Dandenong Ranges Windstorm: Forest Recovery Monitoring

Project update, June 2025

Arthur Rylah Institute report to:

Natural Environment Program, Port Phillip Region

Bushfire and Forest Services, Port Phillip Region

Key Messages

- Forest recovery monitoring was established at two sites in the Dandenong Ranges, where a severe storm in June 2021 had felled thousands of trees.
- Surveys in 2022 and 2025 found that: understorey plants were regenerating vigorously; eucalypt germination was limited by fallen logs and may not replace fallen trees; and blackberries were increasing in cover.
- Ongoing monitoring is important to track forest recovery and assess the effects of future management and planned burns on regenerating plants.

Dandenong Ranges Windstorm

A severe windstorm occurred in the Dandenong Ranges in June 2021, which brought down thousands of eucalypts, affecting more than 220 hectares of forest. There was uncertainty about the long-term effects that this event would have on regeneration of trees and understorey plants, as there were few studies on the effects of windthrow on Australian temperate forests.

Forest Monitoring Aims

The aim of this monitoring project was to assess the regrowth of forest canopy trees and understorey plants in windthrow areas of Dandenong Ranges National Park (DRNP), and the effects of fallen trees and debris on the regeneration of plants. The data collected will help inform management decisions on forest recovery in the Dandenong Ranges including fuel management and planned burning, and priorities for weed control. Funding was provided by the Victorian Storm and Flood Recovery Program.

Methods

Monitoring plots were established at two sites where most trees were windthrown, resulting in minimal canopy retention and a large proportion of the ground being covered in logs and woody debris (Figure 1). These were: Olinda-Bartlett Track (Wet Forest and Damp Forest) and Kalorama-Track 12 (Shrubby Foothill Forest and Lowland Forest). There was a planned burn at the latter site a few months prior to the storm.

At each site, eight windthrow plots and two control plots were established, each plot measuring 10 m × 4 m. In March–May 2022, data were collected in each plot on: the number of mature standing live trees; volume of coarse woody debris (m^3); number of seedlings and juveniles of tree species; and percent cover of individual plant species including weeds. Counts of tree seedlings and juveniles, and cover estimates of all plant species were repeated in December 2024–January 2025. The low number of control plots limits comparisons to the windthrow plots, but changes in vegetation in the windthrow plots though time will be informative.

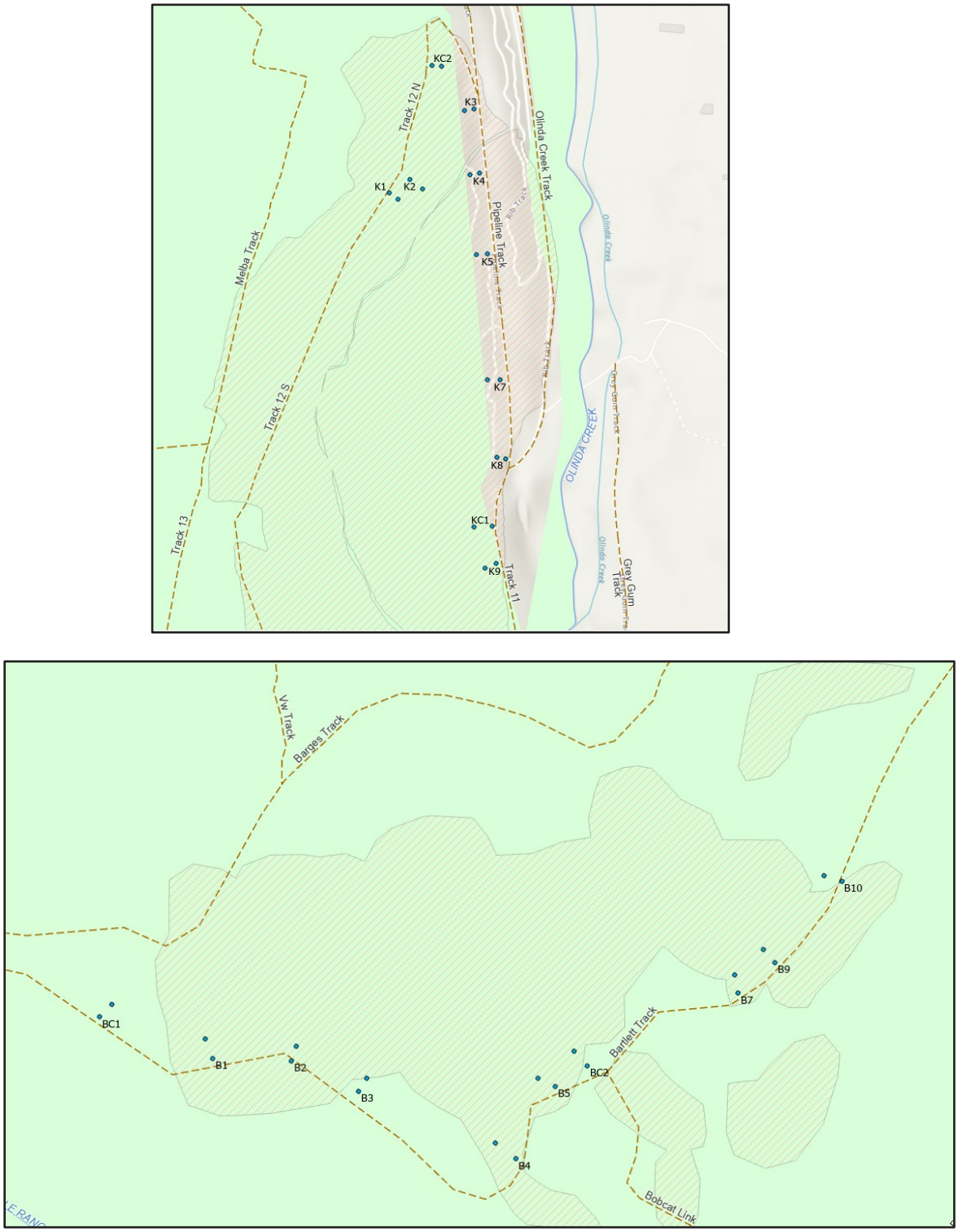


Figure 1: Windthrow monitoring plots in Dandenong Ranges NP: Wet–Damp Forest site (top); Shrubby Foothill–Lowland Forest site (bottom).

Hatching represents area of windthrow from aerial mapping (some minor variation was present on ground). Dots represent the monitoring plots, two at each position along the track. BC1, BC2, KC1 and KC2 are control plots.

Results

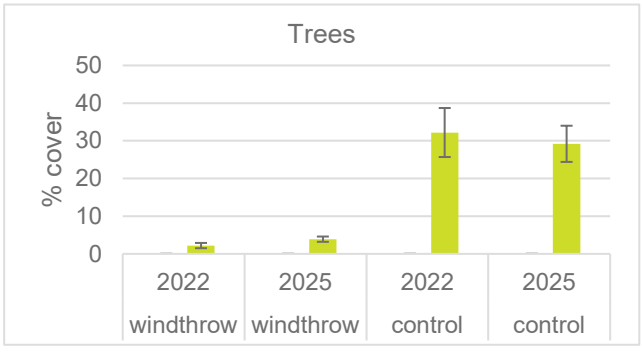
Wet – Damp Forest

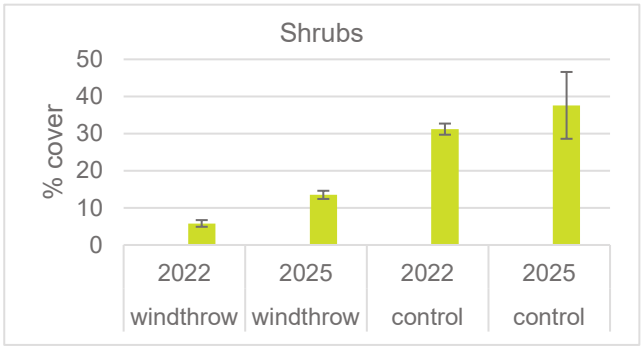
Nine months after the windstorm (2022 survey) there were only 30 mature standing canopy trees per hectare (Mountain Ash, Mountain Grey-gum, Blackwood), and a very high volume of coarse woody debris (779 m^3/ha). Germination of tree species occurred in areas of disturbed soil, such as exposed root balls of fallen trees, and the 2025 survey recorded 130 seedlings and juveniles per hectare (reduced from 190 in 2022).

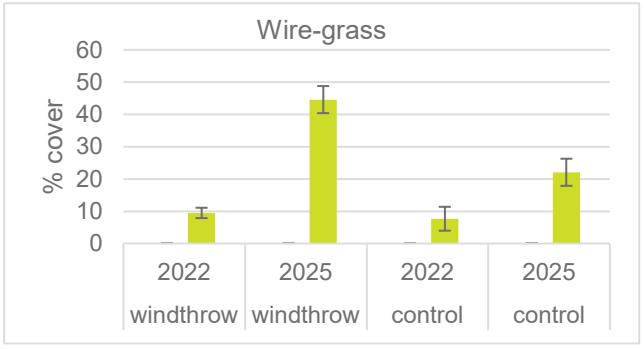
Forest Wire-grass was the dominant lifeform in the windthrow plots by 2025, with an average cover of 44.6% (± 4.2), but was less prominent in the controls (22.1% ± 4.2). Large shrubs (e.g. Musk Daisy-bush, Hazel Pomaderris) had a substantially lower cover in the windthrow plots (13.5% ± 1.1) in 2025 compared to the controls (37.6% ± 9). The average cover of woody weeds such as Blackberry was low (<1%) but showed an increase over time.

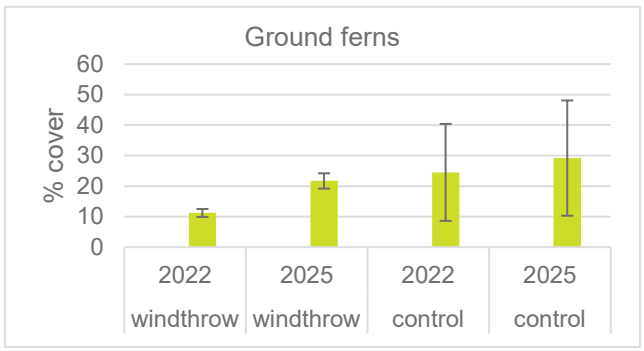
Table 1: Mature trees, tree seedlings, and coarse woody debris in windthrow and control plots at Wet–Damp Forest site. The data have been scaled up from survey plots.

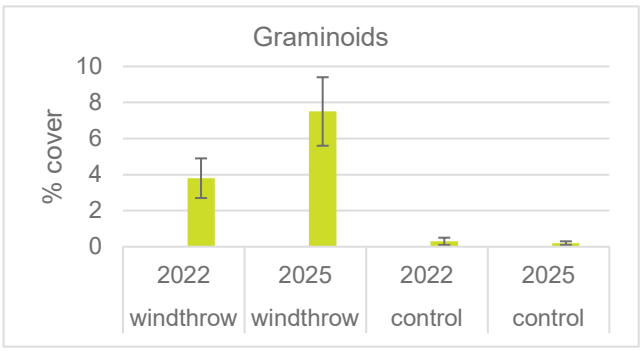
	Survey year	Windthrow	Control
Mature standing canopy trees (number/ha.)	2022	30	250
Logs and branches ≥ 10 cm diameter (m^3/ha.)	2022	779	55
Seedlings and juveniles of tree species (number/ha.)	2025	130	0
Woody weeds (% cover average)	2025	0.3	0











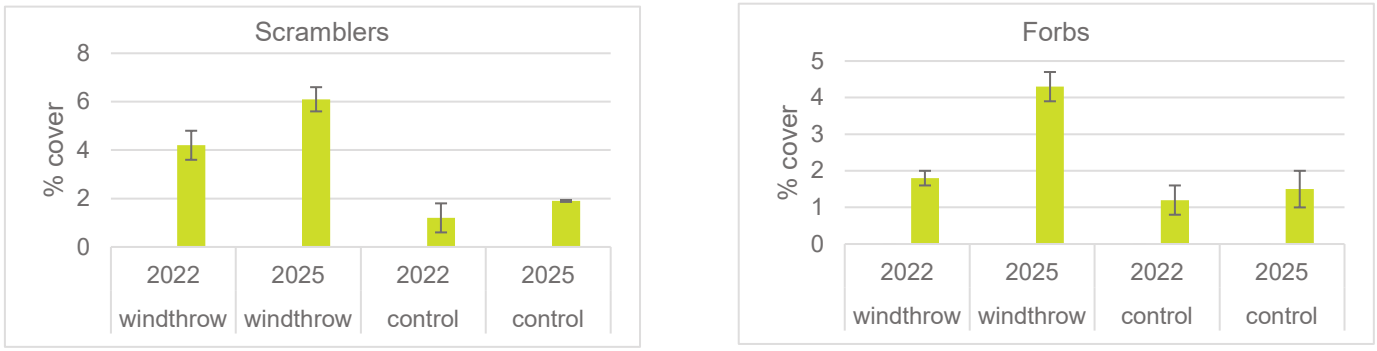


Figure 2: Mean percentage cover (±SE) for different life-forms at Wet–Damp Forest site.
Results for surveys in 2022 and 2025 in windthrow and control plots

Figure 3: Plot B3a in Wet–Damp Forest site, 2022 (left: at 5m from track looking up. right: at 15m from track looking down).

Shrubby Foothill – Lowland Forest

Nine months after the windstorm (2022 survey) there were 160 mature standing canopy trees (Brown Stringybark, Messmate, Narrow-leaf Peppermint, Silvertop Ash), and a very high volume of coarse woody debris (707 m^3/ha). The 2025 survey recorded 880 seedlings and juveniles of tree species (reduced from 1660 in 2022), and many of these were likely to have germinated after the planned burn in April 2021, which preceded the windstorm.

Shrubs (commonly Rough Bush-pea and Dusty Miller) were dominant, increasing from 15% (± 1.7) in 2022 to an average cover of 43.1% (± 3.1) by 2024, and were also common in the controls. In contrast, Austral Bracken decreased in cover between the two survey periods in the windthrow plots, down from 9.2% (± 0.7) in 2022 to 4.8% (± 0.4) by 2024. Blackberry was found in the windthrow and control plots, at a cover of less than 1%, but increased over time in the windthrow plots. The FFG listed threatened species, Powelltown Correa and Victorian Flat-pea, were recorded in the monitoring plots.

Table 2: Mature trees, tree seedlings, and coarse woody debris in windthrow and control plots at Shrubby Foothill–Lowland Forest site. The data have been scaled up from survey plots.

	Survey year	Windthrow	Control
Mature standing canopy trees (number/ha.)	2022	160	310
Logs and branches > 10 cm diameter (m^3/ha.)	2022	707.5	145
Seedlings and juveniles of tree species (number/ha.)	2024	880	1000
Woody weeds (% cover average)	2024	0.2	0.05

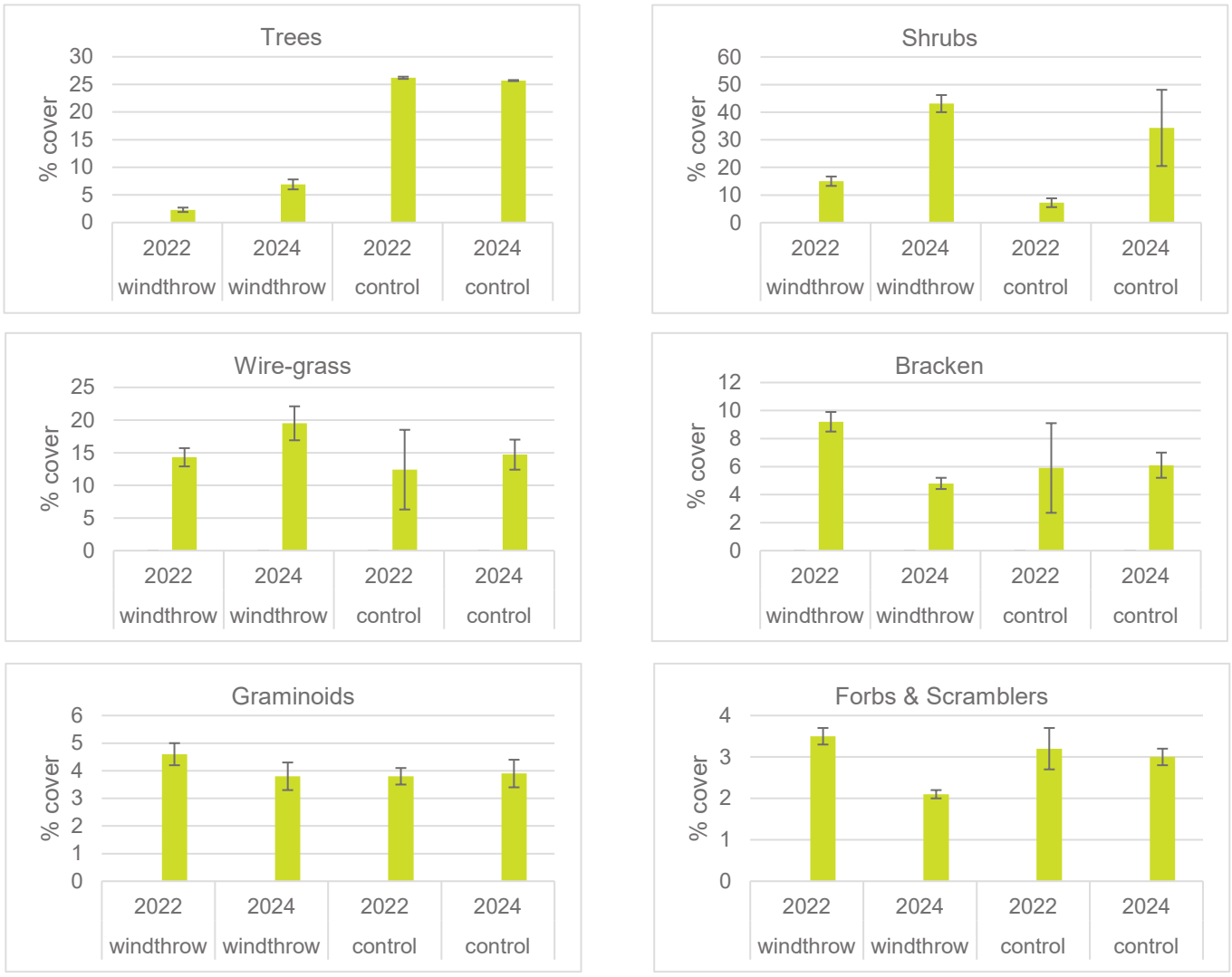


Figure 4: Mean percentage cover (±SE) for dominant life-forms at Shrubby Foothill–Lowland Forest site. Results for surveys in 2022 and 2024 in windthrow and control plots

Figure 5: Plot K3a in Shrubby Foothill–Lowland Forest site, 2022 (left: at 5m from track looking up. right: at 15m from track looking down).

Forest recovery by 2025

Understorey vegetation in the windthrow plots is showing a trajectory of recovery since the storm, responding to the increased light availability. By 2025, wire-grass had the highest cover at the Wet–Damp Forest site, whereas shrubs were the dominant lifeform at the Shrubby Foothill–Lowland Forest site. However, there may not be sufficient eucalypt germination to replace the large number of trees felled in the storm at the Wet–Damp Forest site, because of fallen logs and resprouting plants covering the ground. At the Shrubby Foothill–Lowland Forest site there are larger numbers of juvenile eucalypts as a result of the planned burn that preceded the storm. Weeds such as Blackberry had a low cover, but these were increasing and will need to be controlled to prevent further spread.

Management challenges

Managing both fire risks and biodiversity values in the windthrow-affected areas of DRNP is challenging. Implementation of planned burns at the Shrubby Foothill–Lowland Forest site has increased safety risks due to fuel loads from the large quantity of coarse woody debris and the rapidly regenerating understorey vegetation. Planned burns also pose risks for the regenerating forest plants. Small stemmed juvenile eucalypts may not survive burning, and understorey plants are damaged by mechanical removal of woody debris. Intervals between fires can affect the persistence of threatened plant species at the site.

This monitoring program provides an important baseline for improved understanding of how forests recover from a windstorm event, and the outcomes of management interventions such as planned burns in the windthrow areas. Long-term monitoring is needed to achieve these aims, and the plots are due to be re-surveyed in 2027 and 2032.

Further reading

Fairman, T.A., Nitschke, C.R. and Bennett, L.T. (2015). Too much, too soon? A review of the effects of increasing wildfire frequency on tree mortality and regeneration in temperate eucalypt forests. *International Journal of Wildland Fire* **25**. doi.org/10.1071/WF15010

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Banner Photo: Windthrow in the Dandenong Ranges [image credit: Megan Pollock]

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