

# **Forest Conservation Fund**

## **Assessment Methodology Advisory Panel**

### **Options Paper**

**Methods for Assessing the Significance, Services and Security offered in Proposals to the Forest Conservation Fund and Recommendations for Tender Design.**

**January 2006**

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**Acknowledgements:**

This options paper was developed by the Assessment Methodology Advisory Panel. It is the result of three meetings of the panel during December and January 2006. The panel membership included two ecologists, Dr Philip Barker (team leader-independent) and Dr Michael Brown (independent), three economists, with experience in market based instruments relating to the purchase of ecological assets and services, Mark Eigenraam (DPI Vic), Dr Michael Burton (UWA) and Dr Stuart Whitten (CSIRO). The Commonwealth government was represented by Katy Mallett, Simon Nash and Salim Mazouz and Tasmanian the government by Penny Wells.

## EXECUTIVE SUMMARY

The objective of the FCF is to protect *up to* 45,600 hectares of forested private land, supporting a *minimum* of 25,000 hectares of old growth forest; and targeting other under reserved forests including up to 2,400 hectares of forest to protect the karst values in the Mole Creek area.

This report presents options and recommends the most appropriate ones to assess the contribution and value for money of landholder proposals to protect eligible forests.

The Assessment Method Advisory Panel proposes that the assessment method should include the construction of three independent attribute scores for each proposal. The attributes are Significance, Service and Security.

- **Significance:** The significance of a proposal describes the contribution the forests make to the CAR reserve system in terms of the conservation status of the forests, the attendant biodiversity values, the reserves size and its context in the landscape.
- **Service:** Landholder conservation management actions provide risk mitigation and condition improvement services for the forests included in a proposal.
- **Security:** The duration and the level of protection offered by the proposal.

Each proposal will be assessed on the aggregate score of a site by combining significance, service and security into a conservation value index.

**Conservation Value Index** =  $f\{Significance, Service, Security\}$

AMAP has developed four options for measuring significance and three options for measuring service. The parameters included in the options are listed below.

### Significance options.

- Option 1. Simplest: Old growth, under reserved and rare, vulnerable and endangered forest types.
- Option 2. More complex: Old growth, under reserved and rare, vulnerable and endangered forest types. Apply landscape context as a score modifier.
- Option 3. Even more complex: As above with the inclusion of threatened species habitat
- Option 4. Most complex: As above (1, 2 and 3) with the inclusion of biodiversity and geoconservation values and National Estate values

**Recommendation:** AMAP recommends that option 2 for the measurement of conservation significance be developed. This option offers a relatively simple approach that is strongly focussed on the FCF objectives and provides adequate discrimination between forests. The inclusion of landscape context is a valuable consideration potentially adding to viability and reducing the level of management required.

Options 3 and 4 offer greater discrimination between forests but suffer from complexity, and increasing potential for unequal information between proposals and a broader focus than is necessary to meet the primary FCF objectives.

### Service options.

- Option 1. Simplest. A measure of risk and service potential based on the biophysical naturalness attributes ascribed to the RFA forest layer.
- Option 2. More complex. A measure of risk mitigation and improvement in the condition of the forest as a result of management services. The measure is based on modified biophysical naturalness attributes that are amenable to change through prescribed management actions - field assessed.
- Option 3. Most complex. A measure of risk mitigation and improvement in the condition of the forest as a result of management services. A simplified condition assessment against vegetation condition benchmarks (modified to include old growth characteristics and based on the concept of Oliver and Parkes 2003).

**Recommendation:** The concept of measuring condition and change in condition, due to management actions, is strongly recommended and is applied in both options 2 and 3. Further judicious consideration of the pro's and con's of these two methods is needed to ensure maximum efficiency in field assessment while also attributing accurate measures of the provision of service. It is recommended that both of these options be further considered in stage 2.

### Security

**Recommendation:** AMAP recommends the following levels of protection and management be offered to proponents as eligible alternatives for inclusion in their proposals.

1. Covenant in perpetuity plus a management period:
  - a. In perpetuity
  - b. 12 years
  - c. 4 years (where specific management actions can be effectively completed in this time that will eliminate or substantially reduce risk or improve condition).
2. Covenant only
  - a. in perpetuity.
  - b. 12 years
3. Management only
  - a. 4 years (where specific management actions can be effectively completed in this time that will eliminate or substantially reduce risk or improve condition).

### Tender mechanism

**Recommendation:** AMAP recommends the use of a (multiple round) tender approach to the allocation of funds for the procurement of old growth and under reserved forested areas, but that the extent to which a sequence of regionally based tenders will lead to inefficiency should be evaluated in phase 2. The tender should be open to all landowners who own eligible forests.

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## 1. INTRODUCTION

The Tasmanian Community Forests Agreement included the establishment of the Forest Conservation Fund (FCF). The primary objectives of the Forest Conservation Fund are to:

- protect *up to* 45,600 hectares of forested private land, targeting old growth forest and under-reserved forest communities, of which there will be:
  - a *minimum* of 25,000 hectares of old growth forest; and
  - *up to* 2,400 hectares of forest to protect the karst values in the Mole Creek area.

The impetus for this program is to increase reservation levels to closer to JANIS targets. The primary objectives of the FCF are to remove the risk of clearing and to reduce the risk of degradation while maintaining or enhancing conservation values.

The limestone cave or karst landscape of Mole Creek is a special case which may not be amenable to tender, and will need modification of the assessment method to take into account geoconservation issues.

Success of the program and each tender round will be assessed against the above objectives. The following performance measures could assist in this assessment:

- Sufficient expressions of interest
- Sufficient proposals
- Satisfaction of stakeholder groups
- Landholder satisfaction
- Relative cost effectiveness
- Timely delivery

The Steering Committee of the FCF has developed a Strategic Plan for the implementation of the FCF. The plan establishes an Assessment Methodology Advisory Panel (AMAP) whose role it is to provide options for the assessment of eligible forests according to the criteria set out in the Strategic Plan (Stage 1).

Later tasks (Stage 2) will include:

- establishing what information is needed (and available) for the conduct of the assessments;
- the development of the preferred Environmental Benefits Index;
- advice on tender method and operation;
- development of tools for use by the service provider in analysing reservation proposals; and
- advising on an appropriate methodology for Mole Creek.

### 1.1. Scope of Task - Stage 1

The stage 1 task for AMAP is to develop this options paper. The elements in the scope of the task have been drawn from paper 6.1 and the FCF Strategic Plan.

This paper will identify and critique a range of assessment methods that would allow the steering committee to assess reservation proposals according to the criteria established in the Strategic Plan.

The options paper will advise the Steering Committee on the relative risks, costs and benefits of some different assessment methods of increasing complexity and rigor.

The options will take into account:

- different degrees of on-ground assessment required for implementation;
- the need to build on existing knowledge and tools, not to develop a new methodology;
- the need for the method to be simple, transparent, practical, pragmatic, easy to use (by the service provider);
- the assessment method must include a factor for area offered;
- options for assessing management proposals and joint proposals.

The guiding principle will be the need to build on existing knowledge and tools, not to develop a completely new method. The method needs to fit in with current knowledge and data in Tasmania and be amenable to current programs and stakeholder understanding.

Initial reference points for undertaking the methodology will include the Tasmanian Reservation Priority Index (CARSAG, 2004), and the landscape context used in Oliver & Parkes (2003) and Parkes *et al.* (2003). These reference points were chosen because they have been tried and tested in the field as part of the Tasmanian Private Forests Reserve Program, the National Action Plan for Salinity and Water Quality; the National Market Based Instruments Pilot Programme and other state programs.

The assessment method will aim to maximise the conservation benefits of suitable forests by incorporating secondary attributes which will differentiate otherwise equivalent proposals.

These secondary factors may include:

- habitat, geoconservation and biodiversity values; and/or
- significance for threatened species (listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* or the Tasmanian *Threatened Species Protection Act 1995*); and/or
- National Estate or National Heritage values identified under the *Environment Protection and Biodiversity Conservation Act 1999*.



## 1.2. AMAP interpretation of the Scope of Tasks

AMAP has interpreted the Strategic Plan and the tasks set out in paper 6.1 as follows:

- The priorities for reservation are:
  - Old growth forest
  - Under reserved forest

AMAP interprets the primary objectives as setting a minimum target for old growth forest. This target includes old growth forest from any forest community but preference is to be given to rare or depleted forms and old growth forms of under reserved forest types. The balance of the target should be drawn in preference from under reserved communities but other forest types are eligible for inclusion.

The structure of forest priorities to deliver the primary objectives are illustrated in Appendix 1.

Further interpretation is as follows:

- The assessment of biodiversity values will draw upon the PFRP process and relevant data.
- The assessment of management value will draw upon the concepts described in Oliver & Parkes (2003) and Parkes *et al.* (2003) and their application in other state and national programs.
- Reservation will be judged at the state and bioregional scales.
- The metric must provide sufficient discrimination between proposals to objectively order the proposals according to conservation significance.
- The metric must provide sufficient discrimination between proposals to objectively order the proposals in terms of management services offered and value for money.
- Secondary attributes may be used to discriminate between similar proposals.
- The assessment method will be entirely objective, tested and agreed upon prior to entering the field to ensure a transparent, robust, consistent and fair selection of sites.

## 2. DEVELOPMENT OF OPTIONS

The following sections examine options for the development and application of a metric to score the conservation value of individual sites. This is followed by an assessment of the mechanisms that can be used to allocate funds. In considering the mechanism to allocate funds a number of alternatives were canvassed (Appendix 2). Although flagged as primarily stage 2, the mechanism is touched on here because discussions relating to the mechanism include consideration of land parcel size and relative transaction costs of alternative options.

To ensure conservation funds are allocated cost effectively it is important to have a measure of what is being achieved (Eigenraam *et al* 2005). The FCF's objective is to increase the security (including consideration of the condition) of its priority forests. A straight forward measure of an increase in security is the area of land placed under covenant. However, the forests vary in their condition and the management actions that are required to maintain and improve them. The FCF needs to select proposals offering high quality management and forested areas that are in good condition. Thus, the measure includes an estimate of a change in condition as a result of a change in security (covenant protecting the area) and management (weeds, pests etc ) of that area. Increasing the level of accuracy in the process of systematically quantifying and comparing between sites - in a manner that reflects the ecological values that are the objective of the scheme - increases the potential outcomes that can be achieved when selecting sites using a fixed budget.

### **Background information considered when developing options**

The Tasmanian Private Forests Reserve Program has been operating from 1997 and is proposed to conclude in June of 2006. In that time the PFRP has secured 211 covenants covering 33 000 ha of forest with an average covenant size of 156 ha. Detailed information on the costs of the program and the forest values that it secured are presented in annual reports. An assessment of the size class distribution of covenants secured in the PFRP has been used to inform AMAP's initial recommendations on tender design.

An assessment of participating landowners including those who chose not to continue to a covenant has been undertaken (Vercoe 2003). From this work there emerge some simple lessons to be learned from the PFRP experience. These lessons are incorporated into the risks and benefits of the following assessment options and will be considered further in Stage 2. Additional advice on assessment method, advisor role and other issues relating to the conduct of a tender was received from Jim Binney based on experiences in the application of MBI's in Queensland.

- There is a reasonable degree of diversity in the price per hectare that landholders were willing to accept to enter into the PFRP, which is a prime facie requirement for a tender system to achieve economic efficiencies through revealing different landholder opportunity costs. However, these are negotiated prices, with apparently some constraints on what could be offered, so it may not reveal the true distribution, in particular at the upper end. Furthermore,
- Many landholders would have entered into an agreement had the price been a little higher. This suggests that most of the "low hanging fruit" has been picked, with those landholders who are willing to enter at low cost already participating, and a

program mechanism that allows landholders to propose their own price is likely to be needed to ensure attracting further successful participants.

- The PFRP process took too long. The FCF must indicate clear time lines and meet/manage the expectations of landholders.
- We need to clearly articulate what we are interested in and why and how we are going to assess offers.
- Management assistance was rated as very important by PFRP participant and non participants. FCF must consider incorporating the value of management in the metric.
- The perpetual nature of a covenant was perceived as a barrier to participation. This is a greater problem if management agreements are tied to the covenant. It is very difficult for a landholder to commit to a management regime that involves ongoing costs over a long period of time. FCF needs to consider variable lengths for management commitments to account for landholders' differing levels of risk and preferences, while at the same time ensuring that the environmental objectives are achieved, and transaction costs of repeated negotiation are not excessive.
- The success rate from assessment to covenant was less than 14 percent suggesting that factors such as cost, permanence, and lack of ongoing management support are significant factors in landholder decisions.
- Recruitment from existing voluntary programs such as Bushcare had a higher success rate than the expression of interest process. This suggests that targeting marketing in these areas may be a proactive strategy.
- The PFRP is dominated by small properties with 50% of covenants accounting for nine percent of total area and eleven percent of total payments. Hence, if there are significant fixed costs of assessment and covenanting (such as legal fees), these will need to be carefully managed.

### 2.1. The metric: Conservation Value Index (CVI)

AMAP propose that the assessment method should include the construction of three independent primary value scores for each proposal. The values are Significance, Service and Security.

- **Significance:** The significance of a proposal describes the contribution the forests make to the CAR reserve system in terms of the priority assigned by the FCF program, the conservation status of the forests, the attendant biodiversity values, the reserves size and its context in the surrounding landscape.
- **Service:** Specifically the landholder conservation management actions (services) that would protect (risk management) or improvement the condition of the forests included in a proposal.
- **Security:** The duration of the protection by covenant and the duration of the management agreement offered by the proposal.

The metric will include scores for each attribute contributing to significance, services and security. Each proposal will be assessed on the aggregate score of a site by combining significance, service and security. Options for developing the metric

reflect increasing sophistication or complexity. With different levels of complexity come different risks and benefits. These are presented in Appendix 2.

**Conservation Value Index** =  $f\{Significance, Service, Security\}$

The detailed method adopted to aggregate each of the elements will be determined in stage 2 of AMAP's role.

An index describing the relative conservation significance of all forest patches in Tasmania (drawing from the PFRP Strategic Reserve Design) will be developed to act as a benchmark against which all proposals can be gauged. This will assist in managing the composition of the reserve system, monitoring progress and will inform adjustment of the metric as needed (for example, between tender rounds).

The application of the metric is completely independent of the tender process and as such can be used in tandem with any market mechanism, or indeed to measure the relative effectiveness of any policy options for which the forest areas protected can be identified. This will allow flexibility in the application of alternative mechanisms if needed.

### 2.1.1 Significance

The purpose of the significance score is to measure the contribution of the forests and attendant values to the CVI. The PFRP's Reserve Priority index is an existing tool that serves this purpose. AMAP has considered the potential to modify this tool.

The scope of tasks sets out primary and secondary factors to be considered and assessed where included. The primary factors are old growth forest, under reserved forests at state and bioregional scales. These factors have been assigned a priority using the current conservation status of RFA forest communities. (see Appendix 1). Weighted scores may be assigned to the priorities in stage 2.

Other factors to be considered are habitat, geoconservation and biodiversity values; significance for threatened species and National Estate or National Heritage values may also be considered.

Definitions of these factors and the costs and benefits of including them are presented in Appendix 3. This component of the metric will be developed in stage 2 and will make the index cardinal.

The following are the proposed options for the parameters to be included in the assessment of significance and the value of the provision of services.

#### **Significance options.**

- Option 1. Simplest: Old growth, under reserved and rare, vulnerable and endangered forest types.
- Option 2. More complex: Old growth, under reserved and rare, vulnerable and endangered forest types. Apply landscape context as a score modifier.
- Option 3. Even more complex: As above with the inclusion of threatened species habitat
- Option 4. Most complex: As above (1, 2 and 3) with the inclusion of biodiversity values and National Estate values

### 2.1.2 Service

The purpose of the service component of the metric is to measure the value of risk mitigation actions and the potential for improvement in the condition of the forest. Differentiation between proposals based on their contribution to the reduction in risk is a key objective of the FCF.

1. Risk management: A quantum measure of the threats that the proposed forest reserve faces that may result in a decline in its condition if no management were to be undertaken. The score is based on the quantum value of the risks mitigated.
2. Improvement: A measure of the potential to improve the existing condition of the forest through prescribed management actions.

#### Service options.

- Option 1. Simplest. A measure of risk and service potential based on the biophysical naturalness attributes ascribed to the RFA forest layer.
- Option 2. More complex. A measure of risk mitigation and improvement in the condition of the forest as a result of management services. The measure is based on modified biophysical naturalness attributes that are amenable to change through prescribed management actions - field assessed.
- Option 3. Most complex. A measure of risk mitigation and improvement in the condition of the forest as a result of management services. A simplified condition assessment against vegetation condition benchmarks (modified to include old growth characteristics and based on the concept of Oliver and Parkes 2003).

### 2.1.3 Security

This parameter allows one to place a value on proposals that differ in their willingness to commit to a perpetual covenant.

Lessons from other programs indicate that the perpetual nature of a covenant has been a major cause for landowners not to engage in similar programs. Thus, to reduce the risk of under subscription to the program, AMAP recommends including options to time limit covenants.

While AMAP recognises that a time limited covenant does not secure the long term attendant values of the covenanted forests, it reduces the risk associated with short to medium term threats. Time limiting covenants to less than 12 years has the additional effect of not fully securing a contribution to the stated objectives of this program.

Thus, the preferred level of security is a perpetual covenant under the *Tasmanian Nature Conservation Act 2002*. The minimum level of protection is proposed to be a 12 year covenant.

AMAP also considers that it may be beneficial to include management options to complement covenants. This recognises the fact that while covenants effectively remove land use change threats, they do not address the risks posed by other threats such as pests and diseases.

Land management can also provide immediate benefits in terms of improving the condition of forests, making them suitable / more attractive for subsequent

covenanting. An additional benefit is that the program would become aware of forests that it may not otherwise have become aware of. The program may wish to provide an incentive to landholders to reveal this type of information.

These benefits may outweigh problems associated with the inclusion of management options, such as:

- increased administration, monitoring and enforcement costs associated with ongoing payments for management.
- the potential for the costs of perpetual management to be greater than the value of the land.

Time limiting management has the same drawbacks and benefits as the ones discussed above with respect to time limiting covenants. One key difference, however, is that some short term management actions can remove a threat for the long run. In such circumstances, AMAP considers that 4 year management period should be part of a menu of options.

It is assumed here that a covenant would have a standard set of restrictive requirements with it. A management plan would be the instrument to modify and or add actions to be undertaken by the proponent. Thus, having considered various combinations of the length of covenant and management agreements, AMAP recommends that the following options be provided to landowners:

1. Covenant in perpetuity plus a management period:
  - a. In perpetuity
  - b. 12 years
  - c. 4 years (where specific management actions can be effectively completed in this time that will eliminate or substantially reduce risk or improve condition).
2. Covenant only
  - a. in perpetuity.
  - b. 12 years
3. Management only
  - a. 4 years (where specific management actions can be effectively completed in this time that will eliminate or substantially reduce risk or improve condition).

Given the objectives of the FCF the security of a proposal would decline in value as it moved from 1a through to 3. If sufficient emphasis is given to 1 and 2, and there are sufficient proposals it is not likely many proposals would be accepted for option 3. However, it remains a useful incentive to participate with the potential to move to a covenant. That is, the landholders that are not accepted will recognise that others are willing to offer more. This may provide an incentive to them to participate in a following round and increase their security to option 1 or 2. AMAP considers that these benefits outweigh the drawbacks of including option 3, namely that:

- it exposes the program to risk of adverse selection (landholders who are planning conversion beyond 4 years may see this as an opportunity to extract funds from the FCF, without improving the long run conservation values of the forest); and

- it may lead some land holders that would otherwise have put in a proposal for options 1 and 2 to put in a management only proposal.

## 2.2. Mechanism Options

### 2.2.1 Direct negotiation

Direct negotiation with or without an expression of interest was the primary mechanism used in the PFRP. Notwithstanding other influences on landowner participation the PFRP negotiations have not achieved its original objective in terms of forest area secured. This is a primary motivation for canvassing alternative approaches.

During direct negotiation there is no incentive for the landholder to truthfully reveal their costs of covenanting and managing the site, therefore it is possible for government to pay too much.

Direct negotiation with landowners that are already conservation minded may present cost savings. However one would expect conservation minded landholders to participate in a tender process anyway and present a low price.

Generally, the negotiation process would take longer than a tender process and the transaction costs including negotiation could become quite expensive. There may, however, be a need to spend more time and money before launching the tender process to ensure effective provision and delivery of information by both parties.

### 2.2.2 Tender

In a tender process sites are selected based on cost effectiveness - the environmental benefit derived per dollar spent. In the current case the measure of benefit is the extent to which old growth forest and under reserved forested areas are brought under improved protection.

Landholders are invited to submit a bid to covenant and / or manage their area of forest and are provided with a measure of the environmental benefit they would provide. They are aware that there are many landholders in the same position as themselves and acceptance of their proposal is contingent on them being competitive per unit environmental benefit provided. This provides an incentive for landholders to price close to their true opportunity cost, and therefore be cost effective from the perspective of the scheme. It is proposed that a price discriminatory tender process be run, where landholders are paid the amount they bid. A consequence is that different landholders may be funded differentially for similar areas of forest and management actions. However, tenders are voluntary, and presumably represent the amounts required by landholders to enter into the scheme. Furthermore, because the value of a tender is based on an assessment of its environmental benefit, in a single price scheme (where all successful landholders are paid the highest marginal price / unit benefit funded) the calculation of the payments actually made will not be transparent.

It is also suggested that the tender operate on an input basis, i.e. the contracts / management agreements are written in terms of inputs (e.g. areas of land covenanted, management actions undertaken) as opposed to outputs (e.g. areas of forest in certain condition). The implication is that risks of failure of outcomes are borne by the scheme not by landholders (e.g. if dieback enters a protected area despite the management actions being fulfilled, the landholder is not deemed to be in breach of contract). With a large number of holdings, the state is probably better placed to cover such a risk, and if the landholder *were* required to, they would probably require a substantial risk premium in the tender amount.



The assessment process allows for direct comparison of different offers against each other within each tender and therefore allows tradeoffs in significance, service and security to be made directly amongst each other within the tender.

If negotiation is to be potentially incorporated as a mechanism then it is suggested that a tender process be undertaken, proposals be evaluated and as much area as possible obtained efficiently, and only then decide whether further areas should be targeted through negotiation. The worst of all outcomes would be for government to signal (either publicly or leaked privately) that there may be a negotiation phase if the tender fails to deliver the required outcomes. This would invite players (especially large players who have most to gain) to try to game the system (especially by putting in a high price based on a calculated guess that the government will need them to engage to achieve the FCF objectives). The high price would then form the starting point for negotiations in the second round with the large player holding an advantage.

An important issue is the use of repeats of the same tender structure, either temporally or geographically.

Running repeated tenders over time has a number of benefits and disadvantages. On the positive side, repeated tenders allows both the scheme designers and landholders to become familiar with the process and through learning deliver better outcomes. Some landholders may be unwilling to enter into a scheme until they have seen others participate (a common finding in adoption studies) and the scheme itself may be adapted as field experience is gained. On the downside, it is possible that landholders will learn what the marginal price is, and that all low bid values will converge on that value, thus losing some aspects of the cost efficiency element of the tender.

Running the scheme sequentially over different geographical areas also has some advantages. Again, design issues may emerge, and there will be some (although more limited) familiarisation with the scheme for landholders. Perhaps more significantly, the administration of the scheme can be focussed into a particular area, and it may be possible to achieve administrative efficiencies. On the downside, arbitrary budget levels have to be assigned to each geographical area, and there will be no guidance as to the correct allocation *ex ante*. Secondly, one may find that the scheme is purchasing expensive outcomes in one region that could be obtained more cheaply in subsequent areas. There are also issues of complementarity and context, which are better addressed at a state level rather than at a regional level, which will lead to losses in ecological efficiency in the outcomes being achieved.

### **2.2.3 Land acquisition**

Not seen as politically acceptable and would take too long to bring into force.

Provides perverse incentive to hide good forested areas from the government.

### **2.2.4 Revolving fund**

A revolving fund is a practical complement to the FCF. This could be a very useful ongoing program to aid in matching conservation oriented buyers with covenanted properties into the future.

### 3. PRELIMINARY DETAIL OF SIGNIFICANCE AND SERVICE OPTIONS

The following options are proposed for measuring the conservation significance and the value added by the provision of management services by a proponent. Four options for the measurement of significance are followed by three options for measuring services.

#### 3.1. Significance

##### **Option 1. The Simplest method.**

The measure of significance score is based on a scale of forest priorities described in Appendix 1. These reflect the primary factors relating to the objectives of the FCF. The priorities are weighted to promote old growth and then under-reserved communities to ensure the targets are met if 45 000 are protected. Proposals are scored using an area-weighted average of each priority patch of forest.

The field assessment requires confirmation of the extent of old growth, under reserved and RVE forest communities ie confirmation or field truthing of the RFA (Tasveg) map.

The priority forest communities occur across a range of altitudes, soils types, climatic regimes and land uses. The method relies on the variety of habitats that are present across the full range of priority forest communities as a surrogate for threatened species habitat. Many threatened species are so threatened because of the past clearance of forest habitat. The forests that represent their habitat are now the rare and endangered forest types that are included in the primary objectives. The remnants of these habitats have a high probability of supporting a suite of commonly associated threatened species.

##### *Strengths:*

- The method is strongly focussed on the objectives of the program.
- Provides a clear basis for discrimination between proposals.
- Simple balanced comparison of proposals with a high level of repeatability.
- Method does not include redundant data nor data that could be incomplete across all proposals.
- Field verification is straightforward and parameters are unambiguous, therefore the method is robust.

##### *Risks:*

- No secondary attributes are considered. Doesn't include known threatened species locations.
- No basis to judge relative significance compared to all private forests.

## **Option 2. A more complex method.**

This method builds on the simplest method (above)

In this method the measurement of significance incorporates a component for context (connectivity to reserves, patch size (in a similar way to both the PFRP Strategic Reserve Design (SRD) and Oliver and Parkes 2003 ). This method takes advantage of existing data in an existing structure that allows the assessment to be run with a minimum of additional development.

The risk posed by adjacent threats is also part of the context score. The risks may include grazing, weeds, pests, subdivision, harvest, clearing, mining, and are assessed by for example soil type (productivity) or vegetation type or region. This is a desk top assessment that can fit into the current data structure.

The risks are weighted by a regional average for each risk eg Phytophthora is a high risk on poor soils and conversion to plantation is a high risk in the north east and north west on suitable soils and subdivision is a high risk near Hobart.

The field assessment requires confirmation of the extent of old growth, under reserved and RVE communities ie confirmation or field truthing of the RFA (Tasveg) map.

A simplified SRD process is used to generate benchmarks by using a modified reserve building algorithm for a 46 000 ha (25 000 ha oldgrowth) reserve scenario. This index will act as a benchmark against which all proposals can be compared. This will assist in managing the composition of the reserve system, gauging progress and will inform adjustment of the metric as needed (for example, between tender rounds).

### *Strengths:*

- The method is strongly focussed on the objectives of the program.
- Provides a clear basis for discrimination between proposals.
- Simple balanced comparison of proposals with a high level of repeatability
- Recognises the value of buffers and context of reserves to promote long term viability.
- Additional data for risk and context is equal across all proposals and is generated in a desktop exercise.
- Allows comparison of proposals to the statewide dataset. (SRD 45 000 ha (25 000 OG) scenario).

### *Risks:*

- No secondary attributes are considered. Doesn't include known threatened species locations.
- Potentially increases non target forest capture by promoting the inclusion of connected forests as buffers. If such connected forests are not included in the proposals there is no guarantee they will not be cleared or degraded.

## **Option 3. An even more complex method.**

This method builds on the option above by considering threatened species. The threatened species listed on the *EPBC 1999* and the *TSPA 1995* are used as an additional variable in this component of the metric. Records from the GTspot

database and from field assessment are attributed to each proposal. The threatened species are weighted according to conservation status (rare, vulnerable or endangered).

*Benefit:*

- This method provides greater discrimination between proposals.
- It increases knowledge of the biodiversity values of proposals and thus promotes opportunities to protect threatened species.
- Provides opportunity to propose and undertake informed management services for threatened species.

*Risk:*

- Increasing the complexity of field assessment with a lower level of repeatability. Skilled ecologists required for field assessments.
- If only records from the database were used it would introduce a high level information inequality.
- Even with field survey for threatened species, seasonality (of species observations) would bias data and create information inequality. Proposals assessed in spring, for example, would have a higher chance of threatened species observations.

#### **Option 4. The most complex method.**

Combined options as above plus consideration of habitat, geoconservation, biodiversity and national estate values. This is the complete set of the secondary factors that would maximise discrimination between proposals.

*Strength:*

- Most comprehensive assessment allows greatest degree of discrimination between proposals.
- Based on known data is it the most likely method to capture the greatest range of Comprehensive Adequate and Representative reserve values.
- Habitat variables such as structural complexity and abundance and quality of litter may provide simple surrogates for biodiversity sufficient to discriminate between forests.

*Risks:*

- If only data based information were to be used the metric would suffer from incomplete data and hence data inequality for comparison of proposals.
- The collection of an independent set of data for each proposal would increase the time spent in field assessment.
- Old growth is itself a surrogate for a number of the values that contribute to biodiversity (eg tree hollows and logs on the ground). Thus the inclusion of habitat and other biodiversity surrogates may result in some double counting issues (see condition assessment under Service options).

- Much of the National Estate data however is at different scales, some of which may be inappropriate.
- Some National Estate values would introduce double counting, for example, rainforest refugia on the east coast and Flinders Island are picked up in bioregional priorities.
- The limits of ranges, disjunctions and other species values are based on known records and so data is incomplete and thus would be unbalanced.
- Greater complexity than is required to meet the primary objectives of the FCF.

### 3.2. Service

**Option 1. The simplest method.** The biophysical naturalness layer produced during the RFA is used to report the condition of the forest. This layer classifies natural areas according to the intensity of:

1. timber harvesting
2. grazing
3. mining

The classification uses a six class rating system ranging from 0 (cleared land) to 5 (unaffected by logging, grazing).

The scores for risk management and improvement in condition are based on changes in the intensity of 1 to 3 and hence the overall class rating. The level of risk management and improvement of forest condition by management is restricted to the exclusion of timber harvesting and grazing management.

Field assessment: is limited to confirming elements and rating of the elements of biophysical naturalness.

*Strength:*

- Very simply balanced approach using existing data based information as a starting point.

*Risk:*

- Few opportunities to discriminate between proposals based on a range management inputs.

### **Option 2. A more complex method**

A modified biophysical naturalness layer is used to report the condition of the forest. The classification uses a high medium and low measure to which numeric scores are given for each threat. This layer scores the condition of the forest in the proposal according to the manageable threats that are present, for example:

1. timber harvesting
2. grazing
3. weeds
4. pests
5. fire

6. Phytophthora
7. potential for subdivision

The condition may be a negative score. The scores for threat management and hence improvements in condition are based on changes in the measure of threats 1-7 and hence the overall condition score. Change may be estimated by the predicted impact of proposed actions. Field assessment is required to attribute scores to each threat.

*Strength-*

- Relatively simple field assessment.
- Focussed on known threats
- Rewards preparedness to manage threats
- Consistency between proposals
- Easy to monitor implementation of actions.

*Risks:*

- Categorical data can present problems with discrimination of proposals scoring close to category thresholds. This can be managed by careful attribution of categories.

### **Option 3. The most complex method**

The condition of the forest is assessed against vegetation benchmarks. The benchmarks are scores that describe the condition of a typical forest in the best possible condition. A number of benchmarks have already been established in a Tasmanian government program.

The current benchmarks would need to be modified to include old growth characteristics. The assessment and scoring method is simplified to improve repeatability and reduce assessment time. Opportunities for simplification have been identified. The condition scores are applied to a forest area using the habitat ha concept (Parkes *et al* 2003).

Improvement is scored by applying quanta to management actions eg weed removal, fencing, track closure. This score is added to the condition score as the service component.

Field assessment requires survey of the entire proposal.

*Benefits:*

- Provides a high degree of discrimination by using the continuous benchmarked condition score as the basis.
- Focussed on the condition of the forest
- Rewards preparedness to manage the forest

*Risks:*

- Modification of the method, completion and testing of benchmarks would be time consuming.
- Field assessment could be onerous
- Quantitative condition responses to management actions may be difficult to predict. As a result the condition measure may not reflect management effort.

- May require a high degree of training to get repeatability.
- Need to guard against perverse outcomes e.g. may reward landowners for poor previous management practices by promoting actions to improve forest. This may be able to be managed by using current condition as co variate or offset by the significance score.

**NOTE:** It is important to emphasise that while a proposal may have little opportunity to score on improvement (no management being needed) it may score highly on risk management. If neither improvement nor risk management provide opportunities to score then it is likely to be offset by a high significance and context score. Thus weights here need to be tested to get the offset balance right.

The structure of metric (its component weights and interactions) will need to be tested and adjusted as required to deliver sensible and predictable outcomes.

## 4. RECOMMENDATIONS- STAGE 1.

Summary of what we see as the appropriate mechanism, metric and contract length and type.

Four options for measuring significance and three for measuring services have been described above. These have been designed with increasing levels of complexity and demands for data requirements. They also present increasing levels of discrimination between proposals. It should be reiterated that significance, service and security are independent values.

- **Significance:** The significance of a proposal describes the contribution the forests make to the CAR reserve system in terms of the conservation status of the forests, the attendant biodiversity values, the reserves size and its context in the landscape.
- **Service:** Landholder conservation management actions provide risk mitigation and condition improvement services for the forests included in a proposal.
- **Security:** The duration of protection by covenant and the management agreement offered by the proposal.

### 4.1. Significance

Option 2 for measuring significance is recommended. This option includes the assessment of old growth, under reserved and rare, vulnerable and endangered forest types. It also considers landscape context as a score modifier. This offers a simple approach that is strongly focussed on the FCF objectives and provides adequate discrimination between forests. The inclusion of landscape context is a valuable consideration potentially adding to viability and reducing the level of management required.

Options 3 and 4 offer greater discrimination between forests but suffer from complexity, and increasing potential for unequal information between proposals and a broader focus than is necessary to meet the primary objectives.

### 4.2. Service

The concept of measuring condition and change in condition, due to management actions, is strongly recommended and is applied in both options 2 and 3.

Option 3 for measurement of the services component is potentially a sensible balance between the time and cost efficiency of undertaking condition assessments and the need to provide a strong measure of the contribution of management actions to the proposal. This option provides adequate discrimination of service provision to satisfy selection of proposals based on value for money and is transparent.

Option 2 also provides a strong basis on which to measure the provision of services.

Further judicious consideration of the pro's and con's of these two methods is needed to ensure maximum efficiency in field assessment while also attributing accurate measures of the provision of service. It is recommended that both of these options be further considered in stage 2.

Option 1 offers a simple and cheap assessments but suffers from less accuracy and precision such that discrimination between the values of services would be difficult.



### **4.3. Security**

AMAP recommends that all of the combinations of period of covenant and management agreement be adopted as options available to participants in the first tender round. If necessary this could be modified in subsequent tender rounds.

The alternatives are:

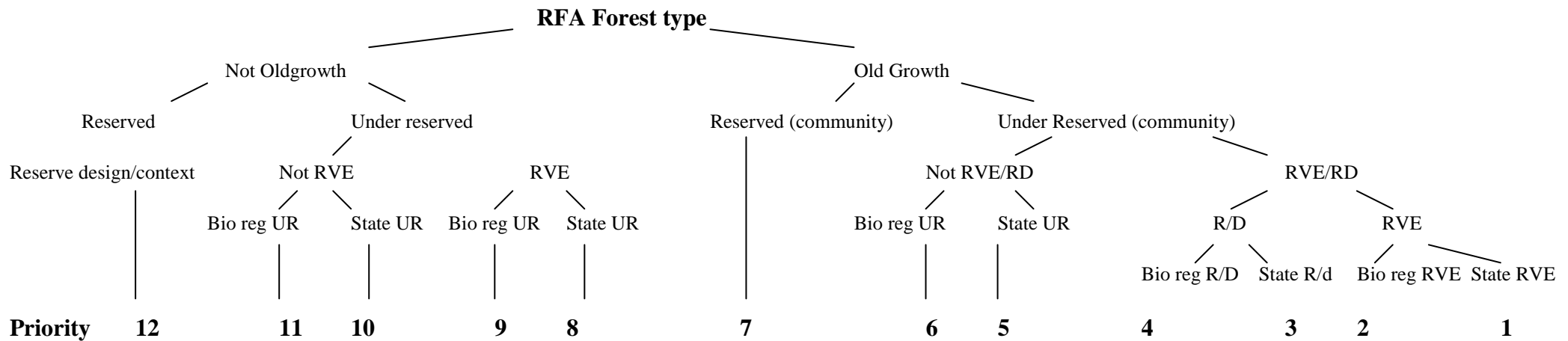
1. Covenant in perpetuity plus management period:
  - a. In perpetuity
  - b. 12 years
  - c. 4 years (where specific management actions can be effectively completed in this time that will eliminate or substantially reduce risk or improve condition).
2. Covenant only
  - a. in perpetuity.
  - b. 12 years
3. Management only
  - a. 4 years (where specific management actions can be effectively completed in this time that will eliminate or substantially reduce risk or improve condition). Option to complete covenant before the end of the program.

### **4.4. Mechanism Design**

AMAP recommends the use of a tender approach (that may include repeat tenders) to the allocation of funds for the procurement of OG and under reserved forested areas, but that the extent to which a sequence of regionally based tenders will lead to inefficiency should be evaluated in phase 2.

**5. APPENDIX 1: FOREST PRIORITIES CONTRIBUTING TO THE CONSERVATION VALUE INDEX**

Figure 1. The scheme below illustrates the priorities of the forests according to the objectives of the program<sup>1</sup>. The priority scores are simply an indicative rank (from 1 – highest priority, to 12 – lowest priority) that may be expressed by a different quantum in the significance score.



<sup>1</sup>Acronyms- RVE- Rare, Vulnerable or Endangered RFA forest types, R/D- rare or depleted oldgrowth, Bio reg/State- Bioregional or State scale of assesment. UR- under reserved

## 6. APPENDIX 2. IMPLEMENTATION- ISSUES CONSIDERED BY AMAP

This section is included here to capture the fabric of the breadth of discussions that AMAP has had. This is not an exclusive list of implementation issues that will need to be considered and there are many others that have been explicitly left for future consideration.

### 6.1. Try before you buy

Some landholders may wish to enter into a management contract as a precursor to entering into a covenant with management at a later date. (e.g. option 3 security). This may particularly be the case where landholders are uncertain about the costs of the management that a perpetual covenant could impose on them.

Notwithstanding the discussion regarding security (above), if it is expected that, over the period of the management contract, regulation of land clearing will increase and thus increase the overall security of all forested areas on private land, then it is a very viable option. However, it needs to be ensured that the management contracts are for a sufficient period of time to capture the potential for regulation to in fact change eg 12 years.

- Risk to Government is that it may pay for land otherwise covered by regulation (not withstanding no management). Government also has to retain funds for the future completion of covenants and may find it difficult and costly to enforce management contracts, especially in the long run and / or where the land is sold on.
- Risk to landowners is little different to present but they may benefit from management payment. The value of management is included in the metric.
- Landowners may manage the risk of regulation by not signing covenants.

The risks could be managed in contract details that provide for the circumstances Government or landowners would proceed to a covenant.

The following issues are considered but need to be dealt with in detail in stage 2:

- The four year management agreement or 12 year covenant could be extended to a perpetual covenant at 4 or at 12 years.
- Some proposals may prefer to include a performance clause to allow either escape from a perpetual covenant or step up to one.
- Assistance for purchase where a perpetual covenant is placed on the land is also being considered.
- Additional means of securing land could include a revolving fund with which land is purchased, a covenant placed on the title, and the land is resold. High transaction costs.

### 6.2. Tender mechanism

There may be a political reason why a large payment (in total, not per area, or a relatively large per area payment but still below the reserve price) to a large player through an open tender would be unacceptable. If so this would need to be taken into

account in the risks associated with the mechanism (potentially via a maximum payment).

### 6.3. Transaction costs

The transaction costs (TCs) of engagement need to be managed carefully for several reasons:

- They are likely to be significant costs associated with the incentive program, especially when effective long term monitoring and evaluation are considered:
- The TCs of engagement to participants could be a major disincentive to participation. This could be particularly the case if the tender structure tends to fix the costs of engagement per forest unit which would not allow larger players to effectively leverage potential economies of scale in engagement.

If there are significant economies of scale in different program structures / costs of processing / monitoring, it may be better to add a margin to the proposals to cover such costs. This would allow such costs to be incorporated in project design.

### 6.4. Ongoing management

The issue of ongoing management and incentive structure needs to be addressed. It may be difficult to enforce proactive management in the circumstances of upfront payments to landowners and particularly where the FCF pays more than property value. It is easier to enforce the actions that are restricted in the covenant, the “do nots” (e.g. don’t clear, hunt, fertilise) than the “dos” (e.g. do remove weeds, feral animals, manage fire). The impact of sale on the management agreement and *visa versa* needs to be considered, as it may be difficult to force the new owner to incur the additional management costs to comply with the covenant or agreement.

There may be little difference in the monitoring costs between a covenant and a management agreement particularly if positive management actions are part of the covenant.

### 6.5. Package of multiple proposals

There is a need to resolve when multiple proposals from adjacent landowners would be an advantage over a single proposal, eg a single large proposal compared to several small proposals, multiple proposals with the same values versus multiple proposals with multiple values etc. Essentially, this addresses the implementation of “landscape context” within the significance score. In the context of reserve design, the “complementarity” of a proposed area relates to the potential contribution of that area to achieving biodiversity objectives, **given existing or other potential reserved areas**. Thus, the biodiversity value of a site is not determined solely by its innate attributes, but by the context within which it is operating, or may potentially operate.

One can implement such a concept in two ways: ‘naïve’ complementarity considers a proposal within the pre-scheme reserve context, whereas a ‘dynamic’ implementation of complementarity will account for the potential context, given the other proposals that may (or may not) be selected. Implementing ‘dynamic’ complementarity will automatically account for any benefits of multiple adjacent proposals, as selection of the group will improve context scores. However, there is a cost, in that the tender evaluation process (but not the fundamental scoring system) is more complex if one adopts a dynamic form of complementarity. Whether this cost is acceptable will depend on the improvement in ecological values that occurs as a result of using the more complex selection mechanism, which in turn depends upon the importance of

context within the significance score. While joint tenders may be able to be successfully encouraged there may also be consequences for a tender mechanism.

By ensuring that the scoring method for conservation value can accommodate joint tenders then only contracting issues distinguish them from any other proposal.

### **6.6. Relationship to other programs**

Extreme caution should be exercised if any other incentive programs are in play that could influence tender prices. These have high potential to set a floor in the tender market.

As foreshadowed in the Tasmanian Community Forest Agreement, the Tasmanian government (DPIWE) is moving to develop an integrated private property vegetation conservation program, incorporating the key objectives of a range of existing programs. As the new private property vegetation conservation program evolves, governments will cooperate to ensure that delivery of the Forest Conservation Fund is complementary to the state's activities.

Integration and cooperation with other programs, where appropriate, provides the greatest benefit to all parties. By working with other programs offering conservation management or planning programs to landholders, the Forest Conservation Fund can maximise opportunities for landholders and conservation outcomes.

Anyone can enter the FCF program and can be referred from any source. Assuming there is going to be more than one tender round, those in, or associated with, other programs will become increasingly aware and likely to participate. Landowners that are referred as a result of regulatory controls on land use, such as clearance control through Forest Practices Authority regulations, would similarly be eligible to participate in any round.

### **6.7. The role of the independent landholder advisor**

The strategic plan identifies the intention to allow proponents to engage an independent advisor from a pool of available advisors. The purpose of the advisor is to assist the landowner to develop an eligible proposal. In doing so, the advisor will be required to fulfill four separate roles. These are to:

1. confirm the forest types;
2. assess the condition of the forests;
3. advise the proponent about relative desirability of forest types and management options; and
4. Be the human face of the program.

To provide reliable discrimination between proposals the confirmation of forest types and assessment of the condition of the forests must be accurate and repeatable.

As advisor to proponents the advisor must clearly deliver a consistent and complete message.

As the human face of the program the advisor must have credibility and be personable.

Ideally a single person who has sufficient ecological understanding or the ability to quickly develop it would fill all roles. It may however be valuable to employ one or more professional ecologists to assist advisors.

**Proposal development (advisor role) cost benefit analysis**

A. Site visit only to gather data on proposal. No advice on preferred management or forest class

*Risk* May attract poor tenders which don't target desired forest types or management.

Benefits: Cheap

B Site visit with data gathering and advice on preferred forest type and management actions but no formal feedback on management advice for tender

*Risk.* Poorly targeted management proposals. Landholders may find it difficult to estimate prices and may tender below price exposing themselves to financial difficulty in complying with tender. Variability in ecological skills between assessors will need to be minimised to avoid bias in assessments (but field data collection reduces impacts of errors and data limitations in mapping).

C. As per B. but some negotiation on desired management outcomes (plan sent to landholder for adjustment / costing per Bushtender model) = low risk of poorly targeted tenders but cost risk remains.

*Risk.* Could reduce flexibility in management actions (by limiting these to a set list) and thus increase cost of achieving desired outcomes. Similar ecological risks to B.

D As per C. but some information on the likely nature and scale of costs of different management actions, especially for unfamiliar activities (e.g. local contractor rates, gross margins etc. supplied as part of background material). Landholders can choose to use their own costs or those provided.

*Risk.* This structure reduces the financial risks to landholders and facilitates more informed cost on tendering. Similar ecological risks to B.

E. As per C. but separate field assessor and proposal advisor (including financial advice from proposal advisor). Promotes high quality of skills applied to each task. May be more efficient if field assessors can eliminate illegitimate proposals.

*Risk.* There are increased costs of engagement (a minimum of two visits) and higher risk of informal collusion in pricing process. Note that farmers make these sorts of financial and land management decisions every day AND can always choose to see their regular advisor and include these costs in their bid.

## 7. APPENDIX 3: ATTRIBUTES CONTRIBUTING TO THE VALUE OF PROPOSALS

### 7.1. Old growth presence

The definition of oldgrowth is as included in the Tasmanian RFA. Old growth is ecologically mature forest and that been subjected to negligible unnatural disturbance. The definition includes growth stage, tree crown attributes, and crown cover of the upper stratum of the forest. The presence and extent of disturbance has been derived from five data sets including visible disturbance (from aerial photography), timber harvesting history, fire, grazing and biophysical naturalness.

RFA old growth is mapped. Some areas mapped as RFA old growth may not be so and other areas not mapped may conform to the definition.

The operational interpretation of the definition is described in the national forest reserve criteria as ecologically mature forest where the effects of disturbances are now negligible.

All old growth forest is eligible under this program.

If a forest is not old growth forest it is either disturbed mature forest or else regrowth forest.

Comment: The operational definition raises the possibility that the appropriate management of an ecological mature forest could result in it being old growth in a short period of time, ie effects of disturbance are now negligible. It would be pragmatic to explicitly include these opportunities as eligible proposals. If not it would be difficult to include any forest that has weeds present as weeds are a contemporary sign of disturbance.

Risks: The areas mapped as oldgrowth according to the above criteria may not actually be old growth when inspected on the ground. On the other hand, areas currently mapped as mature forest may actually meet the old growth definition.

It is important to be able to communicate to landowners whether or not they have old growth or have the potential to have old growth on their property and so are eligible to make a proposal under this criterion.

Mitigation. Eligibility from expressions of interest needs a very quick and efficient test by field investigation.

### 7.2. Old growth communities

Old growth forests potentially occur within most of the forest communities included in the RFA. Old growth communities are the old growth component of the forest communities or types. All old growth forests are attributed to a community. For example old growth *Eucalyptus viminalis* forest or old growth *Eucalyptus delegatensis* forest. Not all *E. viminalis* or *E. delegatensis* forests are old growth. The balance is disturbed mature forests or regrowth. Some old growth communities are considered to be rare or depleted.

All old growth communities are eligible under this program, but rare or depleted oldgrowth communities should have a higher priority for reservation.

Risks: Differences in the ecology of some forest types mean that some may never express the defining characteristics of mapped old growth but do have old growth forms. For example, *Eucalyptus rodwayi* forest often has little evidence of crown senescence but has many logs of various stages of decay on the ground. This is because roots often rot in the wet habitats and the trees blow over before developing hollows.

### 7.3. Under-reserved communities

Under reserved communities are forest types (including all growth stages) that do not meet the JANIS targets for area to be reserved (Tasmanian RFA). The amount by which they fail to meet the JANIS targets is referred to as the percentage shortfall.

If a forest patch is old growth and is part of an under reserved community it will contribute to both targets. To maximize the achievement against targets old growth in under reserved communities should be the highest priority.

Risk: Analysis of reservation targets based on JANIS criteria is categorical. As such there is a step function that implies two communities that are in adjacent categories are very different and those within a category are the same. In fact communities near the threshold of two categories may be very similar.

This can be over come by dispensing with targets and imposing a decreasing weight or decay function as the area reserved of each community increases weighted by total area. This will allow a better distribution or mix of the under reserved forest types to be included in the reserve scenario, ie 45 000 ha.

### 7.4. By-catch

By-catch includes areas of forest that are part of a proposal that do not contribute to the primary objectives of the program but can contribute to the viability of a reserve.

Comment: During the PFRP financial considerations did not reflect the inclusion of by catch areas although in many cases they do contribute to the integrity of the reserves design. In the case of the PFRP and almost certainly in the FCF the landowner will not exclude by-catch from their estimation of the proposals value, even if they explicitly know that is it not eligible.

The CARSAG SRD (Carsag 2004) reserve design principles include the addition of forest patches to the reserve core until the average score for the reserve (RPI) falls by 20 %. This aims to build a viable reserve around the core value. It is inevitable that some of the forests added to the reserve core in this way will not old growth or under reserved communities. Thus the FCF will be legitimately faced with including and paying for none target forest types to ensure the viability of reserves.

The most efficient way, therefore, of progressing toward targets is to minimise the area of non target forests required to fulfill for reserve design principles. It may be that under reserved communities areas more likely to be adjacent to old growth of under reserved communities than any other. Other than for its conservation value, under reserved oldgrowth should be the highest priority for this additional reason. Generally, reserves with the greatest proportion in area of target communities should be of highest priority.



## 7.5. Bioregion

Because the distribution of vegetation and the impact of clearance upon it varies from region to region around Tasmania, the conservation status has been determined and presented at a bioregional basis as well as examining statewide priority. A bioregion is an area that is similar throughout in biological and physical characteristics and hence the vegetation that occurs in it is generally characteristic of the region. Vegetation that is characteristic of a neighbouring or remote region but also occurs in the bioregion of interest may be considered rare or threatened in that region but not in another. Consequently, the conservation status of any vegetation type may vary from bioregion to bioregion.

Tasmania has nine bioregions all of which have some private land (and oldgrowth/unreserved forests).

Risk: Bioregional boundaries are represented by imprecise boundaries in ecological terms. Where a small amount of a community extends across a boundary into a bioregion in which it is not characteristic is may be inappropriately recorded as rare. A genuine outlier it is legitimately recorded as rare. To overcome this issue a fuzzy boundary can be applied to the data by way of allocating patches that occur near boundaries to the bioregion in which it is characteristic. For example, where high altitude *E. delegatensis* forest occurs in the northern midlands below 600 m and adjacent to the central highlands it is ascribed to the central highlands bioregion. *E. delegatensis* is not characteristic of the northern midlands.

## 7.6. Condition (to be defined in more detail)

The condition of a patch of forest refers to its relative similarity to a notional measured benchmark or can be expressed as a categorical index. The indices can be constructed in a number of ways. In this assessment it would be useful to include attributes that can be estimated for all forest. It may also be useful to use a secondary condition assessment for direct comparison of proposals.

The biophysical naturalness layer is complete. The BN includes intensity of logging grazing and mining.

The benchmarking condition assessment method of Parkes *et al* (2003) requires an on site assessment. This would have to be undertaken as part of the development of a proposal development. A simplification of the current scoring and its relevance to oldgrowth would need to be addressed in Stage 2. In any event, these data may be able to be compared between proposals but cannot be used in the reserve priority index.

The time required to undertake an on site assessment of condition would depend on the size and variability in the condition of the forest included in a proposal.

## 7.7. Additional attributes contributing to viability

**Size.** The number of hectares of forest.

Different forest types occur in different patch size distributions due either to the natural characteristics of its habitat or as a result of clearance history. The primary consideration is the number of ha of old growth or under reserved forest in a proposal. The proposal may however include an additional area of forest to buffer the reserve from potential future edge effects or to create practical boundaries. By-catch may

also be included in the proposal but should not be considered in the comparative value for money.

**Shape:** Forests exist in many shapes. Some shapes are determined by the boundary with cleared land leaving remnants of various shapes including linear, square and irregular. Undisturbed forests exist in more extensive forest mosaics. In the mosaics patches of eligible forests can occur naturally in a variety of shapes. Some forest types tend to be linear ( along drainage lines) in a forest mosaic and others elliptical, spilling from ridges in a forest mosaic or ovoid in the heads of gullies.

A meaningful inclusion of shape may therefore only be relevant to the shape of the proposal if it has an edge with cleared land.

**Risk:** This may be too complex and add very little value to the assessment.

**Connectivity.** The continuity of one patch of forest with another. This is most often described as, the patch being part of a larger patch, the patch being connected to another by corridors or the patch being connected or continuous with a reserve. This concept is included in the biodiversity benefits index of Oliver and Parkes et al 2003.

**Risk:** Unless a patch is continuous with a reserve or other land that is protected then connectivity may be temporary and may not be useful in the assessment.

**Context** of whole proposal (i.e. area and type of forest surrounding preferred forest communities in proposal)

The context can be a qualitative assessment of how the proposal sits in the landscape. It would consider the surrounding qualities such as current connectivity, size and shape of the entire remnant and risks posed by known regional threats. A quantitative index may be complex and care is needed not to double count attributes related to condition.

## **7.8. Secondary attributes**

### **Habitat and biodiversity values**

These are the characteristics or elements of a forest that provide the habitats for species. For example tree hollows of different sizes provide nesting opportunities for birds and mammals of different sizes, logs on the ground at different stages of decay, litter and the structural complexity of a forest all provide an increasing number of habitat opportunities. Old growth is itself a surrogate for a number of these values; the presence of hollows and logs for example. Thus inclusion of habitat and other biodiversity surrogates may result in some double counting issues. Habitat variables such as structural complexity and abundance and quality of litter may provide simple surrogates for biodiversity sufficient to discriminate between forests.

The criteria for measuring vegetation condition provided by Parkes *et al* 2003 include some measures of this kind, however, modification may be required to align the variables with the objectives of the program.

### **Threatened species**

Threatened species are those listed on the Tasmanian Threatened Species Protection Act 1995 and the Environmental Protection and Biodiversity Conservation Act 1999. During the Tasmanian RFA a list of priority forest dwelling species was compiled. This list has been maintained and modified by CARSAG.

The SRD data contain point locations and modeled polygons for priority RFA species. These data are important in promoting the priority of reserves containing this

important fraction of biodiversity. The presence of threatened species is a legitimate discriminator between two reserves that are otherwise equal.

Risk: The SRD only contains known records for flora species. The SRD presents a useful indication of how threatened species values affect reserve priority. Other forests in the SRD may and almost certainly do support threatened flora. Therefore the field assessment will be important to be able to compare proposals.

A number of limitations will affect the information available and hence the comparability of proposals.

1. Skills of the ecologist in recognition of threatened plants
2. Season of observation and presence of fertile material
3. Intensity and extent of survey

These limitations need to be weighed against the value of applying incomplete data that may assist in identifying eligible forests containing threatened species.

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