

## Ensuring adequate habitat for forest-dependent fauna in Victoria's protected areas

### In brief

We undertook an assessment of how well the current reserve system in Victoria protects a suite of more than 70 threatened forest-dependent species across multiple Ecological Vegetation Class (EVC) Groups.

The Wet and Damp Forest EVC has historically been subject to the highest levels of commercial logging, and currently has the least land in protected areas (as a percent of the total EVC area).

19% of this EVC Group has previously been logged. 74% of this logged using clearfelling. The young regrowth forests created lack features that threatened forest-dwelling mammals and birds depend on. Large fires have exacerbated this impact.

As a result the Wet and Damp Forest EVC now requires higher levels of protection in order to adequately conserve native species in this EVC.

We found that informal reserves did not provide adequate protection to habitat in this EVC, e.g., from boundary effects and the current network of formal protected areas alone is insufficient for the long-term survival of some species such as Leadbeater's possum and greater glider.

Other areas of high value habitat are currently found outside of formal protected areas. We recommend that all of these high quality habitat areas are added to the formal protected area network. If this is done it will greatly contribute to the long-term survival of at risk species.

### Background

In the 1990s, Australian federal, state and territory governments agreed to a Comprehensive, Adequate and Representative (CAR) reserve system, with the intention to protect 15% of area of pre-European forests and the full range of the biodiversity that they support.

The JANIS\* technical working group drafted criteria on which to base a CAR reserve system, with objectives of biodiversity conservation for forests included:

- to maintain ecological processes and the dynamics of forest ecosystems in their landscape context;
  - to maintain viable examples of forest ecosystems throughout their natural ranges;
  - to maintain viable populations of native forest species throughout their natural ranges; and
  - to maintain the genetic diversity of native forest species.
- \* Joint ANZECC/MCFFA NFPS Implementation Sub-Committee (JANIS)

As such, the CAR reserve system includes:

1. dedicated reserves, which mostly align with the IUCN definition of protected areas, and in Victoria are legislated under the *National Parks Act 1975*; and
2. informal protected areas are also set aside for conservation purposes in forests that are otherwise production forests. They are indirectly enforced by legislation and declared under forest management plans and a code of forest practice but can be amended without change to legislation.

There has been expansion of the Australian reserve system in recent decades, however some of Australia's threatened species do not occur in reserves and many may not have enough of their range in the protected areas network. Therefore, reserve systems are not yet fully ecologically representative.

Some of these unprotected forested zones are subject to logging. As these forests are harvested and replaced with very young forests, they are losing many of the features that threatened forest-dwelling mammals and birds depend on, like large old hollow-bearing trees.



Old growth mountain ash forest in the O'Shannassy catchment. Photo: David Blair



Leadbeater's possum nest box.  
Photo: David Blair

## Research Aims

We aimed to assess how well the current reserve system in Victoria protects a suite of more than 70 threatened forest-dependent species across multiple Ecological Vegetation Class (EVC) Groups. EVC Groups are vegetation communities that share habitat and environmental characteristics and where similar ecological processes take place.

We posed three questions:

- How well are the different EVC Groups represented in the Victorian reserve system?
- How well are the 70+ threatened forest-dependent species represented in the reserve system?
- How are the different types of protected areas distributed across the Victorian landscape?

The information from the study will provide guidance to decision makers about which areas are the highest priority to add to the existing dedicated reserve network in order to support the protection and persistence of all forest dependent species and ecological communities.

The findings will be relevant to both conservation and forestry policy and planning.

## What we did

We used spatial data to analyse land use and cross-validated it with regional land-use maps and satellite data, along with forest zoning information and protected area boundaries.

We also used the forest management zone data to identify areas where commercial logging takes place and where it is prohibited within the informal protected area network. This included identifying steep terrain and water courses with buffers where logging would be excluded. We used Victorian Government-developed EVC data to identify 20 broad vegetation types, including Wet and Damp Forests, Rainforests, Dry Forests and Mallee, and applied the data across all land tenures throughout Victoria.

Next, we looked at historical and proposed logging data to analyse the EVC Groups targeted by commercial

logging activities and the gross area planned for logging by the Victorian Government owned commercial forestry business, VicForests. We used habitat distribution models developed by the Arthur Rylah Institute for more than 70 species that were identified as solely dependent on Victorian native forests for habitat. The models incorporated typical environmental characteristics that each species is known to favour, such as elevation, soil type, aspect and slope, as well as tree age for hollow-nesting species like the Critically Endangered Leadbeater's possum.

Finally, we used a program called Zonation whose algorithms enabled us to rank the conservation value of landscapes and how "irreplaceable" they are for achieving representation of suitable habitat for each of the 70+ threatened species.

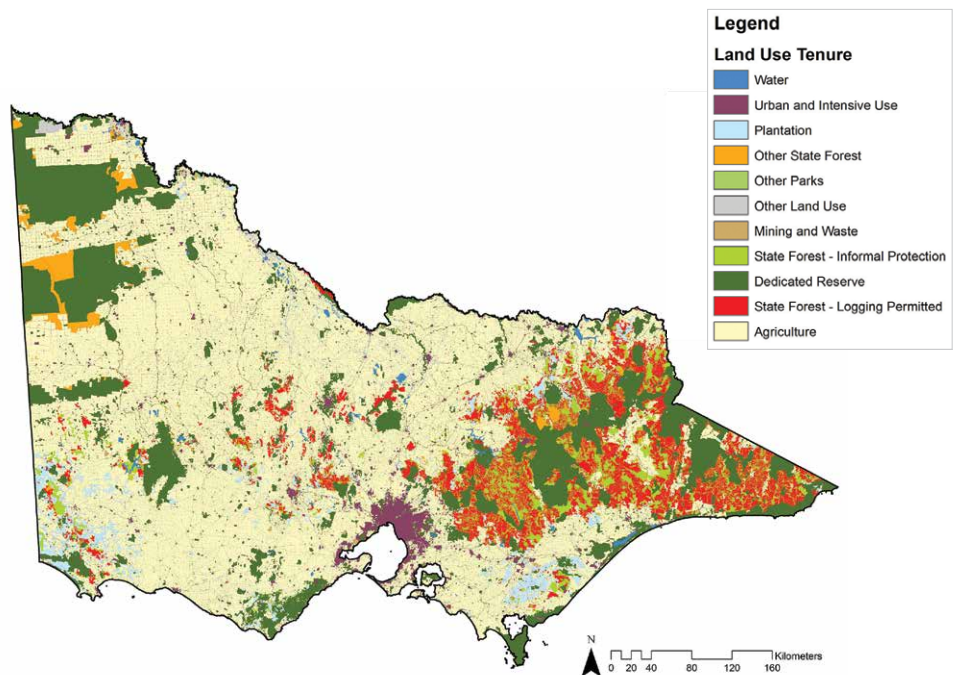


Figure 1: Land tenure and forest management zones across Victoria. Red indicates state forests where logging is permitted. These logging zones are concentrated in areas with higher rainfall and more productive soils, which is in conflict with the conservation of biodiversity in these areas. Taylor and Lindenmayer 2019.

Leadbeater's possum is dependent on hollows and prefers hollows in very large old trees.  
Photo: D Lindenmayer and M Greer



## Key findings

Our zonation analysis revealed that EVC Groups on more productive and economically valuable land were afforded less protection than those on less productive land.

The largest land tenure in Victoria is agriculture (58% of the state's land area), followed by conservation reserves and other protected areas (19%), then state forests (14%). Around 1.7 million hectares or 8% of the state's total land area is state forests, which is covered by zones where logging is permitted. Plantation forests cover 3% of Victoria.

Native vegetation (EVC Groups) cover 10.3 million hectares across Victoria, which equates to 45% of the state's land area. We found that the proportion of each EVC Group in dedicated reserves was highly variable: ranging from 73% for Mallee and 31% for Wet and Damp Forest. Wet and Damp Forest also has the largest proportion covered by state forest where logging is permitted (36%). Nearly 260,000 hectares or 19% of the Wet and Damp Forest EVC Group has previously been logged, 74% of this by clearfelling.

We found that Victoria's reserve system does not contain enough habitat of this EVC Group to conserve native forest-dependent species and ecological communities.

This Wet and Damp Forest EVC requires higher levels of protection in order to adequately conserve native species inhabiting this EVC.

This EVC has historically been subject to the highest levels of commercial logging, and currently has the least areas in protected areas (as a percentage of the total EVC area).

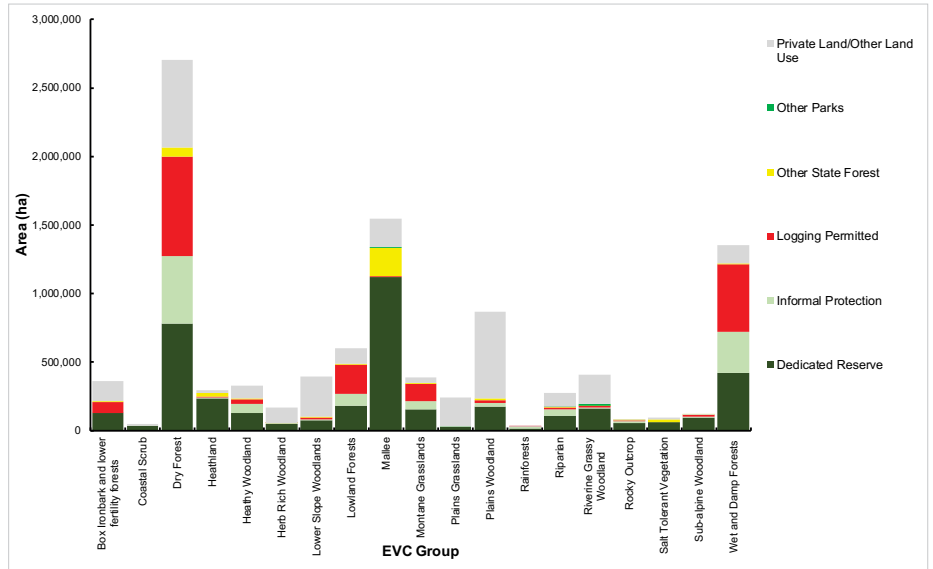


Figure 2: Land tenures across Victoria's Ecological Vegetation Class (EVC) Groups. Each column shows the extent in ha of one EVC. Colours within each column show the proportion covered by different land tenures. Dark green is dedicated reserve. Yellow, light green and red are state forest under different zones: light green being informal protection and red being logging permitted. Taylor and Lindenmayer 2019.

The EVC Group covering the most land is dry forest (2.7 million ha) and of this 47% is covered by state forest. Next greatest in extent is Mallee (1.54 million ha) of which 73% is in dedicated reserves. Third in extent, Wet and Damp Forests (1.35 million hectares total) has the largest proportion in state forests of any EVC Group (59%).

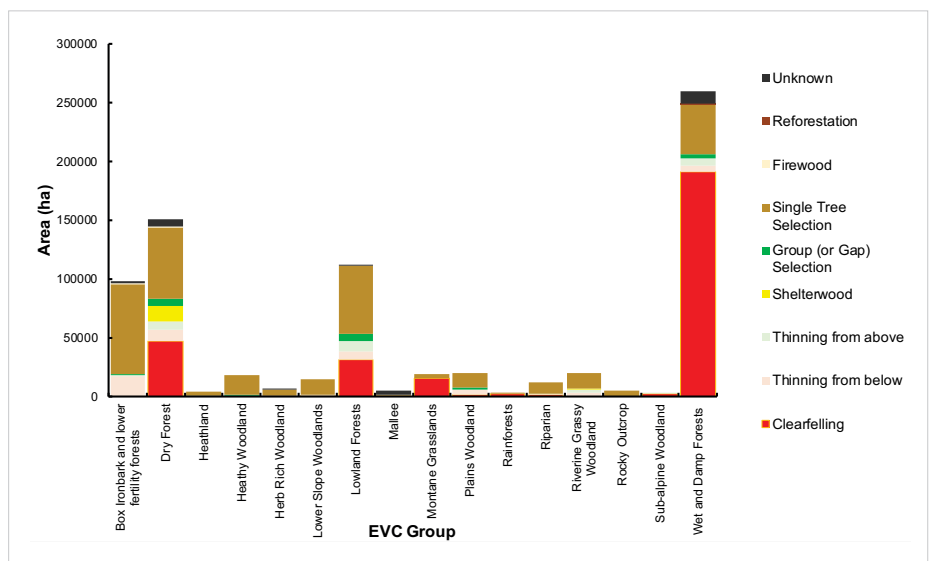


Figure 3: Historic logging across all Victorian EVC Groups. The Wet and Damp Forests EVC Group has had the most land logged. Of this EVC group, 74% of it was clearfelled. Taylor and Lindenmayer 2019.





Mountain ash forest trees. Photo: David Blair, ANU

## Key findings (continued)

### Boundary effects

We found that informal protected areas had much greater boundary effects than land within dedicated reserves. Overall, across all EVC Groups, the median distance for a random point inside a dedicated reserve to a boundary was 1756 metres, but only 150 metres within informal protected areas in state forests.

The most fragmented areas were within the Wet and Damp Forests EVC Group across informal protected areas in state forests. For this EVC Group, the median distance for a random point inside an informal protected area was only 71 metres,

while the distance was 1700 metres within dedicated reserves. The effects of close proximity to boundaries where logging occurs can include microclimatic changes such as higher temperatures and lower humidity that have implications for the survival of the threatened species that inhabit them.

For the Dry Forest EVC Group, the median distance to a boundary was 1232 metres within dedicated reserves but 180 metres within informal protection areas of state forests. For the Mallee EVC Group, the median distance to a boundary is 5209 metres within dedicated reserves.

### This factsheet summarises the key findings of:

Taylor, C., Lindenmayer, D.B. (2019). The adequacy of Victoria's protected areas for conserving its forest-dependent fauna. *Austral Ecology* 44, 1076–1090. <https://doi.org/10.1111/aec.12805>

### This research also builds on research published in:

Lindenmayer, D & Sato, C (2018), Hidden collapse is driven by fire and logging in a socioecological forest ecosystem. *PNAS*. 115/20, 5181-5186. <https://doi.org/10.1073/pnas.1721738115>

Taylor C, Cadenhead N, Lindenmayer DB, Wintle BA (2017) Improving the design of a conservation reserve for a Critically Endangered species. *PLoS ONE* 12(1): e0169629. <https://doi.org/10.1371/journal.pone.0169629>

## Implications

The Wet and Damp Forests EVC has historically been subject to the highest levels of clearfelling and this impact has been exacerbated by large-scale fires. It currently has the smallest proportion of land formally protected of any Victorian EVC.

Some species inhabiting this EVC, such as the Critically Endangered Leadbeater's possum and the Vulnerable greater glider, are undergoing severe declines. Victoria's formal protected area network does not currently contain sufficient high value habitat for the long-term persistence of viable populations of native species within this EVC. Informal protected areas are not currently providing an adequate complementary contribution to the formal reserve system to satisfy the needs of these species.

If all existing high value habitat areas within this EVC that are currently outside formal protected areas are added to the formal protected area network it will greatly contribute to the long term persistence of these species. If habitat critical to the survival of species, like the Leadbeater's possum and greater glider, is not protected from impacts such as boundary effects from within commercial forestry zones, it will reduce the conservation value of these areas for these species, and may contribute to their extinction.

## Further Information

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