to applying stricter ameliorative measures where necessary in relation to the construction of minor logging tracks, over and above the minimum set out in the SEMC.

Calls for the exclusion of logging above 25° (or some lower limit) have been considered and rejected as unnecessary because of the protection offered by the erosion mitigation conditions proposed.

3.1.4 Impact of proposed roading in areas prone to slumping and appropriate mitigation measures:

Areas prone to slumping are clearly those causing most concern in Bailey v. Forestry Commission, to respondents to the EIS; and to the Forestry Commission.

The Commission observes that slumping has occurred in the past as a result (at least partly) of major roading. But it also observes that slumping does not need the impetus of roading and occurs naturally, according to the juxtaposition of slope and underlying rock strata, and is exacerbated by soil moisture saturation.

The report of Veness and Associates concludes that if major roading is to be undertaken, further survey should identify areas prone to slumping and these should be avoided. The EIS states that major roading is complete and future roading will be minor. However, the Commission recognises that the uphill batters of snig tracks and minor logging roads also have the propensity to slump. In addition, some soil movement is unavoidable particularly during pavement formation. The quantity of soil and the distance it travels will be minimised by:

- location, alignment and grade to minimise chances of slumping.
- cross fall drainage on tracks.
- roll-over banks.
- windrows on outer edge removed.
- minimise run off from tracks into gullies.
- steep batters to minimise earthworks.
- remove soil in drainage lines where practicable.
- revegetation of tracks following use.

Construction of short-life logging tracks will include planning to avoid sites that are predisposed to slumping, as far as practicable. Slump-prone areas are identified by:

- the angle of dip of the strata.
- the shallowness of the sub-soil.
- the aspect (northerly to north-easterly aspects are the most slump-prone).
- existence of slopes beneath natural seepages.

3.2 Catchment hydrology:

Water quality and erosion are closely related and it is not proposed in this section to repeat relevant material from 3.1 above.

3.2.1 Impact of proposed operations on water quality and existing problems of sedimentation:

This subject was discussed at length in Bailey v. Forestry Commission. Mr Justice Hemmings stated "I am satisfied that claims of siltation of creeks outside the forest as a direct consequence of logging activities are exaggerated and unfounded. No further major roading is proposed in the forest and it was open to the Forestry Commission to determine that existing roads have already significantly altered the character and nature of the relevant environment".

Evidence was given at the hearing by several local residents who did not consider that logging would stop them using water from streams emanating from the forest. Some said that there was more danger to be expected from agricultural practices in the catchment, year in year out, than from intermittent forestry operations.

3.2.2 Relevance of the Karuah hydrology study to the Mistake State Forest:

Several respondents questioned the use of the Karuah hydrology study to Mistake State Forest. Obviously the transposition of any scientific results from one environment to another is a matter for careful consideration. The value of the Karuah experiment is that it is the only large scale, long-term trial of the effects of forestry as a land use on hydrology in North Coast forests.

The Karuah area does not contain the same proportion of steep country as Mistake State Forest, although the steepest slopes are matched. On the other hand the types of operations observed at Karuah (including clearing for plantation) were far more intensive than those proposed for Mistake. On balance it is believed, on the basis of the Karuah results, that there would be a very minor and temporary impact on water turbidity in Mistake State Forest catchments, given the size of the operations in relation to the overall size of the Mistake catchments and the time span of 2 to 5 years for effective revegetation of exposed soils.

However, the EIS makes the comment that the impact within this time frame is necessarily related also to the probability of severe rainfall events occurring prior to revegetation. Some minor siltation is inevitable but will be ameliorated by strict adherence to the SEMC.

3.3 Flora and Fauna:

Flora and fauna considerations were criticised by a number of respondents. Concern was expressed that rainforest would not be sufficiently protected. The rare tree species, *Bosistoa floydii*, was quoted as a species which may be endangered by operations. *Elaeocarpis grandis* was also mentioned as occurring in the area without prescriptions for protection. One submission was concerned that Blackbutt (*Eucalyptus pilularis*) was likely to be favoured by operations.

Several submissions, including that of the National Parks and Wildlife Service (NPWS), expressed concern for the conservation of old growth forest. The Service also considered that Forest Type 62 (Grey Gum - Grey Ironbark - White Mahogany) should be better represented in conservation reserves. Concern was expressed about the logging of Brush Box.

NPWS is concerned that koalas have not been dealt with in the EIS, as it considers that koalas would occur on the forest. Other submissions claim that koalas are present. The Service is also concerned about the endangered Rufous Scrub Bird and the Sphagnum Frog, and also mentions the likely presence of the Parma Wallaby, Spotted-tailed Quoll and Brush-tailed Phascogale.

3.3.1 Limited availability of information on flora and fauna and potential impacts on these:

Surveys were undertaken in Mistake State Forest for flora and fauna. These indicated that the forest is about average for the North Coast in relation to fauna and are sufficient to establish the likely presence of animals, with the possible exception of koalas, which may be disturbed by forestry operations. The experience of Forestry Commission research officers is that much time and financial and other resources can be expended in searching for cryptic species. In many cases these species are unlikely to be more than temporarily subjected to impacts of logging. The koala is possibly an exception. However, the distribution of koalas on the North Coast includes many areas of logged forest, indicating that the animal is not necessarily endangered or significantly affected by forestry activities.

Nevertheless, it is intuitively apparent that if koalas are present in trees to be felled, they are highly likely to be injured and that there should be prescriptions to ensure that this does not happen and that sufficient habitat is reserved to enable individuals or colonies to survive and recover.

The Sphagnum Frog is an animal that inhabits wet or riparian habitat. Such areas are well protected by existing controls on logging, including filter strips and rainforest exclusions. The management prescriptions recommended by the consultant in the FIS will be implemented to provide further amelioration of impacts.

The Rufous Scrub Bird is unlikely to occur in the EIS area. If it does, based on its preferred habitat type, it's occurrence would be very limited in area. Should forestry activities extend into this area, investigations will be conducted to determine the presence of the animal.

The EIS shows forest typing which represents a quite detailed investigation of the forest flora of the area, particularly in conjunction with the site specific surveys of Binns and Milledge. The investigations are not equal to the types of survey being carried out for management area EIS's, being conducted at very great cost by or on behalf of the Forestry Commission. Such work on Mistake State Forest would largely duplicate work already being carried out that will, when completed, be applicable to some degree to Mistake State Forest. In addition, comprehensive fauna surveys, in accordance with accepted methodology, will be undertaken over the amalgamated Urunga Management Area (including Mistake State Forest) as part of the proposed EIS process. The Urunga EIS will be completed before February 1994.

The Mistake EIS covers the whole of the State Forest that is proposed for logging, and those surrounds likely to be affected. In the course of carrying out the activity, following determination of the EIS, personnel directly responsible will still be required to consider the impact of activities on the environment. If further knowledge is obtained either in closer inspection for logging, or from specific investigation, or from the extrapolation of information gained in more comprehensive investigations on North Coast forests, then the results will be considered to decide if environmental impacts of activities in Mistake State Forest can be further ameliorated.

Impacts due to grazing were raised in one submission. Parts of the area, namely the lower slopes of dry forest types, are currently grazed and it is not proposed to increase grazing following logging. Impacts are therefore not likely to be significant given the existing environment which has had a long association with, and been modified by, past grazing and associated burning.

3.3.2 Impact of the proposed operations on rainforest including the impact and extent of temporary logging tracks in rainforest areas, and harvesting activity on the margins of these areas:

The EIS makes it quite clear that clearly defined rainforest areas will not be logged, they are not part of the proposal. Rainforest species do not form part of the quota of industries dependent on the EIS area. If the species *Elaeocarpis grandis* is present, it is likely to be in rainforest and thus will be adequately protected.

Several submissions contended that the definition of rainforest should include areas where a rainforest understorey exists under a sclerophyll overstorey. This definition is not accepted by the Commission and the proposal is intended to apply to such areas for the logging of Brush Box and eucalypt species. Some damage will be done to the rainforest understorey but no more than would be done by a range of natural occurrences. Such disturbance is necessary for the continued survival (by regeneration) of sclerophyll overstorey species in these areas. Damage due to logging is not significant for the survival of rainforest species (see below) which may even develop further without a sclerophyll overstorey, in certain circumstances and in the long-term. Such fluctuations between rainforest and sclerophyll forest in moist forest situations are a long-term natural phenomenon.

The species, *Bosistoa floydii*, requires special attention in rainforest understorey as it is classified as a rare species and close to its southern limit. As this species is more likely to be found in rainforest, its overall conservation on Mistake State forest is assured. However, it is desirable to note its presence in sclerophyll forest and take measures to protect it from damage when practicable. It should be noted that the tree is of no commercial timber significance.

The Commission initiated an investigation of the distribution of this species in Mistake State Forest with a view to identifying a suitable area for preservation. An area where the species is well represented centred around Mistake Creek has been located and is proposed to be added to the native forest preservation program. The area will be known as "Floyds Flora Reserve". The population along Mistake Creek is estimated to contain 1000 individual plants and is considered to be the largest population, or at least one of the largest, in the forest.

Concern is also expressed that some rainforest may be damaged by the intrusion of short-term logging tracks. Such intrusion is inevitable as ribbons of rainforest traverse the contours along creeks which any system of roads or tracks must cross in steep country. It is not proposed to cross broad areas of rainforest that could be regarded as having heritage significance. Crossings will mean the loss of few trees at most and an insignificant area overall. Some snig tracks will traverse rainforest but disturbance in such cases is very temporary and minimal.

Similarly the immediate edges of hardwood forest types adjacent to rainforest will be logged with minimal disturbance; by the most selective type logging, ensuring that trees are not felled into rainforest stands.

3.3.3 Habitat values of buffer strips (for streams) and steeper sloping areas, for arboreal mammals:

Stream buffer strips are not as important in North coast forests as for those on the south coast. This is because of the nature of North Coast forests which are more uniformly used by the majority of animals, and the nature of logging which is far more selective, leaving more upper canopy trees per hectare than at Eden for example. Hence the EIS has not stressed the need for additional wildlife corridors along streams.

Nonetheless the riparian environment is important as habitat for particular vegetation (including such species as *Bosistoa floydii* and other rainforest species). It is important also for frogs and aquatic flora and fauna, although Mistake State Forest has few permanent streams, greatly limiting its importance in this respect. The riparian environment is adequately protected by existing prescriptions and conditions for logging.

Steep slopes are not as important as flat ground and undulating slopes for arboreal mammal habitat. Hence while the prevailing steepness in parts of Mistake SF increases the likelihood of erosion, logging on such areas poses a less significant threat to fauna values than on less steep forests.

3.3.4 Ingress of feral predators along minor roads and snig tracks:

Feral predators are widespread if not common in the area. They include foxes, cats and dogs. It is not known whether this spread has been influenced by roads already in the area and the proximity of farm lands but it is highly unlikely that the situation will be significantly exacerbated by further tracks.

Work being done on other logging areas on the North Coast should provide some answers on the likely extent of increased ingress. It is not considered practicable or necessary to set up individual monitoring programs on each forest area, nor in this instance, particularly useful.

3.3.5 Adequacy of National Parks and Reserves in the surrounding areas to meet requirements for habitat protection and conservation of rare and endangered species:

The NPWS response suggests that Grey Gum, Grey Ironbark, White Mahogany forests (Forest Types 62a and 62b) are poorly represented in the reserve system. The Service recommends a flora reserve be established within the Nambucca Catchment to sample these types. Section 2.3.1 of this report gives the area of unlogged forest for each forest type that will remain unlogged. All the major associations are represented to some extent in these areas. An area of 88 hectares of forest types 62a and 62b will not be logged. Nevertheless, the need to have these types represented in the reserve system will be investigated

In its submission, the North East Forest Alliance stated that "Mistake State Forest is not a forest that on the basis of available information, the North East Forest Alliance would recommend for addition to the National Park system". However, the NPWS expresses some concern for the expected loss of some "old growth forest".

The NPWS requested information on the location of the flora reserves mentioned in the EIS. These reserves contain examples of the main forest associations represented in Mistake State Forest. The Commission will contact the NPWS and supply this information.

The EIS has clearly indicated that pockets of "old growth" are proposed for logging. An attempt was made to indicate where these areas cover (map 3). Further refinement, as requested by NPWS, has been prepared by the Forestry Commission and this is provided as appendix 4 to this report and discussed below in section 3.3.7.

3.3.6 Changes to forest structure and species composition:

The EIS sets out the area proposed to be logged over the next five years and indicates the temporary changes this would cause to forest structure. These changes are similar to those required in the natural sequence of mortality, regeneration and regrowth which are necessary to the ongoing health and even survival of a forest ecosystem. In the Australian environment they are more likely to be brought about (in a natural sequence) by wildfire destruction or cyclonic damage. Logging reproduces this type of disturbance, albeit more regularly and more frequently, on average, than in nature. However, the frequency is controlled and, if at some time in the future it is desired to extend the cycle, forest stands can be left for whatever period is considered desirable. That is to say that the impacts of logging on forest structure are by no means irreversible.

Similarly fire regimes proposed in the activity are similar to natural occurrences. Fire is part of the natural environment; however, society cannot tolerate irregular, devastating wildfire and has substituted periodic (more frequent) controlled and cooler fires. These are controlled to the point where particular ecosystems and habitat can be specially protected. For instance, the incursions of controlled burns into rainforest will rarely occur.

The effects of these impacts have been stated in the EIS. Plant species composition will not significantly change due to burning, except in some cases where ridgetop vegetation will tend to become more grassy and less shrubby.

It is stated in submissions that the proposal favours Blackbutt in regeneration. Such effects are usually only evident on certain sites which could have been occupied by Blackbutt given circumstances favourable to the species in the past. Blackbutt has been a dominant forest species in the Nambucca Valley from prior to widespread logging to the present day. Logging is not considered to have changed forest species composition to any significant degree.

3.3.7 Unlogged forest:

Several submissions expressed concern over the logging of "old growth" hardwood forest. The NPWS submission requested information on the locations of "old growth" areas as a supplement to the EIS. This information has been collated by the Commission and is presented as an attachment to this report. There is a wide range of "old growth" definitions. In this case the most practical definition is any area showing no evidence of previous logging. Suspected unlogged hardwood areas were identified using aerial photos and then confirmed following ground checking. The resultant map shows unlogged areas are widely dispersed and each discrete unit is relatively small in area. Unlogged areas account for 1025 hectares (10.6 %) of the total 9620 hectares of Mistake State Forest. Approximately 686 hectares (7.1 %) is available for logging and 339 hectares (3.5 %) is classed as inaccessible or otherwise unavailable for logging. The EIS describes approximately 1800 hectares of generally mature/overmature forest as available for logging. The information now at hand shows that this is comprised of 1025 hectares of previously unlogged forest.

A significant proportion (3.5 %) of the whole forest is unlogged forest that does not form a part of the logging proposal. This area adds to the area of "old growth" forest in conservation reserves on the north coast. Particular attention is given to the fact that Mistake State Forest is in close proximity to the Black Scrub Area within New England National Park. The Black Scrub section has been described in a report by the National Parks and Wildlife Service as probably the best unlogged Blackbutt forest in NSW (Adam, 1984).

3.4 Historic sites:

Several submissions called for further consideration of Aboriginal sites and further consultation with Aboriginal groups.

3.4.1 Inventory methods for location of archaeological and Aboriginal sites and the possible need to locate further sites

The EIS accepts that a number of peaks probably have some anthropological or religious significance. Harvesting operations are not proposed for these peaks. Logging of the upper slopes would only be undertaken after consultation with local Aboriginal Land Councils.

The Commission has recently obtained the services of a qualified archaeologist and future work on Mistake State Forest will be done in conjunction with local Aboriginal Land Councils. Further investigations will be undertaken to locate the suspected Bora Ring and to determine the need for further surveys. As requested by NPWS, a more explicit management prescription will be formulated for sites "known to exist, or projected to exist within the forest".

3.5 Social/Economic factors:

A number of social and economic concerns were expressed in submissions. The more cogent were expressed by the timber industry which saw a serious impact on the industry if logging on Mistake was suspended or seriously restricted.

Other concerns considered the sustainability of yields. Current yields are sustainable as part of the broader Urunga Management Area yield strategy. Such yields would not be sustainable if the area of supply was reduced.

Factors noted by the Director, Department of Planning for comment in the report are considered below.

3.5.1 Impact of the proposed operations on tourism:

No submission was received from tourist authorities. One received from a local resident claimed that an important tourist attraction was being degraded.

There is limited recreational activity and it largely depends on the roads which are, as far as possible, open to the public. The existence and continued maintenance of these roads is largely a result of logging activity. Without the economic impetus of logging, road maintenance would be more difficult to justify.

3.5.2 Impact of proposed activities on local roads:

Two submissions raised the question of impact an public road users and the roads themselves. It must be remembered that the timber industry pays taxes and individuals have a citizen's right to the legal use of roads. The proposed activity is the continuation of long-standing use of shire roads and is not envisaging increased use.

It is also necessary to consider the volume of use that is being proposed; namely three to five truck movements per day on average for 200 days per year. Loads will be within legal limits and it is unreasonable to assume that this road use will affect roads more than the current regular use.

There may be problems of perceived danger due to the use of log trucks on relatively narrow roads. These matters are not unique to the environs of Mistake State Forest. If there are such problems, the Commission could assist in mediating between the local community and the timber industry and hopefully arrive at mutually acceptable norms for road usage.

In the Nambucca Valley, the timber industry has demonstrated its willingness to co-operate on this matter by funding CB radios in school buses and routinely sounding truck horns on blind corners and narrow roads.

3.5.3 Economic Comparison of Alternatives:

Several submissions were critical of the economic evaluation of alternative proposals. It must be pointed out that the evaluation was not a cost/benefit analysis but rather a regional economic impact assessment. It was not attempted to conduct a cost/benefit analysis because of the inherent difficulties associated with assigning values to many of the unpriced benefits and costs of forestry projects.

DETERMINATION

4. Determination:

The Commission has fulfilled the requirements of the Environmental Planning and Assessment Act 1979 by examining and considering an Environmental Impact Statement prepared and displayed for the required period, and by taking into account submissions from other Departments, organisations and individuals, and the requirements of the Director, Department of Planning.

The Commission hereby determines the proposal described in the Environmental Impact Statement in the following terms:

The proposed activity shall proceed as described in the Environmental Impact Statement and in this Assessment Report, with the following modifications to eliminate or reduce any possible significantly detrimental effects of the proposed operations on the environment.

Soil Erosion

In areas showing a potential for mass movement, location of minor roads will be defined by the supervising Forestry Commission staff who shall ensure that minimal earthworks are employed and that roads are drained adequately.

In those areas of Mistake State Forest identified as part of the Hanging Rock Landscape Unit, consideration will be given to applying filter strip prescriptions to drainage lines with catchments smaller than 100 hectares and these will be documented in harvesting plans.

Care will be taken over all of Mistake State Forest and particularly in the Hanging Rock Landscape Unit with the location of snig tracks and the maintenance of adequate ground vegetation and tree cover.

Harvesting plans shall show areas where a potential for mass movement has been identified and where filter strip prescriptions will apply.

Unlogged Hardwood Forest

The Commission will ensure as far as practicable, that the areas shown by vertical hatching (unlogged and inaccessible or otherwise unavailable for logging) on the accompanying map will remain as unlogged forest. This undertaking will be enforced through harvesting plans.

Bosistoa Floydii

Staff will be instructed in identification of the small tree, *Bosistoa floydii* with a view to minimising disturbance in the process of track construction and logging. Specific protection of a substantial population of this species will be implemented by adding the proposed Floyds Flora Reserve to the native forest preservation program. Periodic review of its rare status and continued need for specific protection is required.

Intrusion into Rainforest

Care shall be taken to minimise intrusion of operations into delineated rainforest areas by:

(a) Location of all minor roads and snig tracks through these areas strictly by supervising Commission staff.

(b) Ensuring that all trees removed on the immediate edges of hardwood forest types adjacent to rainforest types are felled away from the rainforest as far as practicable and by ensuring that individual trees only, rather than large groups of trees, are felled in such locations.

Flora Reserves

Consultation will be pursued with the National Parks and Wildlife Service about flora conservation requirements in the Nambucca Valley with a view to determining whether further flora reserves are required on State Forests or other Crown Lands. Representation of forest types 62a and 62b in the reserve system will be subject to particular attention. This matter will be further investigated during both the Kempsey and Urunga EIS processes.

As previously referred to, it is proposed to add Floyds Flora Reserve to the preserved native forest estate. Exact boundaries of the Reserve will be determined following further field investigations to confirm the extent of the population and consider management practicalities.

Koalas

Where a koala has been discovered in advance of, or during logging or burning, and brought to the attention of forest officers, the tree will be retained together with all other trees within a radius of 100 metres pending an inspection by a forest officer to determine whether or not other koalas are present in the vicinity. If koalas are present, operations will not commence or continue in the immediate vicinity until expert advice is obtained on further action.

The management prescriptions recommended in the accompanying FIS will be implemented.

Rufous Scrub Bird

An investigation shall be carried out in the area identified as potential habitat as per Ferrier (1985) prior to any logging or burning commencing in that area.

Sphagnum Frog

The management prescriptions recommended in the accompanying FIS will be implemented.

Aboriginal Sites

Logging of the upper slopes of the peaks identified in the EIS will only be undertaken after consultation with local Aboriginal Land Councils.

Further investigations will be undertaken to locate the suspected Bora Ring and to determine the need for further surveys.

A more explicit management prescription, as requested by the NPWS, will be formulated for sites known to exist or projected to exist within the forest.

Monitoring of Impacts

Annual management reports shall describe any mass movement that may occur in logged areas, measures taken to prevent mass movement and to minimise the further movement of displaced soil into streams. If such areas of mass movement are found proposals shall be put forward for future avoidance.

Compliance with the SEMC, code of logging practice, harvesting plans and conditions of pollution control licence will be monitored and reported on in annual management plan reports.

Annual management reports will describe observations of rare or endangered animals in logging areas and action taken to protect them. Annual management reports will describe action taken to reserve forest areas in the vicinity, and will report on the occurrence and protection of the plant, *Bosistoa floydii* in or adjacent to logging areas on Mistake State Forest.

Ongoing Environmental Assessment

At the time of producing harvesting plans, the District Forester will reassess the likely site specific impacts of the particular operation on the environment.

COMMISSIONER FOR FORESTS

5. References:

Adam, P. 1987. New South Wales Rainforests - The Nomination for World Heritage Listing. NSW National Parks and Wildlife Service, Sydney.

Ferrier, S. 1985. Habitat requirements of a rare species, Rufous Scrub-bird. In Birds of Eucalypt Forests and Woodlands: Ecology, Conservation, Management. A. Keast, H. F. Recher, H. Ford and D. Saunders eds. RAOU and Surrey Beatty & Sons.

ATTACHMENT 1

Submissions Received and Summary of Issues

MISTAKE EIS ASSESSMENT REPORT

LIST OF EIS SUBMISSIONS

1. NSW Forest Products Association
PO Box 903
DARLINGHURST NSW 2010

RECEIVED 11/991

In support of the proposed operations and the prescriptions outlined.

Considers that routine forestry operations should not fall within the jurisdiction of the EP&A Act. NPWS is not required to produce this level of investigation to add areas to the Park's estate.

Reductions in allocated yields have already been made in pursuance of the sustained yield strategies. The alternative proposals would lead to further reductions and this is not considered necessary to achieve acceptable standards of environmental impact. Reduced sustained yields have resulted specifically from the Government's 1982 Rainforest Decision. At that time a commitment was made not to reduce quotas further.

2. Total Environment Centre
18 Argyle Street
SYDNEY NSW 2000

RECEIVED 17/9/91

Concerned about the effectiveness of the Standard Erosion Mitigation Conditions, both in implementation and adequacy.

Critical of cost-benefit analysis for the no-logging alternative. Favours a ban on logging over 25°.

3. The Colong Foundation for Wilderness Ltd
18 Argyle Street
SYDNEY NSW 2000

RECEIVED 17/9/91

Claims that the Soil Erosion Mitigation Conditions will be breached most of the time on slopes between 26° and 35°. Believes that much of the area has a high erosion hazard.

Contends that hardwood rainforest margins should not be logged, to prevent die back in adjacent rainforest.

Critical of cost-benefit analysis for the no-logging alternative on areas with grades greater than 25°.

Recommends that logging of slopes in excess of 25° should not occur.

4. G. W. WILSON
Bakkahat
South Arm Road
BOWRAVILLE NSW

RECEIVED 20/9/91

Claims inadequate surveying of flora and fauna.

Identifies inaccuracies with the logging history map (map 3 in the EIS) and the location of Hanging Rock Road on all maps.

Voices concern over the regeneration capabilities of logged areas, specifically log dumps, stressing the necessity for proper rehabilitation.

Not satisfied with the effectiveness of the Standard Erosion Mitigation Conditions to minimise landform slippage and general soil erosion. Points to landslips on Hanging Rock Road.

Critical of use of Karuah Catchment experiment results in EIS.

Critical of rainforest typing definitions.

5. North East Forest Alliance
Big Scrub Environment Centre
88A Keen Street
LISMORE NSW 2480

RECEIVED 20/9/91

Claims inadequate consideration of impacts of operation on flora, fauna, rare and endangered species, weed spread, soils, landscape and cultural values.

Questions the adequacy of Standard Erosion Mitigation Conditions.

Critical of rainforest type definitions.

Concerned with habitat tree prescriptions and methods to maintain suitable trees in perpetuity.

Recommends that further surveys be undertaken for rare and endangered species.

Suggests that parts of the forest should be reserved to protect identified values (particularly the plant *Bosistoa floydii*).

Requests that the Logging History map (3) show areas dominated by mature and overmature trees.

Considers the EIS to be inadequate and requests that it be re-done and re-exhibited

6. The Nambucca Valley Conservation Association
PO Box 123
BOWRAVILLE NSW 2449

RECEIVED 20/9/91

Concerned about the sustainability of logging operations. Critical of an imbalance of emphasis amongst the various forest values that is skewed towards timber production.

Not confident that SEMC and other safeguards will satisfactorily protect soils.

Claims that consultation with Aboriginal Land Councils was inadequate.

Points out a lack of clarity in how the proposed activities will disturb rainforest.

Critical of safeguards to ensure the maintenance of flora and fauna populations. Calls for full and comprehensive flora and fauna surveys to be undertaken.

Claims that the exhibition period was insufficient to compile a comprehensive submission.

7. The Springs Community
Upper Buccrabendinni Road
BOWRAVILLE NSW 2449

RECEIVED 23/9/91

Critical of the ability to conduct harvesting on a sustainable basis. Points out that the EIS does not provide information on how the sustained yield for Macksville Management Area was arrived at.

Claims that silvicultural work will favour Blackbutt over other species.

Points out a lack of clarity in how the proposed activities will disturb rainforest. Plans for roading should be discussed in EIS.

Suggests that Commission should consult with neighbours about keeping some minor roads open for fire protection.

Requests more information on grazing within the forest and its predicted impacts.

Points out that water from streams arising from Mistake SF. is available through reticulation to 3 major towns. Expresses concern about increased turbidity.

States that map 1 incorrectly shows Upper Buckrabendinni Road as Lower Buckra Road. Recommends that FC consult with local council to ensure road surface degradation is minimised.

Concerned with the affects of prescribed burning on habitat trees.

Concerned with nutrient loss.

Brings to attention the omission of *Eleaocarpis grandis* from flora considerations.

8. Residents of South Arm
(Top end)
BOWRAVILLE NSW 2449

RECEIVED 24/9/91

A petition signed by 17 residents of the South Arm.

Claims that the EIS is biased towards logging and does not adequately consider other forest values.

Concerned that the proposed activities will significantly disturb their living environment.

9. Perry and Smith Solicitors
P.O. Box 69
MACKSVILLE NSW 2447

RECEIVED 25/9/91

Critical of length of time available for public comment.
Would have liked at least 3 months to enable effective public input.

Claims EIS has failed to address the matters set out in the judgement of Hemmings in the Land and Environment Court in the case of Bailey v Forestry Commission.

Claims inadequate consideration of soil erosion potential. Questions the sufficiency of SEMC.

Claims inadequate flora and fauna surveys. Presence of the koala has not been considered or included in the species list.

Notes errors in management history map. Recommends that additional soil and erodibility studies, further flora and fauna surveys and an archaeological survey by undertaken before any activities are carried out.

10. Wingham Forest Action
C/- Post Office
ELANDS NSW 2429

RECEIVED 4/10/912

Questions why no public participation in the pre-EIS process was undertaken.

Critical of SEMC to protect soils.

Points out that the social impacts or benefits of alternative proposals were not canvassed.

Claims that EIS fails to adequately address the issues raised in the case of Bailey v Forestry Commission.

Claims inadequate detail given in sample harvesting plans.

Critical of extrapolation of Karuah hydrological data.

Claims inadequate Flora and Fauna surveys.

Recommends reduction in annual timber yields.

11. Nambucca Valley Association
(John Monro)
PO Box 34
BOWRAVILLE NSW 2559

RECEIVED 9/10/91

Objects to the proposed activities and recommends restricting logging to slopes under 25°, cessation of prescribed burning, withdrawal of grazing permits, reserving flora and fauna areas and regenerating disturbed rainforest.

12. Duncan's Heron's Creek
Main Street
HERON'S CREEK NSW 2443

RECEIVED 9/10/91

In support of proposal.

Points out the economic contribution that Mistake State Forest operations will have to the community. Emphasises community dependence upon the local forest industry.

13. National Parks and Wildlife Service
PO Box 1967
HURSTVILLE NSW 2220

RECEIVED 18/10/91

Claims inadequate consideration of various impacts upon the environment.

Recommends site specific surveys be conducted to describe locations and distribution of rare and endangered species.

The species *Bosistoa Floydii* is considered inadequately reserved.

The conservation status of species and associations was not adequately compared in a local, regional, state and national context.

The EIS does not consider the existence of the koala even though it is thought to occur in the forest.

Recommends that further archaeological surveys be conducted and a detailed management strategy be prepared for existing sites.

Points out that forest type 62 is inadequately reserved in the part of its range from Kempsey to Coffs Harbour.

Requests that old growth forests in each compartment be shown on management maps.

14. Soil Conservation Service
PO Box 1771
KEMPSEY NSW 2400

RECEIVED 18/10/91

Recommends that the compliance with and effectiveness of SEMC be monitored.

New roading should avoid areas which are pre-disposed to mass movement. Where this is unavoidable, geotechnical expertise should be consulted.

Recommends that snig track grades do not exceed 27°, that side cutting may be undertaken on slopes up to 30°; and that winching methods only be used for snigging on slopes greater than 30°.

Supports prescribed burning in preference to wild fires for water, soil, flora and fauna protection.

ATTACHMENT 2

Letters from the Director
Department of Planning

New South Wales Government

Department of Planning

THE DIRECTOR

Remington Centre
175 Liverpool Street, Sydney 2000
Box 3927 G.P.O. Sydney 2001
DX . 15 Sydney

Telephone : (02) 391 2001
Fax No : (02) 391 2338

Dr E. Drielsma
Commissioner for Forests
Forestry Commission of New South Wales
Building 2
423 Pennant Hills Road
PENNANT HILLS NSW 2120

22 NOV 1991

Dear Dr Drielsma,

EIS FOR PROPOSED FORESTRY OPERATIONS IN THE MISTAKE STATE FOREST

I refer to the Commission's letters of 11 October and 31 October 1991 forwarding copies of submissions regarding the Environmental Impact Statement on forestry operations in the Mistake State Forest.

It is considered appropriate for the Commission to determine the matter without an inquiry under section 119 or an examination under section 113(5) of the EPA Act.

In making its determination the Commission should satisfy itself on a number of matters which have been raised in submissions to the EIS. The National Parks and Wildlife Service is particularly concerned that the EIS does not provide information in sufficient detail for the Service to adequately appraise the proposal in terms of its statutory responsibilities for nature conservation and habitat protection. In its submission the Service indicates additional documentation required to supplement the EIS and it is important that any determination made by the Commission deals comprehensively with the Service's concerns.

The Soil Conservation Service, in its submission, raises a number of issues regarding soil erosion and makes several recommendations for reducing the risk of erosion. The Commission should ensure that its determination adequately addresses these issues and incorporates the Service's recommendations.

Several other submissions refer to matters pertinent to the assessment of environmental impacts and are summarized in Attachment 1. The Commission should satisfy itself that its determination considers these matters.

The Commission will be aware that in determining the proposed activity the matters specified in clause 56 of the EPA Regulation should also be taken into account. Particular note should be taken of the recent addition of paragraph (e1) to clause 56, which deals with the impacts on the habitats of protected and endangered fauna.

I would appreciate receiving a copy of the determination when available.

Yours sincerely,

Gabrielle Kibble

G. KIBBLE,
Director.

ATTACHMENT 1

SUMMARY OF ISSUES RAISED IN SUBMISSIONS

Most submissions expressed concern regarding the level of detail provided on the following issues:

1. Soil Erosion

- Suitability of the Standard Erosion Mitigation Conditions (SEMC) for the proposed operations, particularly in areas where slope is greater than 25 degrees.
- Monitoring the implementation of the SEMC.
- Impact of the proposed operations on slopes greater than 25 degrees.
- Impact of proposed roading in areas prone to slumping and appropriate mitigation measures.

2. Catchment Hydrology

- Impact of proposed operations on water quality and existing problems of sedimentation in catchment waterways.
- Relevance of the Karuah hydrology study to the Mistake State Forest.

3. Flora and Fauna

- Limited availability of information on flora and fauna and the potential impacts on these.
- Impact of the proposed operation on rainforest including the impact and extent of temporary logging tracks in rainforest areas, and harvesting activity on the margins of these areas.
- Habitat values of buffer strips (for streams) and steeper sloping areas for aboreal mammals.
- Ingress of feral predators along minor roads and snig tracks.
- Adequacy of National Parks and Reserves in the surrounding areas to meet requirements for habitat protection and conservation of rare and endangered species.

4. Historic Sites

- Inventory methods for location of archaeological and aboriginal sites and the possible need to locate further sites.

5. Social/Economic Factors

- Impact of proposed operations on tourism.
- Impact of proposed activities on local roads.

Department of Planning

THE DIRECTOR

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RECEIVED
26 JUN 1992
ANS / /

Dr H Drielsma
Commissioner for Forests
Building 2
423 Pennant Hills Road
PENNANT HILLS 2120

G91/00410/001

Dear Dr Drielsma,

I refer to your letter of 4th June 1992 in which you ask whether the proposed logging of Mistake State Forest for which an EIS was prepared and exhibited prior to the commencement of the Timber Industry (Interim Protection) Act (Timber Act) should be determined by the Commission or the Minister for Planning.

It is the Department's view that the current Mistake State Forest EIS does not fall within the scheme of the Timber Act. This view is based on Section 9 of the Act which operates to make the Minister the determining authority only when an EIS has been obtained for land specified in Schedules 1, 2 or 4 of the Timber Act, after commencement of the Act. Mistake State Forest EIS was prepared and exhibited prior to the commencement of the Act.

Yours sincerely,

G. Kibble
Director

2 1992

ATTACHMENT 3

Fauna Impact Statement

Attachment 3

A FAUNA IMPACT STATEMENT FOR MISTAKE STATE FOREST

Compiled by Rick Webster

Armata Environmental Consultants

227 River Street

Deniliquin NSW 2710

CERTIFICATION

This is to certify that this Fauna Impact Statement has been prepared by the undersigned in accordance with the provisions of the National Parks and Wildlife Act 1974 and the Environmental Planning and Assessment Act 1979, both as amended by the Endangered Fauna (Interim Protection) Act 1991.

Rick Webster B.Sc. .....

Armata Environmental Consultants

1. Introduction

This document reviews current fauna information (including the Mistake State Forest Environmental Impact Statement) for Mistake State Forest and, where information is available, the surrounding environs. It therefore addresses the requirements of the Environmental Planning and Assessment Act (1979), in particular section 4A and clause 56 (e1). Initial consideration found that the impact on some endangered fauna may be significant. Therefore, a fauna impact statement is incorporated with this review. The NPWS Directors requirements and terms of reference for this Fauna Impact Statement are included as Appendix 2.

2. Director's Requirements

2.1 Fauna Survey

The Urunga Environmental Impact Study to be undertaken during the latter half of 1992 and early 1993 will include Mistake State Forest. At least three people have conducted surveys within Mistake State Forest. The data collected by Binns (1988) and Milledge (1988) has been included in the Mistake State Forest Environmental Impact Statement and will form the primary basis of this Fauna Impact Statement. Additional information will be used from studies conducted in nearby areas including Brathwaite (1991), Milledge (1991), Clancy (1992), Mount King Ecological Surveys (1992), Richards (1992) and York and Shields (1992).

A four day visit by Binns (1988) concentrated on both recently logged sites and sites that had not been logged for 30 years. At these sites vegetation research and a fauna survey were conducted. The sites investigated by Binns (1988) where located in the Jaspers Creek Catchment (Cpt 340) and opportunistic recordings were made throughout the forest.

Milledge (1988) visited Mistake State Forest for nine days and concentrated on those compartments excluded from logging by the Land and Environment Court hearing of 30 November 1987. The three sites investigated where located in rainforest on Bowra Sugarloaf (site 1), South Creek (site 2) and compartment 324 (site 3) as it was believed that rainforest would undergo the greatest impact during the proposed operations.

A three day survey was also undertaken by the author in which opportunistic recordings of fauna species were made throughout Mistake State Forest.

A total of 16 days has been spent in Mistake State Forest collecting fauna information. Most forest types within the forest have been visited. Several intensive studies have also been conducted in nearby areas of similar forest types. From the information available, a Fauna Impact Statement can be prepared that fulfills the Director's requirements. An Environmental Impact Study, for the Urunga area will be completed in the near future (1993). This EIS will include a comprehensive fauna survey in accordance with accepted EIS survey methodology.

2.2 Methodology of Surveys

Binns (1988) conducted spotlighting surveys on the nights of 11th, 12th and 13th January 1988. The location and length of these transects are as follows:

Carbine Road	2.4km
Jaspers Creek	2.0km
Hanging Mtn.	1.4km
Wilkes/Kosekai	2.0km

The Carbine Road and Jaspers Creek sites were in recently logged forest while Hanging Mountain and Wilkes/Kosekai sites were in forest logged over 25 years ago. All transects were conducted on foot except for the Wilkes/Kosekai transect which was surveyed from a slow moving vehicle (approx. 3.5km per hour). Recordings of reptiles and amphibians were made opportunistically throughout the forest.

Milledge's (1988) survey was conducted from the 13th-21st January 1988 and included Mistake State Forest and adjacent parish portions (39 and 40) on South Creek. As the majority of time was spent in rainforest the vertebrate investigations of this survey were biased towards this habitat type. Identification of species was opportunistic using 10 x 40 binoculars or calls of frogs and birds. Nocturnal species were identified using 100 watt hand-held spotlights.

Observations by the author were made from the 9th-11th June 1992 and consisted of opportunistic sightings throughout Mistake State Forest. Weather conditions on the three days were fine and cool. However, a strong south-westerly wind was blowing on the 10th including the night of the 10th when spotlighting was undertaken from Bowra Sugarloaf to the forest boundary along Kosekai Road. These conditions made location of fauna difficult.

2.3 Fauna of Mistake State Forest

Appendix 1 contains a list of fauna for Mistake State Forest. This list was constructed using the Mistake State Forest EIS (Forestry Commission of NSW 1991), the affadavit by Milledge (1988) and personal observations made during a field inspection. (9-11.6.92).

2.3.1 Reptiles and Amphibians

A total of 13 species of amphibians have been recorded for Mistake State Forest (Appendix 1). At least one other species (Fletchers Frog *Lechriodus fletcheri*) is expected to occur in this area (Milledge 1988). One of these is listed on Part 2 (vulnerable and rare species) of Schedule 12 of the National Parks and Wildlife Act. This species is:

Sphagnum Frog	*Philoria sphagnicolus*

Fourteen species of reptiles have been recorded for Mistake State Forest (Appendix 1) and a further two are expected. The two expected species are the Southern Angle-headed Dragon (*Hypsilurus spinipes*) and Stephens Banded Snake (*Holocephalus stephensii*) (Milledge 1988). One recorded species and one expected species are listed as vulnerable and rare species on Part 2 of Schedule 12. These species are:

Southern Angle-headed Dragon	*Hypsilurus spinipes*
Carpet & Diamond Python	*Morelia spilota*

2.3.2 Birds

Seventy-two bird species have been recorded for Mistake State Forest (Appendix 1). A further three species could occur in the area (Milledge 1988, Forestry Commission of NSW 1991). These species are the Pacific Baza (*Aviceda subcristata*), Sooty Owl (*Tyto tenebricosa*) and Rufous Scrub-bird (*Atrichornis rufescens*). One recorded species and two expected species are listed as vulnerable and rare species on Part 2 of Schedule 12. These species are:

Glossy Black-Cockatoo	*Calyptorhynchus lathami*
Sooty Owl	*Tyto tenebricosa*
Rufous Scrub-bird	*Atrichornis rufescens*

2.3.3 Mammals

Seventeen mammals have been recorded for Mistake State Forest (Appendix 1). A further four species are expected in this forest (Milledge 1988, Forestry Commission of NSW 1991). These species are the Brush-tailed Phascogale (*Phascogale tapoatafa*), Eastern Pygmy Possum (*Cercatetus nanus*), Long-nosed Potoroo (*Potorous tridactylus*) and Parma Wallaby (*Macropus parma*). Only one species of bat has been recorded for Mistake State Forest, but according to the literature (Strahan 1983) and research conducted in the Wingham

Management Area (Richards 1992) it is possible that another 18 species of bat could be located in Mistake State Forest. Two recorded and ten expected mammal species are listed as vulnerable and rare species on Part 2 of Schedule 12. These species are:

Tiger Quoll	*Dasyurus maculatus*
Brush-tailed Phascogale	*Phascogale tapoatafa*
Yellow-bellied Glider	*Petaurus australis*
Long-nosed Potoroo	*Potorous tridactylus*
Parma Wallaby	*Macropus parma*
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*
White-striped Mastiff-bat	*Nyctinomus australis*
Eastern Little Mastiff-bat	*Mormopterus norfolkensis*
Common Bent-wing Bat	*Miniopterus schreibersii*
Little Bent-wing Bat	*Miniopterus australis*
Fishing Bat	*Myotis adversus*
Great Pipistrelle	*Falsistrellus tasmaniensis*

Although the Koala (*Phascolarctos cinereus*) has not been recorded for Mistake State Forest it has been recorded in other state forests within the Urunga Management Area, including: Pine Creek, Newry, Irishman, Bellinger River (Forestry Commission of NSW 1992), Way Way, (Milledge 1991) and Oakes (Onfray pers comm.). This species is also listed on Part 2 of Schedule 12 as a vulnerable and rare species. Due to its wide distribution within the management area and concern expressed by National Parks and Wildlife Service over the effects the proposal would have on the Koala, the Koala will be treated in the same manner in this Fauna Impact Statement as other Schedule 12 species.

2.4 Schedule 12 Species

The following sections contain a listing of Schedule 12 species, their conservation status and a statement of significance of effect of the proposed operation. The last line in the description of the distribution in New South Wales refers to the conservation status imposed by the interim Schedule 12. Definition of significance, and the definiton of geographic terms follow those in the Fauna Impact Statement for the Eden Management Area (Forestry Commission of New South Wales 1992). In the first instance, significance is considered for local populations. The term local in this sense varies for each species. The maximum area considered in this category is the entirety of Mistake State Forest (9 620 ha). Briefly, a significant impact is one that reduces the population under consideration by more than 30% Local distribution refers to Mistake State Forest (approx. 10 000 hectares).

Sphagnum Frog

Abundance/conservation status

Local: Recorded from compartment 334 (Binns 1988) and upper tributaries of South Creek (Milledge 1988).

Regional: Has been recorded in Werrikimbe and New England National Parks (Forestry Commission of NSW internal file) as wellas Leagues Scrub Flora Reserve in Buckra Bendinni State Forest (Forestry Commission of NSW 1992).

State-wide: Only recorded in the ranges from Ebor and Dorrigo to Barrington Tops (Cogger 1986). A vulnerable and rare species.

The Sphagnum Frog inhabits rainforest, antarctic beech forest and wet sclerophyll forest above 750 metres. Burrows in soil or moss or sits in cavities besides streams (Cogger 1986).

The likely effect of the proposed operation on the species:

Local: Under the proposed operation there will be no direct loss of habitat due to logging as logging is to be excluded from the habitat (rainforest and certain creek lines including South Creek and some of its tributaries) in which Sphagnum Frogs are found (see Map 4 Mistake S.F. EIS). No significant effect.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

The following proposed management prescriptions will further ameliorate any impacts on the habitat of the Sphagnum Frog by the proposed logging operation:

- constrain the movement of machinery near streams;
- specifying the location of tracks, snig tracks and log dumps away from water courses;
- prohibiting the use of tracks when run-off occurs from the track surface during periods of wet weather;
- retaining filter strips of undisturbed vegetation along defined streams; and
- providing drainage works to direct run-off onto undisturbed vegetation.

These management prescriptions will be further enhanced as a large portion of Compartment 336 to the south and west of South Creek will remain unlogged due to the steepness of the compartment (see Map of Mistake S.F. showing areas that will remain unlogged).

Southern Angle-headed Dragon
Abundance/conservation status

Local: Unknown

Regional: Has been recorded by Milledge (1991) in Way Way State Forest and in the Wingham Forestry Mangement Area (Clancy 1992).

State-wide: North-eastern New South Wales. A vulnerable and rare species.

An inhabitant of rainforest and adjacent wet sclerophyll forests. Generally diurnal, aboreal and only seen when foraging and basking near roadsides, tracks or streams (Cogger 1986, S. Debus pers. comm.).

The likely effect of the proposed operation on the species:

Local: The major habitat type (rainforest) of the Southern Angle-headed Dragon will be protected during the proposed operation as rainforest is excluded from logging (p.34 Mistake S.F. EIS). Some individuals may undergo direct mortality or suffer a small loss of habitat in the short term when logging tracks are constructed through rainforest. Within logging areas that have a rainforest undertorey, there may be a significant local effect in the short term (2-6 months). No significant effect for the entirety of Mistake State Forest. No significant long term effect.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

If this species was located in Mistake State Forest the ability of this species to recover from the proposed operation would probably be favourable as it has been found inhabitating areas which have been logged in the past in the Wingham Management Area (Clancy 1992) and utilises road sides (S. Debus pers. comm.).

Carpet and Diamond Pythons
Abundance/conservation status

Local: Observed by Milledge (1988) along the lower course of South Creek and in rainforest near Carbine Road. Binns (1988) also recorded this species in logged areas near Carbine Road.

Regional: Recorded from Irishman, Pine Creek, and Way Way State Forests (Forestry Commission of NSW 1992) in the Urunga Management Area and from the Taree and Wingham Management Areas (Clancy 1992, Forestry Commission of NSW unpubl. data.)

State-wide: A vulnerable and rare species.

Carpet and Diamond Pythons occupy a wide range of habitats throughout continental Australia and New Guinea (Cogger 1986). A nocturnal and sometimes arboreal snake that feeds on terrestrial vertebrates.

The likely effect of the proposed operation on the species:

Local: As this species is likely to be found across a wide range of forest types its habitat will undergo varying degrees of disturbance. This will possibly lead to the loss of a small number of individuals from the Mistake State Forest population via direct mortality. The population as a whole however, should survive as rainforest habitat, steep terrain (2 360 ha of wet and dry forest types) and filter strips are excluded from logging. Within logging areas the impact may be significant in the short term (2-6 months). No significant long term effect.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

The following proposed management prescriptions will further ameliorate any impacts on the habitat of the Carpet and Diamond Pythons by the proposed logging operation:

- no logging in non-productive hardwood forests; and
- prescribed burning in any one year will only disturb one percent of Mistake State Forest.

This species has been recorded utilising logged forest in the Wingham Management Area (Clancy 1992) and is likely to recolonise those areas proposed to be logged in Mistake State Forest.

Glossy Black-Cockatoo
Abundance/conservation status

Local: Uncommon. Glossy Black-Cockatoos have been recorded twice (pers. obs., R. Onfray pers. comm.) in Mistake State Forest and on both occasions they were feeding in Forest Oak (*Allocasuarina torulosa*).

Regional: Within the Urunga Management Area this species has been recorded from Bundagen Flora Reserve (Forestry Commission of NSW 1992), and is expected in Way Way State Forest (Milledge 1991). It occurs on private property near Way Way State Forest regularly (J. Parkins pers. comm.) The Glossy Black-Cockatoo has been recorded in both the Taree and Wingham Management Areas (York and Shields 1992, Forestry Commission of NSW internal file).

State-wide: Northern New South Wales is the stronghold of this species. Within in this area they are scarce to locally common (Forshaw 1981). Elsewhere uncommon. A vulnerable and rare species.

The Glossy Black-Cockatoo is associated with *Allocasuarina* and *Casuarina* spp.in the following habitats: dense mountain forests, temperate rainforests, coastal and dry woodlands (Pizzey 1980, Forshaw 1989). Nesting occurs in hollows in either dead or live trees and Blackbutt (*Eucalyptus pilularis*) is known to be used as a nest tree (Forshaw 1981). This species inhabits eastern Australia from central Queensland to eastern Victoria (Forshaw 1981).

The likely effect of the proposed operation on the species:

Local: Mistake State Forest consists of 9 620 ha of forest and of this area 6 800 ha is considered suitable for wood production (Forestry Commission of NSW 1991). Although there is no measure of the distribution of Forest Oak through this forest, from inspections made during June 1992 this species is widely distributed in Mistake State Forest. Under the current logging proposal there will be a reduction in the number of potential nest sites and cause some depletion of feeding sites. Where present in a stand forest oak regenerates prolifically following logging. At present there are no measures aimed directly at ameliorating the impacts of this proposal on the Glossy Black-Cockatoo apart from the retention and recruitment of habitat trees. Impact on the population over Mistake State Forest may be signficant in the medium term (6 months to 5 years). No long term effect.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

The following proposed general wildlife management prescriptions will aid in mitigating the effect of the proposed logging operation on the Glossy Black-Cockatoo:

- maintain a minimum of three suitable habitat trees per hectare;
- provision for retaining future habitat trees;
- modified harvesting in filter strips;
- exclude logging from excessively steep terrain (slope >35);
  and
- exclude logging from non-productive forest.

This species is capable of utilising logged forest (York and Shields 1992) but would only remain in logged areas if suitable stands of *Allocasuarina* spp. and nest trees are retained. As the period after logging increases the forest will regenerate at least suitable food sources for the Glossy Black-Cockatoo in the short term. Suitable hollows may not be available for possibly as long as 150 years (Mackowski 1984).

Sooty Owl
Abundance/conservation status

Local: Unknown.

Regional: Sooty Owls have been recorded in the Urunga Management Area from Way Way (Milledge 1991) and Bellinger River (Forestry Commission of NSW 1992) State Forests. This species has also been recorded in the Wingham Management Area (York and Shields 1992).

State-wide: Uncommon. A vulnerable and rare species.

The Sooty Owl is found on, and east of the Great Dividing Range in eastern Australia from southern Queensland to southern Victoria (Pizzey 1980). Blakers *et al.* (1984) recorded the Sooty Owl inhabiting pockets of rainforest and wet sclerophyll forest where it roosts and nests in hollows in the trunks of trees. The Sooty Owl's food includes terrestrial mammals and occasionally aboreal mammals and birds.

The likely effect of the proposed operation on the species:

Local: The proposed operation will modify the wet sclerophyll portion of the Sooty Owl's habitat. This modification would reduce the number of potential roosting and nesting trees and cause some depletion of the food resource. At present the effect on this species in Mistake State Forest is not fully known as this species has not been confirmed as a resident in this forest. If present impact may be significant in the medium term (6 months to 5 years). No long term effect.

Regional: Not significant.

NSW: Not significant.

Species: Not significant.

However, as this species is also a rainforest dweller the effect of the proposed operation on roosting and nesting habitat will be ameliorated by the following proposed management prescriptions:

- rainforest is excluded from logging;
- rainforest edges are protected from disturbance as any hardwood trees that could be felled and would cause damage to the rainforest are retained;
- retain three habitat trees per hectare; and
- provision will be made for the recruitment of future habitat trees.

Little information is available on the ability of the Sooty Owl to recolonise logged areas. However, field work in Mount Royal State Forest located Sooty Owls in areas that had previously been logged (pers. obs., Shields *et al.* 1992). It has been recorded in logged areas on surveys for the Glen Innes, Tenterfield and Dorrigo EIS surveys (Kavanagh, pers. comm).

Rufous Scrub-bird

Abundance/conservation status

Local: Unknown. Between 40 and 170 ha of suitable habitat in the vicinity of Bowra Sugarloaf (Binns 1988, Milledge 1988 and Forestry Commission of NSW 1991). One unconfirmed sighting reported by Milledge (1988).

Regional: This species has been recorded from a number of locations within the region. Including Killiekrankie Flora Reserve (Oakes S.F.) (Forestry Commission of NSW 1992) , Banda Banda Flora Reserve (Mount Boss S.F.), Mount Boss State Forest (Forestry Commission File No. 1579), Werrikimbe and New England National Parks (Forestry Commission of NSW unpubl. data).

NSW: An uncommon bird inhabiting the eastern side of the Great Dividing Range. A vulnerable and rare species.

The Rufous Scrub-bird is found from south-east Queensland to the Barrington Tops National Park in New South Wales (Pizzey 1980). The preferred habitat of this bird is dense undergrowth in rainforest and adjacent eucalypt forest (Pizzey, 1980 and Blakers *et al.* 1984). The habitat of the Rufous Scrub-bird is considered to be an intermediate successional stage resulting from disturbance due to fire or opening of the canopy (Ferrier 1985). This disturbance produces an extremely dense cover 2-50cm above the ground and a moderate cover 50-100cm above the ground (Ferrier 1985).

Although this species is currently unconfirmed for Mistake State Forest the 40 ha of suitable habitat (rainforest above 700 metres) (Forestry Commission of NSW 1991) will be excluded

from logging as logging is excluded from all rainforest in Mistake S.F. (Forestry Commission of NSW 1991). There is evidence that the Rufous Scrub-bird can recover from selective logging (50% canopy retention) in rainforest, but logging in eucalypt forest where Rufous Scrub-birds have territories may be detrimental (Ferrier 1985). Preferred Management Priority 1.1.7 Special Emphasis Flora and Fauna protection of Rufous Scrub-bird territories in the Wauchope district appears to have successfully protected known territories. Although no surveys of territories currently protected has been undertaken work being carried out for the Wauchope EIS has located Rufous Scrub-birds at a number of locations within Mount Boss S.F. Some of the observations made correspond to areas protected by Preferred Management Priority and others are new sites.

The likely effect of the proposed operation on the species (if present):

Local: Not significant if known territories protected.

Regional: As above.

State-wide: As above.

Species: As above.

Tiger Quoll
Abundance/conservation status

Local: Unconfirmed sightings along Hanging Rock Road and South Creek (Milledge 1988).

Regional: Recorded from Bellinger River and Irishman (Ringwood Flora Reserve) State Forests (Forestry Commission of NSW 1992). Also recorded from the Taree and Wingham Management Areas, (York 1992, Forestry Commission of NSW unpubl.data), Coffs Harbour municipal area (Mackowski, pers. comm.), and around established camps at Wauchope (Shields pers. comm.).

NSW: Uncommon, eastern coast and tablelands . A vulnerable and rare
species.

This mostly nocturnal mammal inhabits sclerophyll forests and rainforests from southern Queensland to Tasmania. Tiger Quolls take a wide range of prey items including: birds, terrestrial and aboreal mammals, reptiles and arthropods (Strahan 1983).

The likely effect of the proposed operation on the species:

Local: Logging could result in the loss of suitable habitat for the Tiger Quolls and the habitat of the Tiger Quoll's prey. It is possible that this species is also suffering from competition from feral cats and foxes (Strahan 1984) both of which have been recorded in Mistake State Forest (Forestry Commission of NSW 1991, pers. obs.).

However, this species should survive in Mistake State Forest as substantial areas of forest will remain unlogged (see unlogged hardwood forest map). Tiger Quolls are known to exploit environments modified by man and have also been recorded in old logged forest in Mount Royal State Forest (pers. obs.).

A significant impact could occur in the short term (2-3 months during and immediately post logging) from disturbance of individuals. Given the management prescriptions listed below, and the scale of operations, the effect would not be significant for the entirety of Mistake State Forest. Not significant in the long term.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

The following proposed management prescriptions will ameliorate the effect of the proposed logging operation on the Tiger Quoll:

- exclude logging from rainforest;
- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive forest; and
- modified logging in filter strips.

Brush-tailed Phascogale

Abundance/conservation status

Local: Unconfirmed sightings along South Creek (Milledge 1988).

Regional: The Brush-tailed Phascogale has been recorded in Bellinger River State Forest (Forestry Commission of NSW 1992) and in Way Way State Forest (Shields pers. comm.). This species has also been recorded in the Taree and Wingham Management Areas (Forestry Commission of NSW internal file).

State-wide: Uncommon. A vulnerable and rare species.

The Brush-tailed Phascogale is found in all continental states of Australia. A large number of habitats are utilised by this species but its favoured habitat is open, dry sclerophyll forest on ridges up to 600 metres above sea level (Strahan

1983). Roost sites are hollows in trees from which they emerge at night to forage upon arthropods and small vertebrates.

The likely effect of the proposed operation on the species:

Local: The Brush-tailed Phascogale is sensitive to land clearance, but is known to maintain populations in disturbed and regrowth forest. Under the proposed operation, nest trees would be lost, and individual animals disturbed. Within logging areas, there could be a significant effect on local populations. Given the management prescriptions listed below, and the scale of operations, the effect would not be significant for the entirety of Mistake State Forest.

Regional: Not significant.

State-wide: Not significant.

Management prescriptions which will ameliorate the effect of logging on this species if it is located are:

- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive areas of hardwood;
- retain three habitat trees per hectare; and
- provision for recruitment of future habitat trees.

Information regarding the ability of this species to recover from the proposed operation is unavailable. However, observations of this species in logged dry sclerophyll forest have been made in Mount Royal State Forest (Shields *et al.* 1992) and Candole State Forest (pers. obs.).

Yellow-bellied Glider
Abundance/conservation status

Local: This species has been recorded in a logged area of the Jaspers Creek catchment (Binns 1988).

Regional: Yellow-bellied Gliders have been recorded during surveys conducted at Way Way (Milledge 1991) and Pine Creek / Newry State Forests (Forestry Commission of NSW 1992). This species has also been recorded in the Wingham Management Area (York 1992). They are wide-spread and relatively common in northern New South Wales (Kavanagh, *in litt.*).

State-wide: Moderately common in the right habitat along the north and south coasts and tablelands. A vulnerable and rare species.

The Yellow-bellied Glider is found from northern Queensland to southern and western Victoria. This glider has a diverse diet consisting of nectar, pollen, sap, honeydew and insects (Strahan 1983) which means the habitat of this species must contain a wide variety of eucalypts (*Eucalyptus* spp.). Yellow-bellied Gliders live in groups of up to five animals and can range over as much as 50 hectares (Lacey *et al.* 1990). Yellow-bellied Gliders require hollows for shelter and breeding.

The likely effect of the proposed operation on the species:

Local: Within logging areas the proposed operation could significantly effect this species by reducing the tree species diversity required to supply the necessary food requirements for this species. Logging could also significantly effect this species by removing trees which are utilised as den sites.

Regional: Not significant.

State-wide: Not significant.

The effect of the logging operation will be mitigated by the following proposed management prescriptions for Mistake State Forest:

- modified logging prescriptions in filter strips;
- retention of 3 habitat trees per hectare; and
- provision for recruitment of future habitat trees.

Recovery of this species will be determined by the amount of suitable habitat retained within their territories. If food and den trees are lost then recovery will be a slow and lengthy process. In other areas (Wingham Management Area) this species has been found in moist gullies (York 1992) and as the only record for Mistake State Forest is along Jaspers Creek similar management may assist in the recovery of this species.

Long-nosed Potoroo
Abundance/conservation status

Local: Unknown. Expected in Mistake State Forest (Milledge 1988).

Regional: Unknown, but has been recorded in the Wingham Management
Area (York 1992) and is expected in Way Way State Forest (Milledge 1991).

State-wide: Patchy distribution along the coast. A vulnerable and rare species.

The Long-nosed Potoroo is found in coastal heath and dry and wet sclerophyll forest from southern Queensland to Tasmania (Strahan 1983). An important component of the Potoroo's habitat is thick ground cover where it feeds on roots, tubers, fungi, and larvae by digging holes in the soil.

The likely effect of the proposed operation on the species:

Local: The proposed operation will probably displace individuals in the areas where operations are undertaken. This species is also strongly dependent on a thick understorey consisting of either grass or shrubs and such habitat will be destroyed during logging and control burning operations. The effect could be significantly negative in the short term (3 months - 2 years post operation), after which recovery should ensue and habitat values may be significantly increased.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

Loss of habitat will be mitigated by the following proposed management prescriptions:

- modified logging prescriptions in filter strips;
- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive hardwood forest;
- exclude logging from rainforest; and
- proposed burning regime will effect only 1% of the total area of Mistake State Forest.

Information regarding recolonisation of areas after logging is unavailable for the north coast of New South Wales. In Tasmania as habitat recovered from logging and developed a dense understorey so too did the population of Long-nosed Potoroos.

Parma Wallaby
Abundance/conservation status

Local: One unconfirmed sighting on Bowra Sugarloaf made by Milledge.(1988).

Regional: Widespread but uncommon; has been recorded in the Wingham Management Area (York 1992).

NSW: Restricted distribution between Gibraltar Range and Watagan Mountains in north-eastern NSW. A vulnerable and rare species.

The Parma Wallaby prefers wet sclerophyll forest with a thick, shrubby understorey (particularly tussock-grass) with grassy patches (Strahan 1983). Has also been recorded from dry forests and occasionally rainforest.

The likely effect of the proposed operation on the species:

Local: This species may initially be displaced by logging in the wet and dry sclerophyll forest types. The proposed burning regime may result in the destruction of thick understorey requirement in the Parma Wallaby's habitat. This would also result in some individuals being displaced. Within logged or burnt areas the impact may be significant in the short term (2-6 months). No significant long term effect.

Regional: Not significant.

NSW: Not significant.

Species: Not significant.

The proposed management prescriptions for Mistake State Forest which will help ameliorate the effect of logging are:

- modified logging prescriptions in filter strips;
- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive hardwood forest;
- exclude logging from rainforest; and
- proposed burning regime will effect only 1% of the total area of Mistake State Forest.

After intial displacement of individuals regenerating forest should provide habitat in the medium to long term. Evidence for this is provided by York (1992) where in the Wingham Management Area Parma Wallabys were recorded most frequently in both logged and unlogged moist forest types.

Koala
Abundance/conservation status

Local: Unknown. Can be difficult to detect (Braithwaite 1991).

Regional: Has been recorded during surveys in Pine Creek/Newry, Irishman (Ringwood Flora Reserve) and Bellinger River State Forests (Forestry Commission of NSW 1992). Also recorded in Way Way State Forest (Milledge 1988) and the Taree and Wingham Management Areas (Forestry Commission of NSW internal file, York 1992).

State-wide: Moderately common along the tablelands and coast with some colonies west of the Great Dividing Range. A vulnerable and rare species.

The Koala is found from the tropics to the cool-temperate regions but is restricted to those areas where suitable food trees are found (Strahan 1983). In Mistake State Forest Blackbutt (*Eucalyptus pilularis*), Tallowood (*E. microcorys*), Grey Gum (*E. propinqua*), and Sydney Blue Gum (*E. saligna*) would provide the Koala with its primary food source (Pahl *et al.* 1990).

The likely effect of the proposed operation on the species:

Local: Braithwaite (1991) has found that Koalas are usually located in eucalypt woodland rather then forest and usually where there is four or more eucalypt species. If Koalas are found in Mistake State Forest then the proposed logging operation would have a significant effect only if a large number of food trees were removed. After the initial disturbance it is likely that Koalas will continue to exploit the remaining habitat. Within logging areas the total effect may be significant in the medium term (up to 5 years). Long term effect would not be significant.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

The following proposed management prescriptions will mitigate the effect of the logging proposal:

- retain three habitat trees per hectare;
- provision for recruitment of future habitat trees;
- exclude logging from non-productive hardwood;
- exclude logging from excessively steep terrain (slope >35);
  and
- modified harvesting prescriptions for filter strips.

Additional management prescriptions which have been developed since the release of the Mistake State Forest EIS will also apply. These are:

Where a Koala has been discovered in advance of, or during logging or burning and brought to the attention of forest officers, the tree will be retained together with all other trees within a radius of 100 metres pending an inspection by a forest officer to determine whether or not other koalas are present in the vicinity. If koalas are present, operations will not commence or continue in the excluded area until expert advice is obtained on further action.

Actions by forestry foreman in the Urunga district will also ameliorate the effect of the proposed logging. Parkins (1991) states that he currently directs that trees containing evidence of Koala habitation be not felled or disturbed. These actions are likely to protect individuals.

As Koalas are capable of using habitats modified by man it is likely that Koalas will recover from a logging operation in Mistake State Forest.

Yellow-bellied Sheathtail-bat
Abundance/conservation status

Local: Unknown.

Regional: Richards (1992) recorded this species during surveys in the Wingham Management Area were he described it as locally rare. Milledge (1991) expected this species to occur in Way Way State Forest.

State-wide: Eastern half of the state. A vulnerable and rare species.

This species is wide spread over Australia and has been recorded from forests, mallee and open country. In the forest situation the Yellow-bellied Sheathtail-bat feeds above the canopy. In northern Australia this species is known to roost in tree hollows but roost sites are unknown for the mid-north coast of New South Wales (Richards 1992).

The likely effect of the proposed operation on the species:

Local: The effects of the proposed logging operation will be in the form of some lost canopy area which will reduce the amount of canopy resource for foraging. If the Yellow-bellied Sheathtail-bat does roost in tree hollows in Mistake State Forest then it is also likely that there will be some loss of roost trees. Within logging areas there may be a significant short term (2-6 months) effect.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

The effect of the logging operation will be mitigated by the following management prescriptions:

- retention of three habitat trees per hectare;
- provision for recruitment of future habitat trees; and
- modified harvesting for filter strips.

This bat is likely to recover well from a logging operation as long as roost trees are protected. Richards (1992) found Yellow-bellied Sheathtail-bats utilising logged moist hardwood types. However, he found no evidence of this bat utilising dry hardwood types or rainforest.

White-striped Mastiff-bat
Abundance/conservation status

Local: Unknown.

Regional: Richards (1992) recorded this species during surveys in the Wingham Management Area were he described it as locally common. Milledge (1991) expected this species to occur in Way Way State Forest.

State-wide: This bat is found throughout New South Wales. A vulnerable and rare species.

The White-striped Mastiff-bat is found across a diverse range of habitats in Australia being absent only from the tropics. Small groups roost in tree hollows while individuals may be found under lose bark or in dead stumps (Strahan 1983). This insectivorous bat can hunt both above and below the canopy.

The likely effect of the proposed operation on the species:

Local: The proposed logging operation will remove roost trees and some canopy, but the operation should not have a negative effect on this bat's status within Mistake State Forest. Not significant.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

Management prescriptions which should mitigate any effect on this species are:

- exclude logging from rainforest;
- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive forest;
- modified harvesting prescriptions for filter strips;
- retain three habitat trees per hectare; and
- provision for future habitat trees.

This species should recover from logging particularly if roost sites are protected. Richards (1992) found that this species utilised both logged and unlogged moist hardwood and rainforest types with a movement into dry forest types after logging.

Eastern Little Mastiff-bat
Abundance/conservation status

Local: Unknown.

Regional: Richards (1992) recorded this species during surveys in the Wingham Management Area were he described it as locally rare. Milledge (1991) expected this species to occur in Way Way State Forest.

State-wide: Inhabits the north coast and ranges of New South Wales. A vulnerable and rare species.

The Eastern Little Mastiff-bat is restricted to north coast of New South Wales and the coast of southern Queensland. The habitat of this bat is sclerophyll forest and woodland. This bat forages on insects above the canopy and in clearings at the edge of the forest (Strahan 1983). Roost sites include tree hollows and loose bark.

The likely effect of the proposed operation on the species:

Local: Due to the habitat requirements of this bat it is unlikely that the proposed logging operation will have a significant affect on its status particularly if roost trees are protected.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

Other management prescriptions which will protect this bat are:

- exclude logging from rainforest;
- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive forest;
- retain three habitat trees per hectare;
- provision for recruitment of future habitat trees; and
- modified harvesting prescriptions in filter strips.

As this species forages in openings in the forest logging will open up the forest and provide additional foraging sites. Therefore recovery after logging should be possible as long as roost sites are available. Richards (1992) showed that logging of dry hardwood forest types had a positive affect on this species status.

Common Bent-wing Bat
Abundance/conservation status

Local: Unknown.

Regional: Richards (1992) recorded this species during surveys in the Wingham Management Area were he described it as locally common. Milledge (1991) expected this species to occur in Way Way State Forest.

State-wide: Recorded from the coast and tablelands. A vulnerable and rare species.

This bat has a disjunct distribution with one subspecies being found in northern Australia and the second being found from Cape York south through eastern Queensland, New South Wales, Victoria and South Australia. This species roosts in caves, old mines and other human constructions. This species utilises well timbered valleys where it forages for small insects above the canopy (Strahan 1983).

The likely effect of the proposed operation on the species:

Local: Logging of Mistake State Forest will result in a loss of foraging habitat, this bat will travel large distances from roost sites to foraging sites. Possibly of more importance is the disturbance of roost sites, particularly during the breeding period. At present no roost sites are known in Mistake State Forest. Within logging areas there may be a significant impact in the short term (2-6 months).

Regional: Not significant.

State-wide: Not significant.

Species. Not significant.

The following management prescriptions should help to ameliorate any effect on the foraging habitat of this bat:

- exclude logging from rainforest;
- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive forest;
- modified harvesting prescriptions for filter strips;
- retain three habitat trees per hectare; and
- provision for future habitat trees.

This species has been recorded using logged forest in the Wingham Management Area (Richards 1992) but the critical factor for this species to recover from a logging operation appears to be the non-disturbance of roost and nursery sites.

Little Bent-wing Bat

Abundance/conservation status

Local: Unknown.

Regional: Richards (1992) recorded this species as being locally common in the Wingham Management Area. Milledge (1991) expected this species to occur in Way Way State Forest.

State-wide: Recorded from the north coast of New South Wales. A vulnerable and rare species.

The Little Bent-wing Bat is found in north-eastern Australia with its distribution in the south of this range being restricted to the coast. This insectivorous bat forages beneath the canopy of well timbered habitats and roosts during the day in caves and tunnels (Strahan 1983). Frequently associated with the Common Bent-wing Bat in New South Wales.

The likely effect of the proposed operation on the species:

Local: It is unlikely that the proposed logging operation will have a significant effect on this species as Richards (1992) has shown that this bat exploits both logged and unlogged forest.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

The following management prescriptions will help mitigate any effect on the foraging habitat of this bat:

- exclude logging from rainforest;
- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive forest;
- modified harvesting prescriptions for filter strips;

- retain three habitat trees per hectare; and
- provision for future habitat trees.

This species should recover from the proposed logging operation provided that any roost sites that may be located are given the appropriate protection.

Fishing Bat
Abundance/conservation status

Local: Unknown.

Regional: Richards (1992) recorded this species as being locally rare in the Wingham Management Area. Milledge (1991) expected this species to occur in Way Way State Forest.

State-wide: This species has been recorded from the coast and tablelands of New South Wales. A vulnerable and rare species.

The Fishing Bat inhabits areas across northern, north-eastern and south-eastern Australia. This bat roosts in colonies in caves, mines and beneath human constructions. Males roost alone. These colonies usually occur near water as this species forages on aquatic insects (Strahan 1983).

Local: The proposed logging operation is unlikely to have a significant effect on this species, because neither of this bat's ecological requirements will be disturbed. At present roost sites are unknown in Mistake State Forest and most creeks in the forest do not contain water during dry periods.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

Proposed management prescriptions which will ameliorate the effect of the proposed logging on both water quality and possible roost sites are:

- exclude logging from rainforest;
- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive forest;
- constrain the movement of machinery near streams;
- specifying the location of tracks, snig tracks and log dumps away from water courses;
- prohibiting the use of tracks when run-off occurs from the

track surface during periods of wet weather;
- retaining filter strips of undisturbed vegetation along defined streams; and
- providing drainage works to direct run-off onto undisturbed vegetation.

Richards (1992) recorded this species utilising logged dry and moist hardwood forest types. So this species should be able to recover from a logging operation provided both roost sites and water bodies are protected.

Great Pipistrelle
Abundance/conservation status

Local: Unknown.

Regional: Milledge (1991) expected this bat to occur in Way Way State Forest and it is expected to occur in the Wingham Management Area (Forestry Commission of NSW internal file).

State-wide: This species has been recorded from the coast and tablelands in New South Wales. A vulnerable and rare species.

The Great Pipistrelle inhabits the south-eastern (including Tasmainia) and south-western parts of Australia. This species has been recorded roosting in caves, tree hollows and abandoned buildings and is considered to be insectivorous (Strahan 1983).

The likely effect of the proposed operation on the species:

Local: The proposed logging operation will remove trees suitable for roosting in by this species. Other effects on this species are unknown due to the lack of knowledge available on this species. Unknown local impact.

Regional: Not significant.

State-wide: Not significant.

Species: Not significant.

The following management prescriptions should help to mitigate the effect on this bat:

- exclude logging from rainforest;
- exclude logging from excessively steep terrain (slope >35);
- exclude logging from non-productive forest;
- modified harvesting prescriptions for filter strips;
- retain three habitat trees per hectare; and
- provision for future habitat trees.

It is possible this species will recover from a logging operation if roost trees are maintained. However, due to the lack of information on this species biology there may be other factors which may need to be considered.

2.4 Habitat Changes and Regeneration

Mistake State Forest is 9 620 hectares in area and of this 6 800 hectares is considered to be accessible for wood production. This 6 800 hectares consists of the following:

Predominantly mature/overmature trees	1 800 ha
Mixed sizes	3 500 ha
Regeneration areas	1 500 ha

These figures are from the Mistake S.F. EIS (Forestry Commission of NSW 1991). Table 4 (Forestry Commission of NSW 1991) shows the area of each forest type found within Mistake S.F. but there is no indication of how much of each forest type will be logged or retained except for unlogged forest. Varying amounts of each of the hardwood forest types found in Mistake State Forest are reserved within the region (the region under consideration in this report extends from Taree to Coffs Harbour). Table 1 shows the areas of hardwood forest type reserved within the region (including National Parks, Nature Reserves, and reserves in State Forests) and areas which will remain unlogged in Mistake State Forest. Table 2 shows the area reserved in each of these land use categories.

Table 1

Forest Type	Area Mistake S.F. (ha)	Unlogged Forest that is not part of proposal (ha)	Area Reserved* (ha)
37	3 569	77	3 087
47	368	12	5 658
53	2 810	154	4 924
62	1 895	88	369
163	48	8	9 594

* Figures from Truyard 1992.

From these figures the only hardwood forest type which is poorly reserved in relation to the area found in Mistake State Forest is Forest Type 62. This forest type contains the following dominant eucalypts Grey Gum (*E. propinqua*), Grey Ironbark (*E. paniculata*) and White Mahogany (*E. acmenioides*).

Table 2

Land Status	Forest Type (ha) 37	47	53	62	163
National Park	2 800	4 697	4 331	205	8 013
Nature Reserve	11	230	81	0	394
State Forest Reserve	266	731	512	164	1 187

Two aspects of habitat which would be considered critical will be reduced during the proposed operation. They are the number of hollows available to hollow dependent fauna and the amount of canopy cover. The number of hollows available in those areas which are logged could be reduced for as long as 150 years. This is how long Mackowski (1984) calculated that it would take a Blackbutt to form a large hollow. Smaller hollows would begin forming before this but would only be suitable for smaller hollow dependent fauna. As the study conducted by Mackowski (1984) included a site at Black Scrub which is approximately 30 kilometrtes north-west of Mistake State Forest and 37% of Mistake State Forest is forest typed as Dry Blackbutt (Forestry Commission of NSW 1991), it is reasonable to assume that a similar time frame for hollow formation would apply for Mistake State Forest. Although the hollow resource will be depleted it will not be eliminated as large areas of the forest will remain unlogged and a minimum of three habitat trees per hectare will be retained in logged areas.

The decrease in canopy cover is a direct result of logging and could be reduced for as long as ten years. This would effect those species dependent on the foilage of the canopy for food resources. However as the forest has been opened up it is likely that there will be an increase in growth as trees regenerate providing food for such animals as Koalas and numerous insectivorous bird species.

No regeneration programs are proposed for Mistake State Forest other than natural regeneration. Eucalypt seedlings would only be planted in areas where necessary to supplement natural stocking and rehabilitate log dumps and would rarely be more than five hectares in any one year (Forestry Commission of NSW 1991).

2.5 Barriers and Corridors

No barriers to fauna movements will exist in Mistake State Forest as a continuous cover of logged and unlogged forest will link Mistake State Forest to surrounding areas of forest. Large areas of Mistake State Forest are unsuitable for logging (see unlogged hardwood forests map) and along with the retained filter strips will form quite extensive corridors allowing fauna movements not only within Mistake State Forest but also into adjoining areas of forest which stretch form the Dorrigo Plateau to the Wingham Management Area.

2.6 Population Health

All individuals observed during the authors visit were healthy. Neither Binns (1991) nor Milledge (1991) indicated that any individuals observed were suffering ill health.

2.7 Recovery Plans

There are no recovery plans currently being considered by the Forestry Commission of New South Wales for any of the Schedule 12 species found or expected to be found in Mistake State Forest. However, Kennedy (1991) has suggested a general management plan for the following species: Tiger Quoll, Brush-tailed Phascogale, Yellow-bellied Glider and Long-nosed Potoroo. There is also a state plan of management for the Koala and Australian National Parks and Wildlife Service are considering producing a management plan for the Parma Wallaby. To produce comprehensive recovery plans the biology of these species needs to be fully understood.

2.8 On-going Monitoring

The distribution and ecology of the above Schedule 12 species will form part of any on-going monitoring program established in Mistake State Forest. The Environmental Impact Statement planned for the Urunga-Coffs Harbour Management Area will constitute an intensive form of monitoring. Sites established in the EIS process can be used for further monitoring programs.

3. Discussion

3.1 Endangered Fauna

Management prescriptions to protect the habitat of endangered species will assist in ameliorating the impacts and will be implemented. Due to lack of before and after logging data on populations, the ultimate effect remains largely unknown for some species; these species are the Glossy Black-Cockatoo, Brush-tailed Phascogale, Yellow-bellied Glider and Great Pipistrelle. Information from other areas (eg. Wingham Management Area), indicates that these species can survive in altered forest environments. Also a problem is the lack of knowledge regarding the use of the forest by some species (eg. Glossy Black-Cockatoo). This should be rectified when the Urunga Environmental Impact Statement (which will include Mistake State Forest) is completed. Research results will be available at that time on the specific impacts of logging in these forests.

3.2 Protected Fauna

Observations made by Binns (1988), Milledge (1988) and in June 1992 found no protected fauna species restricted to either logged or unlogged forest.

Clancy (1992) recorded no species of herpetofauna that was totally dependent on unlogged forest for the Wingham Management Area. At present based on current knowledge and species which have been identifed in Mistake State Forest a similar situation is expected.

From work conducted by York and Shields (1992) and Shields et al. (1992) 16 diurnal bird species are considered to be forest dependent. Fifteen of these species (Grey Goshawk, Wonga Pigeon, Brown Cuckoo-dove, Glossy Black-Cockatoo, Australian King Parrot, Cicadabird, White's Thrush, Rose Robin, Crested Shrike-tit, Rufous Fantail, Logrunner, Spotted Quail Thrush, Red-browed Treecreeper and Regent Bowerbird) have been recorded for Mistake State Forest. From observations made during June 1992 five of these species (Wonga Pigeon, Brown Cuckoo-dove, Glossy Black-Cockatoo, Spotted Quail-thrush and Red-browed Treecreeper) were utilising both logged and unlogged forest.

For mammals the only species which is sensitive to logging is the Greater Glider. Greater Gliders require both a canopy resource for foraging and a hollows resource for denning which requires that habitat trees be retained during the logging operation.

Richards (1992) showed that in the Wingham Management Area logging affected bats both positively and negatively but that there were no individual species lost from the forest due to logging.

3.3 Feral Animals

Four species (Dog, Fox, Cat and Cow) of feral animal have been recorded in Mistake State Forest. Although both foxes and dogs were observed (pers. obs.) using roads to travel through Mistake State Forest the impact on the fauna is unknown. As no further roads are planned for construction and all roading in the future will consist of temporary logging tracks the spread of feral animals in Mistake State Forest is unlikely to increase.

3.4 Fire

The proposed burning regime for Mistake State Forest is unlikely to significantly affect fauna species as only one percent (100 ha) of the forest is planned to be burnt each year. Some individuals may be displaced for short periods during and directly after the burn but individual species are unlikely to become extinct in Mistake State Forest because of this fire management prescription. If a mosaic of burnt patches is created in the forest then there may be an increase in the number of species using these habitats.

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EDUCATION:

1979	Higher School Certificate: NSW
1980-82	Bachelor of Science: University of Sydney
1984	Master of Science Qualifying Course: University of Sydney.

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Royal Australasian Ornithologists Union
Australian Bird Study Association

PROFESSIONAL EXPERIENCE:

1992

NSW National Parks Association

Prepare a submission for a national park nomination in the Parkes/Peak Hill districts.

Planright Pty Ltd.

Assess the environmental impact the construction of McKewen/Brewer Road Community Drain will have on the McKewen/Brewer Road catchment, Kyabram.

Goulburn Valley Irrigation Services Pty Ltd.

Assess the environmental impact the construction of Comma No. 1 Community Drain will have on the Comma No. 1 catchment, Kyabram.

1991

Goulburn Valley Irrigation Services Pty Ltd.

Assess the environmental impact the construction of a community drain would have on terrestrial, riparian and aquatic communities, landscape values and cultural values within the drain's catchment.

Planright Pty Ltd.

Assess the environmental impact the construction of a community drain would have on terrestrial, values and cultural values within the drain's catchment.

Forestry Commission of NSW.

1. Conduct bird and aboreal mammal surveys within Mount Royal State Forest as part of the MountRoyal EIS.

2. As part of a team survey forest areas within the Glen Innes, Grafton, Dorrigo and Coffs Harbour forestry management areas for nocturnal birds and mammals.

3. Conduct bird surveys within the Wingham Management Area as par of the Wingham old growth forest EIS.

4. Conduct bird surveys and collect bird foraging information to assess the effect of different logging intensities on this fauna group 7 years after logging.

Department of Conservation and Environment.

1. Collate information from a questionaire sent to landholders in north-east and northern Victoria asking for information regarding Bush Thick-knees. Conduct on farm inspections to assess habitat.

2. Conduct a survey to map and assess the value of remnant woodland on the flood plain south of Barmah State Forest. This was a Save The Bush project with its main aim to produce a management strategy for the remaining vegetation.

3. Locate nesting colonies of Superb Parrots within Barmah State Forest.

1990

Department of Conservation and Environment.

1. Conduct a survey to further document the distribution and habitat utilisation of the Regent Honeyeater.

2. Survey the Benalla Region for the presence of Regent Honeyeaters and map areas of suitable habitat.

3. Locate and map foraging habitat of the Superb Parrot surrounding Barmah State Forest. Locate and map breeding sites within Barmah State Forest.

Forestry Commission of NSW.

Conduct bird and reptile counts to produce a data base to examine the effect of logging and burning on these fauna groups.

University of Sydney.

Locate transects through selected areas of wetland to assess damage to the wetland and assess the use of these areas by the avifauna.

1989

Department of Conservation and Environment.

Conduct a survey to further document the distribution and habitat utilisation of the Regent Honeyeater in NSW and Victoria.

Forestry Commission of NSW.

1. Conduct bird counts to investigate the effect of different logging intensities on bird populations in tableland forest types in south-east NSW.

2. Conduct bird and reptile counts to investigate the effect of logging and burning on bird and reptile populations.

1988

Department of Conservation, Forests and Lands.

1. Produce a management strategy for the conservation of the Regent Parrot in Victoria.

2. Conduct a survey into the distribution, habitat utilisation, breeding requirements and diet of Regent Honeyeater in NSW and Victoria.

University of Sydney.

Conduct invertebrate counts, list avifauna species and assess damage to wetlands as part of a team conducting an EIS into the proposed development of an old persons home on wetlands at Davistown.

Forestry Commission of NSW.

1. Conduct bird and reptile counts to examine the effect of logging and burning on bird and reptile populations.

2. Conduct bird counts as a continuation of a study investigating the effect of different logging intensities on bird populations in tableland forest types.

1987

NSW National Parks and Wildlife Service.

1. Conduct a survey into the breeding requirements of the Superb Parrot in the Riverina and South-west Slopes districts of NSW and northern Victoria. A publication produced by Australian National Parks and Wildlife Service resulted from this study.

2. Prepare management plans to protect the habitat and conserve the Superb and Regent Parrot. The management plan for the Superb Parrot covered both NSW and Victoria, while the plan for the Regent Parrot covered only NSW.

Forestry Commission of NSW.

1. Conduct bird and reptile counts to produce a data base examining the effect of logging and burning on these fauna groups.

2. Conduct bird counts, aboreal marsupial counts and a vegetation survey to produce a data base to examine the effect of different logging intensities on these groups of animals and their habitat.

1986

NSW National Parks and Wildlife Service.

Conduct a survey into the breeding requirements of the Superb Parrot within the Riverina and South-west Slopes districts of NSW and northern Victoria. This work also involved determining the relationship between the local vegetation and the Superb Parrot.

1985

NSW National Parks and Wildlife Service.
Conduct a survey into the breeding requirements of the Superb Parrot within the Riverina district of NSW and northern Victoria. This work was supervised by a steering committee consisting of members from the Federal, NSW and Victorian Governments.

1984

Forestry Commission of NSW
Section 10 Labourer. Conduct bird counts and vegetation surveys to assess the effect of different logging intensities on bird populations.

1983

Forestry Commission of NSW.
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MISTAKE

Appendix 1

A list of fauna known or expected to occur in Mistake State Forest.

Occurrence

1. Known
2. Expected/Unconfirmed
3. Possible (from literature)

Habitat

1. Rainforest
2. Wet Sclerophyll Forest
3. Dry Sclerophyll Forest
4. Rocky Outcrops
5. Aquatic
6. Openings in Forest

Var. Various, not differentiated below, or else quite indiscriminate in selection of forest

Source

1. Mistake S.F. EIS (Forestry Commission of NSW 1991)
2. Affadavit by Milledge (1988)
3. Personal observations (Webster June, 1992)
4. Literature

SCIENTIFIC NAME	COMMON NAME	OCCURRENCE	HABITAT	SOURCE
Family LEPTODACTYLIDAE				
Adeloptus brevis	Tusked Frog	1	1,2,5	1
Crinia signifera	Common Eastern Froglet	1	1,2,3,5	1
Lechriodus fletcheri	Fletchers Frog	2	1,2,5	2
Limnodynastes peronii	Brown-striped Frog	1	5	1
Mixophyes fasciolatus	Great Barred Frog	1	1,2,5	1
Philoria sphagnicolus	Sphagnum Frog	1	1,2,5	1
Pseudophyrne coriacea	Red-backed Toadlet	1	2,3,5	1
Uperoleia laevigata		1	5	1
Family HYLIDAE				
Litoria barringtonensis	Mountain Stream Tree Frog	1	5	1
Litoria chloris	Red-eyed Tree Frog	1	1,2,5	1
Litoria fallax		1	5	1
Litoria lesueurii	Lesueur's Frog	1	1,2,5	1
Litoria peronii	Peron's Tree Frog	1	2,3,5	1
Litoria tyleri		1	5	1

SCIENTIFIC NAME	COMMON NAME	OCCURRENCE	HABITAT	SOURCE
REPTILES				
Family AGAMIDAE				
Hypsilurus spinipes	Southern Forest Dragon	2	1,2	2
Physignathus lesueurii	Eastern Water Dragon	1	5	1
Family VARANIDAE				
Varanus varius	Lace Monitor	1	1,2,3	1
Family SCINCIDAE				
Lampropholis delicata		1	1,2,3	1
Saiphos equalis		1	2,3	1
Sphenomorphus murrayi		1	1,2	1
Sphenomorphus quoyii	Eastern Water Skink	1	2,3,4,5	1
Tiliqua scincoies	Eastern Blue-tongued Lizard	1	2,3	1
Family BOIDAE				
Morelia spilota	Diamond & Carpet Pythons	1	1,2,3	1
Family COLUBRIDAE				
Boiga irregularis	Brown Tree Snake	1	1,2,4	1
Dendrelaphis punctulatus	Common Tree Snake	1	1,2,4	1
Family ELAPIDAE				
Acanthophis antarcticurs	Common Death Adder	1	1,2,3	1
Cryptophis nigrescens	Eastern Small-eyed Snake	1	1,2,3,4	1
Hemiaspis signata	Black-bellied Swamp Snake	1	4,5	1
Hoplocephalus stephensii	Stephen's Banded Snake	2	1,2	2
Pseudechis porphyriacus	Red-bellied Black Snake	1	2,3,5	1

SCIENTIFIC NAME	COMMON NAME	OCCURRENCE	HABITAT	SOURCE
BIRDS				
Aviceda subcristata	Pacific Baza	2	1	2
Accipter novaehollandiae	Grey Goshawk	1	1,2	1
Accipter fasciatus	Brown Goshawk	1	Var.	1
Family MEGAPODIIAE				
Alectura lathami	Australian Brush Turkey	1	1,2	1,3
Family PHASIANIDAE				
Coturnix sp.	Quail	1	3	3
Family COLUMBIDAE				
Ptilinopus magnificus	Wompoo Friut Dove	1	1	1
Lopholaimus antarcticus	Topknot Pigeon	1	1	1,3
Columba leucomela	White-headed Pigeon	1	1	1
Macropygia amboinensis	Brown Cuckoo-dove	1	1	1,3
Geopelia humeralis	Bar-shouldered Dove	1	6	1
Leucosarcia melanoleuca	Wonga Pigeon	1	Var.	1,3
Family CACATUIDAE				
Calyptorhynchus lathami	Glossy Black-Cockatoo	1*	2,3	3
Calyptorhynchus funereus	Yellow-tailed Black Cockatoo	1	1,3	1
Family POLYTELLIDAE				
Alisterus scapularis	King Parrot	1	1,2	1
Family PLATYCERCIDAE				
Platycercus elegans	Crimson Rosella	1	1,2,3	1,3
Family CUCULIDAE				
Cuculus variolosus	Brush Cuckoo	1	Var.	1
Cuculus pyrrhophanus	Fan-tailed Cuckoo	1	Var.	1,3
Eudynamys scolopacea	Koel	1	Var.	1
Family TYTONIDAE				
Tyto alba	Barn Owl	1	6	2
Tyto tenebricosa	Sooty Owl	2	2	2
Family PODARGIDAE				
Podargus strigoides	Tawny Frogmouth	1	2,3	3
Family CAPRIMULGIDAE				
Caprimulgus mystacalis	White-throated Night jar	1	3	1
Family APONIDAE				
Hirundapus caudactus	White-throated Needletail	1	6,Var.	1

Family ALCEDINIDAE				
Dacelo gigas	Laughing Kookaburra	1	3,6	1
Halcyon sancta	Sacred Kingfisher	1	3	1
Family PITTADAE				
Pitta versicolor	Noisy Pitta	1	1	1
Family MENURIDAE				
Menura novaehollandiae	Superb Lyrebird	1	1,2	1,3
Family ATRICHORNITHIDAE				
Atrichornis rufescens	Rufous Scrub-bird	2	1	1
Family CAMPEPHAGIDAE				
Coracina novaehollandiae	Black-faced Cuckoo-Shrike	1	3	1,3
Coracina tenuirostris	Cicada-bird	1	3	1
Family TURDIDAE				
Zoothera dauma	White's Thrush	1	1,2	1
Family MUSCICAPIDAE				
Petroica rosea	Rose Robin	1	1,2	1
Eopsaltria australis	Eastern Yellow Robin	1	Var.	1,3
Tregellasia capito	Pale Yellow Robin	1	1,2	1
Falcunculus frontatus	Crested Shrike-tit	1	2,3	1
Pachycephala pectoralis	Golden Whistler	1	2,3	1,3
Colluricincla harmonica	Grey Shrike-thrush	1	Var.	1,3
Monarcha melanopsis	Black-faced Monaroh	1	1,2	1
Monarcha trivirgatus	Spectacled Monarch	1	1,2	1
Rhipidura rufifrons	Rufous Fantail	1	1,2	1
Rhipidura fuliginosa	Grey Fantail	1	2,3	1,3
Rhipidura leucophrys	Willie Wagtail	1	6	1
Family ORTHONYCHIDAE				
orthononyx temminckii	Logrunner	1	1,2	1,3
Psophodes olivaceus	Eastern Whipbird	1	1,2	1,3
Cinclosoma punctatum	Spotted Quail-thrush	1	3	1,3
Family MALURIDAE				
Malurus cyaneus	Superb Fairy-wren	1	6, Var.	1
Malurus lamberti	Variegated Fairy-wren	1	6, Var.	3
Family ACANTHIZIDAE				
Sericornis magnirostris	Large-billed Scrubwren	1	1	1
Sericornis citreogularis	Yellow-throated Scrubwren	1	1	1,3
Sericornis frontalis	White-browed Scrubwren	1	1,2	1,3
Acanthiza pusilla	Brown Thornbill	1	2,3	1,3
Acanthiza lineata	Striated Thornbill	1	2,3	1,3
Gerygone mouki	Brown Gerygone	1	1,2	1,3
Gerygone olivacea	White-throated Gerygone	1	3	1

Family CLIMACTERIDAE				
Climacteris leucophaea	White-throated Treecreeper	1	3	1,3
Climacteris erythrops	Red-browed Treecreeper	1	2,3	1,3
Family MELIPHAGIDAE				
Anthocharea carunculata	Red Wattlebird	1	3	3
Philemon corniculatus	Noisy Friarbird	1	3	1
Manorina meanophrys	Bell Miner	1	2	3
Meliphaga lewini	Lewin's Honeyeater	1	1,2	1,3
Lichenostomus chrysops	Yellow-faced Honeyeater	1	2,3	3
Acanthorhynchus tenuirostris	Eastern Spinebill	1	2,3	1,3
Myzomela sanguinolenta	Scarlet Honeyeater	1	1,2,Var.	1
Family DICAEIDAE				
Dicaeum hirundinaceum	Mistletoebird	1	3	3
Family PARDALOTIDAE				
Pardalotus punctatus	Spotted Pardalote	1	3	3
Family ZOSTEROPIDAE				
Zosterops lateralis	Silvereye	1	Var.	1,3
Family ESTRILIDIDAE				
Emblema temporalis	Red-browed Firetail	1	6	1,3
Family ORIOLIDAE				
Oriolus sagittatus	Olive-backed Oriole	1	Var.	1
Family DICRURIDAE				
Dicrurus hottentotus	Spangled Drongo	1	1,2	1
Family PTILONORHYCHIDAE				
Ptilonorhynchus violaceus	Satin Bowerbird	1	1,2	1
Sericulus chrysocephalus	Australian Regent Bowerbird	1	1	1
Ailuroedus crassirostris	Green Catbird	1	1	1
Family PARADISEIDAE				
Ptiloris paradiseus	Paradise Riflebird	1	1,2	1,3
Family CRACTICIDAE				
Strepera graculina	Pied Currawong	1	2	1,3
Family CORVIDAE				
Corvus orru	Torresian Crow	1	2	1

* Glossy Black-Cockatoos were not observed but chewed Forest Oak cones where found on Martha Ann Road.

SCIENTIFIC NAME	COMMON NAME	OCCURRENCE	HABITAT	SOURCE
MAMMALS				
Family DASYURIDAE				
Antechinus stuartii	Brown Marsupial Mouse	1	1,2,3,4	1
Dasyurus maculatus	Tiger Quoll	1	1,2,3	1
Phascogale tapoatafa	Brush-tailed Phascongale	2	2,3	1
Family PHALANGERIDAE				
Trichosurus caninus	Mountain Possum	1	1,2	1
Trichosurus vulpecula	Common Brushtail Possum	1	2,3	1
Family PETAURIDAE				
Petaurus australis	Yellow-bellied Glider	1	2,3	1
Petaurus breviceps	Sugar Glider	1	2,3	1
Petaurus volans	Greater Glider	1	2,3	1
Pseudocheirus peregrinus	Common Ring-tailed Possum	1	1,2,3	1
Family BURRAMYIDAE				
Cercartetus nanus	Eastern Pygmy-possum	2	1,2,3	2
Family POTOROIDAE				
Potorous tridactylus	Long-nosed Potoroo	2	2,3	2
Family MACROPODIDAE				
Macropus parma	Parma Wallaby	2	1,2	1
Macropus rufogriseus	Red-necked Wallaby	1	2,3	1
Thylogale thetis	Red-necked Pademelon	1	1,2	1
Wallabia bicolor	Swamp Wallaby	1	1,2,3	1,3
Family PTEROPODIDAE				
Pteropus poliocephalus	Grey-headed Flying Fox	1	1,2,3	1
Pteropus scapulatus	Little Red Flying Fox	3	2,3	4
Family RHINOLOPHIDAE				
Rhinolophus megaphyllus	Eastern Horseshoe bat	2	1.2	4
Family EMBALLONURIDAE				
Saccolaimus flaviventris	Yellow-bellied Sheathtail bat	2	2,3	4
Family MONOSSIDAE				
Nyctinomus australis	White-striped Mastiff bat	2	2,3	4
Mormopterus loriae	Little Northern Mastiff bat	3	1	4
Mormopterus norfolkensis	Eastern Little Mastiff bat	2	2,3	4

Family VESPERTILIONIDAE				
Nyctophilus gould	Gould's Long-eared bat	2	1,2,3	4
Nyctophilus geoffroy	Lesser Long-eared bat	2	2,3	4
Miniopterus schreibersii	Common Bent-wing bat	2	2,3	4
Miniopterus australis	Little Bent-wing bat	2	2,3	4
Chalinolobus gouldii	Gould's Wattled bat	2	2,3	4
Chalinolobus morio	Chocolate Wattled bat	2	2,3	4
Myotis adversus	Fishing bat	2	2,3,5	4
Scoteanax rueppellii	Greater Broad-nosed bat	2	1,2	4
Scotorpens greyii	Little Borad-nosed bat	2	3,5	4
Falsistellus tasmaniensis	Great Pipistrelle	3	2,3	4
Vespadelus pumilus	Little Cave Eptesicus	2	1,2,3	4
Vespadelus vulturnus	Small Forest Eptesicus	2	2,3	4
Family MURIDAE				
Rattus fuscipes	Southern Bush Rat	1	1,2,3	1
Family CANIDAE				
+Canis familiaris	Feral Dog	1	2,3	3
+Vulpes vulpes	Fox	1	2,3	3
Family FELIDAE				
+Felis catus	Feral Cat	1	2,3	1
Family BOVIDAE				
Bos taurus	Feral Cattle	1	2,3	3

+ Introduced species.

2146 AL, 3014.

FAXED 7-5-92

Appendix 2

NSW NATIONAL PARKS AND WILDLIFE SERVICE

Manager
Environmental Assessment Unit
Forestry Commission of NSW
Locked Bag 23
PENNANT HILLS NSW 2120

Our reference: A12473 JB:JB
Your reference:

Attention: Mr Andrew Lugg

DIRECTORS REQUIREMENTS FOR FAUNA IMPACT STATEMENT - PROPOSED FORESTRY OPERATIONS IN MISTAKE STATE FOREST

In response to your letter facsimile 4 May 1992, the Fauna Impact Statement (FIS) must meet all of the requirements of Section 92D(1) of the National Parks and Wildlife Act, 1974. Pursuant to Section 92D(3), in addition to the basic requirements set out in Section 92D(1), I require the following:

1. A fauna survey of the Mistake State Forest. Selection of sites should be based on sampling a range of environmental strata present, eg., across different vegetation types, altitude and geology. Sites should be replicated and potential habitat of endangered fauna must be adequately sampled. A review of previous fauna studies in the Mistake State Forest should be included.

2. A full description of the methodology used in the survey, including dates of survey, weather conditions, number of traps, configuration of traps etc. Identification of reptiles, frogs and bats should be confirmed by a recognised authority (eg. Australian Museum) for species of taxonomic uncertainty.

3. A list of all protected fauna species known or likely to occur in the areas to be affected by the proposed forestry operations.

Head Office
43 Bridge Street
Hurstville NSW
Australia
PO Box 1967
Hurstville 2220
Fax: (02) 585 6555
Tel: (02) 585 6444

4. A description of the size (i.e. abundance) of endangered fauna populations within areas to be affected by proposed forestry operations and an estimation of the local, regional and state- wide abundance of the endangered fauna known to occur in these areas.

5. Comments on the health of endangered fauna populations recorded during the fauna survey referred to in Point 1.

6. A discussion of known or possible dispersal or movement areas or routes linking habitats and food preferences of endangered fauna known to occur in areas to be affected by logging operations.

7. A description of the location of endangered fauna species recorded during the fauna survey referred to in Point 1 (including Australian Map Grid reference), and a discussion of potential habitat of endangered fauna known to occur in the areas to be affected by logging operations.

8. A description of the local, regional and state-wide distribution of endangered fauna known to occur in the Mistake State Forest.

9. A discussion of protected (including endangered) species known to occur in the Mistake State Forest which are likely to be sensitive to forestry operations and forest disturbances (i.e. species likely to be adversely affected because these activities adversely impact on critical breeding, feeding and nesting areas, for example, loss of tree hollows and hollow logs).

10. Identification of the protected (including endangered) fauna species known to occur in the areas to be affected by logging operations, which are dependant on or utilising old growth forests.

11. A description of the habitats or potential habitats of endangered fauna known or likely to occur in the areas affected by the proposed forestry operations and the regional and state-wide distribution of these habitats.

12. A discussion of the **conservation status**, in local, regional and state-wide context, of all species of endangered fauna known or likely to occur in areas to be affected by the proposed forestry operations.

13. Identification and general discussion of **habitat critical** to the survival of endangered species known or likely to occur in the areas to be affected by the proposed forestry operations. The following are examples of the type of relevant information to be discussed:

    - routine perennial and seasonal living areas,

    - locations for life cycle events (nesting, breeding etc.),

    - refuge locations for environmental-cycle events (drought, flood, fire etc.),

    - buffer areas necessary to maintain habitat characteristics for the survival of endangered fauna ; and

    - the resource available for tree hollow and large log dependent species (i.e. a consideration of the size, types, density and spatial pattern of tree hollows and large logs).

14. A discussion of the likely **impact** on native fauna populations from feral animals, disease and insect damage, changed fire and hydrological regimes and from the potential introduction of invasive weed species.

15. Identification of **significant** localities where there are high fauna population densities, high diversity of fauna habitats or high fauna species diversity.

16. A description of proposals to **ameliorate** the impact on endangered fauna and an assessment of the effectiveness of such proposals.

17. A detailed description of proposed on-going monitoring of endangered fauna and species sensitive to forestry operations, and monitoring and audit of the effectiveness of ameliorative measures.

18. A detailed description of proposed habitat restoration including the expected time taken to restore habitat and critical habitat components and food sources, and any proposals or opportunities to improve habitat and the likely impact on endangered fauna during the time the habitat is being restored.

19. Proposals for the recovery of endangered species known to occur in the Mistake State Forest, that are likely to be affected by the proposed Forestry Operations, and their critical habitats. Recovery refers to any proposals the Forestry Commission has for the preparation of recovery plans for species of endangered fauna likely to be adversely affected by the proposed forestry operations. It is not anticipated that the Commission would propose to prepare recovery plans for all species of endangered fauna likely to be affected, rather, the Service wants to be advised of any Commission proposals to prepare recovery plans.

20. A discussion of the ability of endangered fauna known to occur in the areas to be affected by logging operations to recover from serious declines in population size.

22. All information cited, from which statements or conclusions are made, must be provided or fully referenced.

The Fauna Impact Statement or Environmental Impact Statement which satisfies the above requirements must be forwarded in writing to the Service. Should you require any further information, please contact Ms Diane Campbell, Manager, Threatened Species Unit, on 5856444.

Yours sincerely

W.J. Gillooly
Director

7/5/92

ATTACHMENT 4

Map of Unlogged Forests