



WIND DAMAGE

Broken and uprooted trees caused by severe wind events can result in large value losses for forest growers. Extreme winds, including subtropical cyclones, are predicted to become more frequent in New Zealand.

MANAGING WIND RISKS

Severe wind events cause value losses in forests through reduced revenue, high salvage costs and decreased estate value, including potential carbon liabilities.

Extreme wind events involve gales of high velocity and short duration can cause large areas of forest damage. These storms and their damage patterns are difficult to predict. The most damaging storm event in New Zealand was Cyclone Bola, which destroyed 27,000 hectares of planted forests in 1988.

Strong winds frequently cause scattered damage in forests. Although much less noticeable than catastrophic storm damage, the accumulative effect can be significant in terms of volume loss and negative impacts on wood quality. Damage often occurs around gullies and stand openings, particularly those created from harvesting operations.

Forests can be managed to reduce wind-related risks.

► **Site** - Certain landforms and soil types make trees vulnerable to wind damage. Gullies are at risk because they tend to funnel the wind, and gully bottoms have higher soil moisture content which can reduce root anchorage strength. Soil types or features that encourage shallow rooting can reduce tree stability.

- **Species** - Radiata pine is considered more susceptible to wind damage than many other species, particularly in saturated soils. Douglas-fir tends to be more stable due to its plate-like root structure and more flexible crown.
- **Silviculture** - Any action that opens up the stand can increase wind risk. For example, late thinning (over 18 m mean top height) significantly increases the risk of value loss from wind damage.
- **Rotation age** - As trees get larger they become more vulnerable. Damaged areas in historical wind events have been concentrated in older age classes, especially radiata pine stands over 30 years old.





SALVAGING LOGS

Salvaging logs following a wind event can be a costly and dangerous operation. It is important to prioritise high value stands to ensure the best recovery of high value logs. Research by Scion shows that the rate of log deterioration is influenced by the following factors:

Bark protection - Trees toppled by wind tend to deteriorate at a slower rate than processed stems. This is because storm damaged stems typically remain protected by a high proportion of intact bark.

Air temperature - Less time is available for log recovery during spring and summer than in autumn and winter. The available salvage period is shorter in warmer regions such as the northern North Island, especially during summer.

Moisture levels - Unlike snapped stems, uprooted trees can obtain moisture from the ground, keeping the wood green for longer. Trees that remain rooted after windthrow during winter can stay in good condition for up to a year.

For more information on wind risk management contact john.moore@scionresearch.com

Climate change will affect planted forests in New Zealand

Over the next two or three forestry rotations, NIWA projects the following likely climate trends in New Zealand:

- Warmer by 2.0°C (mid-range projection)
- Wetter in the west and drier in the east
- More extreme weather events

Some of these changes will create opportunities. Others will require higher levels of risk management.

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PLANNING FOR WIND EVENTS

In New Zealand, wind damage in planted forests is relatively common and likely to get more so. It is therefore advisable for forest growers to manage and prepare for wind risk, just as they do for fire risk.

- **Monitor and record** - Accurate historic records of wind damage can help forest managers to identify high-risk sites. Planting more windfirm species on vulnerable sites may be worth considering.
- **Consider different silvicultural options** - Framing stands tend to have lower risks of wind damage due to higher stockings and lower harvesting age.
- **Harvest planning** - Careful location of harvesting boundaries, and the order in which stands are harvested, can significantly reduce the risk of damage to adjacent stands.
- **Management plans** - Forward planning helps managers to ensure they have the capability to respond after a serious wind event. Salvaging operations require specialised skills and training.
- **Log storage** - Wood is affected by sapstain as it dries out. Forest managers can buy themselves more time in a salvage operation by setting up sprinkler systems around log piles.

Forest owners who receive carbon credits under the Emissions Trading Scheme may face carbon liability risks if wind damaged stands are not replanted.