

address the precautionary principle as necessitated by the absence of post-wildfire and long term post-harvest monitoring data on biodiversity.

- 1) That timber harvesting be excluded from all mapped unburnt and lightly burnt forests within state forests for a minimum period of 20 years.
- 2) That all timber harvesting be limited to a maximum average 50% of compartment area (with a maximum of 75% within individual compartments) and maximum 50% of the total local landscape Area.
- 3) That the pattern of harvesting at the compartment and landscape scales be modified to ensure that all retained forest patches > 5 ha in size are connected by permanent corridors and that all gaps in corridors created by roads, rivers and other non-forest areas do not create barriers to glider movement and dispersal.
- 4) That fire refuge areas be modelled and mapped across all compartments and landscape areas to identify and protect those areas of each forest type within each compartment considered least likely to burn or with the lowest burn frequency, and where such areas will initially (for the next 20 years) include all areas unburnt or lightly burnt in the 2019/20 fires.
- 5) That intensive harvesting (all forms of logging that remove more than 40% of the natural (unlogged) tree stem basal area) be limited to Blackbutt and Alpine Ash forest types, and the size of harvesting patches be limited to "gaps" of 10 hectares or less where gaps are defined as areas wholly surrounded by either unlogged forest or low intensity logged forest (forest that retains 60% or more of the natural tree basal area across all tree size classes).
- 6) That harvesting intensity under selective harvesting in all DSF be limited to retention of 60% or more of the natural stand basal area across all medium and large tree size classes to ensure that biodiversity is maintained within the net harvest area.
- 7) That all compartments are subject to comprehensive pre-logging surveys at least once every logging rotation to gather all essential information for application of mitigation conditions and that post logging surveys are undertaken at repeat intervals of 1 to 10 years after harvesting at a minimum representative selection of sites sufficient for statistical analysis and feedback for adaptive management at compartment and landscape scales.

#### 4.2 Monitoring, forest type and species specific recommendations

Appendix A provides all specific monitoring, forest type and species specific recommendations to mitigate the impacts of both the 2019/20 wildfires and proposed timber harvesting. These recommendations have been designed within the context of limited scientific knowledge on the impacts of the wildfires and intensive timber harvesting on fauna populations and the consequent need to apply a precautionary approach.

## 5 Conclusions

1. The 2019/20 extreme wildfires burnt 37-42% of public forests in NSW and caused an unprecedented reduction in the distribution and abundance of key threatened species including the fire sensitive Koala.
2. The primary effect of fire and logging was to restrict populations of threatened species to a series of small, fragmented and isolated patches of unburnt or lightly burnt forest, referred to as fire refuges, scattered throughout the severely burnt forest.

3. Fauna populations surviving in fire refuges are likely to survive and expand outwards over the next 10-120 years in large unlogged forest reserves. The time required for recovery of threatened and sensitive species after average fires ranges from around 10 - 120 years. Recovery times are likely to be around 10 years for the Hastings River Mouse, 20+ years for the Long-nosed Potoroo and Southern Brown Bandicoot, up to 45 years for the Koala, 20-120 years for the Greater Glider and Yellow-bellied Glider
16. Fauna populations surviving in fire refuges in state forests are at risk of elimination by timber harvesting under the normal Coastal Integrated Forestry Operations Approvals (CIFOA) which could prevent recovery, and cause catastrophic population decline in species such as the Koala, Greater Glider and Yellow-bellied Glider.
4. Available scientific studies of fire and logging impacts have relied heavily on surveys of past fire and logging events which were generally less intense than recent harvesting and fire. This has created a real risk that impacts of current harvesting practices are being significantly underestimated, especially at landscape scales.
5. This review found that timber harvesting disturbance is more severe than the effects of fire in several important respects including the following:
  - it preferentially removes rather than retains natural fire refuge areas commonly found in gullies, sheltered aspects and stands of older forest;
  - retained forest patches are generally too small to sustain viable local populations for the number of years (10-60) required for surrounding forest to recover after logging and fire; and
  - selective logging is too intense and the basal area of retained trees is too low to maintain the natural post-fire forest structure required by mature and late stage dependent fauna like Greater Gliders and Yellow-bellied Gliders, especially in Dry Sclerophyll Forests.
6. While substantial areas of forest are currently protected and retained in ESAs (Environmentally Significant Areas) at both compartment scales (about 5%-45%) and landscape scales (about 45%) within state forests the pattern and distribution of these retained areas does not guarantee biodiversity conservation because they are often too small, too isolated, contain unsuitable habitat, are not specifically located in fire refuges and are not connected across the landscape by a network of permanent protected corridors in low fire risk areas across all public tenures.
7. The standard CIFOA does not guarantee delivery of ecologically sustainable management as required under the objectives of the *Forestry Act 2012* and is likely to cause a significant impact on threatened species under the *NSW Biodiversity Conservation Act 2016* and the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999*.
8. Site-specific Operating Conditions (SSOCs) developed by the EPA to manage environmental risks associated with timber harvesting in burnt landscapes to supplement standard Coastal Integrated Forestry Operations Approvals (CIFOA) will have little or no benefit as their time frame of application is too short.

9. There is scope for one of the SSOCs, the requirement to exclude harvesting from unburnt and lightly burnt forests, to mitigate fire and logging impacts if it is extended for a period of 20+ years or made permanent, and if it is applied to the least burnt 50% of each compartment across the LLA.
10. In general, as a precautionary principle, it can be assumed that species of native fauna and flora are adapted to, and able to sustain viable populations, under scales and patterns of fire and logging that do not exceed the scale and pattern of natural disturbances occurring after severe wildfire. Current CIFOA fall well short of constraining timber harvesting to the scale and pattern on natural disturbance.
11. The severity of recent 2019/20 wildfires in conjunction with timber harvesting in state forests has exposed the need for planning and implementation of ecologically sustainable forest management across entire landscapes and tenures. It can no longer be considered sufficient to regulate timber harvesting activities in isolation primarily at the compartment scale over the short term. There is a clear need to develop additional landscape scale conservation measures to regulate the size, location and connectivity of retained environmentally significant areas (ESAs) within state forests over the long term to mitigate the combined impacts of wildfire and timber harvesting on biodiversity in both state forests and adjacent National Parks.
12. New conditions are required that focus on permanent protection of large forest patches across regions and landscapes and which capture and include fire refuges (areas of forest that are least likely to be burnt and which provide wildlife oases after fire) and old growth and which link all retained forest in patches larger than 5 hectares in size in a network of permanent wildlife corridors.
13. This report also recommends that the intensity of so called selective harvesting in all Dry Sclerophyll Forest types be reduced significantly by increasing minimum tree basal area limits and minimum medium and large tree stocking limits, to ensure that populations of threatened and sensitive fauna such as Koalas and Greater Gliders are maintained at close to normal densities within the net harvest area consistent with principles and requirements for ecologically sustainable harvesting required under Regional Forest Agreements and the Forestry Act 2012