

Chapter 9

Steep slope harvesting and the environment



In this chapter you will find out:

- ✓ How winch-assist can affect the environment.
- ✓ Why winch-assist can create a lighter footprint on the ground than an unassisted machine.
- ✓ Ways to improve environmental outcomes.

Environmental challenges of winch-assisted systems

Environmental problems usually only occur when things are pushed, rushed, wrong options are chosen, or when people don't know or care.

Many companies aim to fully mechanise felling and extraction for health and safety and other benefits.

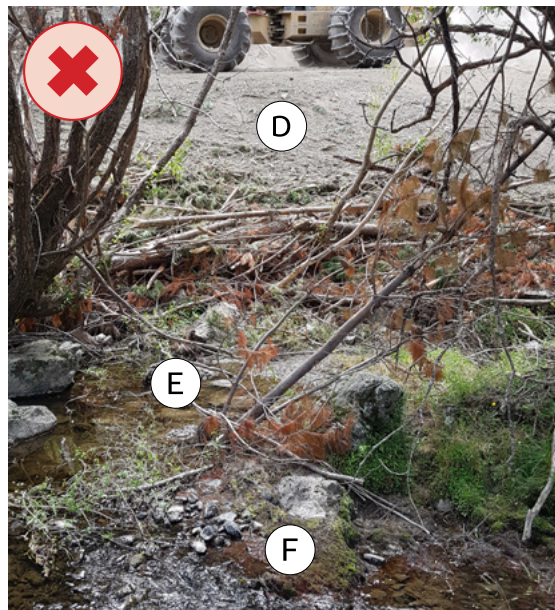
At times, this has put pressure on environmental outcomes. Winch-assist puts machines in places previously not accessible. For example, shovel logging, especially uphill, can lead to heavy rutting.



- It was logged in the wet so the SSH had poor traction.
- The good soil has gone and the tracks struggle to grow grass.
- The tracks channeled rainwater and they've scoured.

Many parts of New Zealand have thin and relatively fragile soils, and when exposed to heavy rainfall, it can create erosion and sedimentation. Ground-based equipment can potentially damage soils through excessive rutting or compaction. Rutting on steep slopes may also cause water redirection or concentration and result in erosion and sedimentation. Soil damage will affect the growth of the next rotation.

Poor winch-assist planning creates environmental risks, especially where winch-assist is in conjunction with traditional ground-based grapple extraction. This typically leads to downhill logging and extraction. Tracks are often a significant source of sediment, which can impact waterways. Also, mid-slope contour tracks may be needed, especially where the slope is longer than the winch rope. These open steep slopes to erosion, often by soil slip.



- A The winch-assist operator did a good job
- B An extraction track was built in a perennial river
- E Debris in a river
- F The river turns to mud when it rains

- C The loggers didn't remove the crossing
- D The track is too close

Also:

- Downhill logging to the waterway created environmental non-compliance.
- Improved planning and operational management could have created a much better outcome.

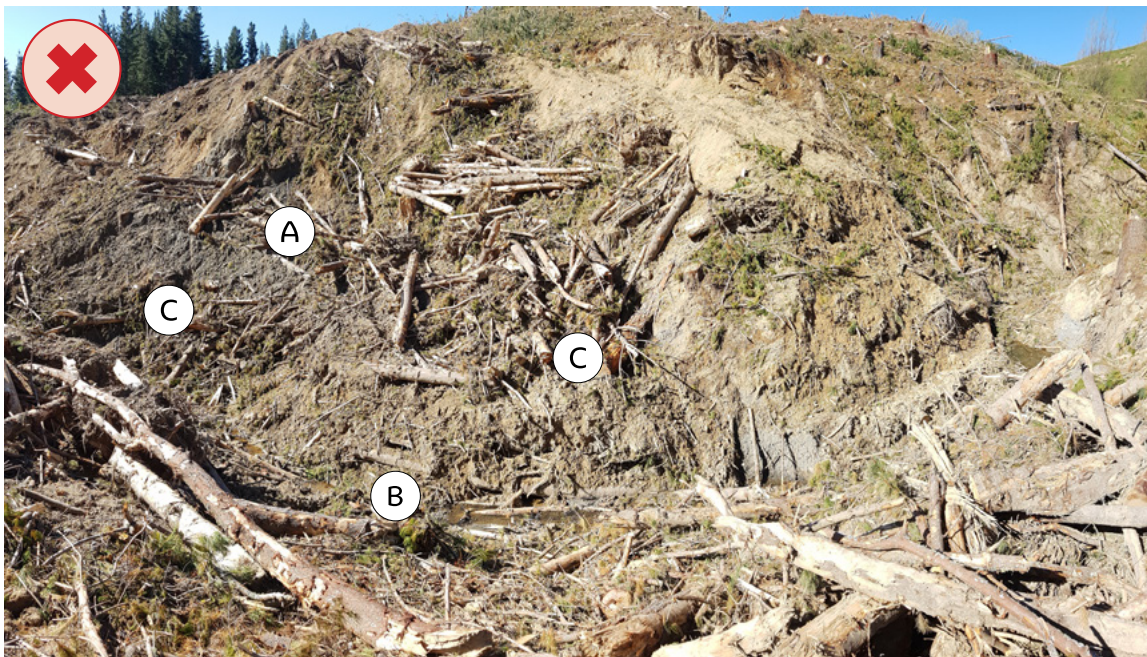


A A light rainfall created sediment into the side creek that went into the main river

B The river has silt over the stones and is not good habitat for fish, even a km downstream

C The trout river upstream is clean and good for fish

Machine felling does not always give the best environmental outcome, especially for the tricky areas that machines either struggle to access or require tracking.

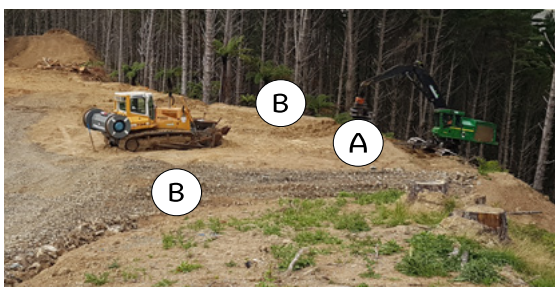


This small 0.2 ha area could have been hand felled, then extracted with the hauler, rather than tracked and machine felled, leading to NES-PF non-compliance.

- A The track was cut for the felling machine
- B The creek has fill in it
- C Logging slash is in or could slip into the workway

Winch-assist rope is often dragged through the edge of landings and roads. This is because the anchor machine needs to sit back far enough so the steep slope harvesting machine can be lowered off

the slope, and the road because landing edges are often built of fill that lacks good anchoring strength. This creates an erosion and sedimentation problem if the site is not remediated after harvesting.



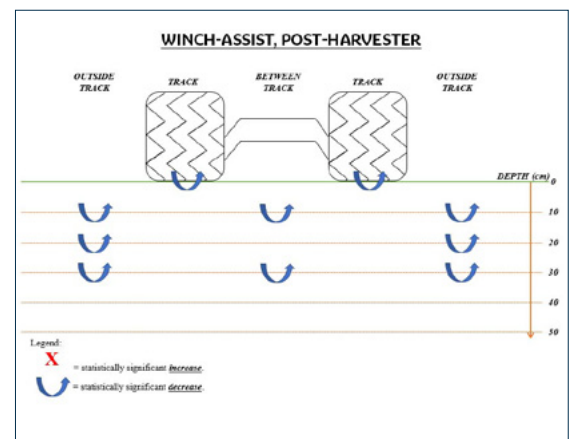
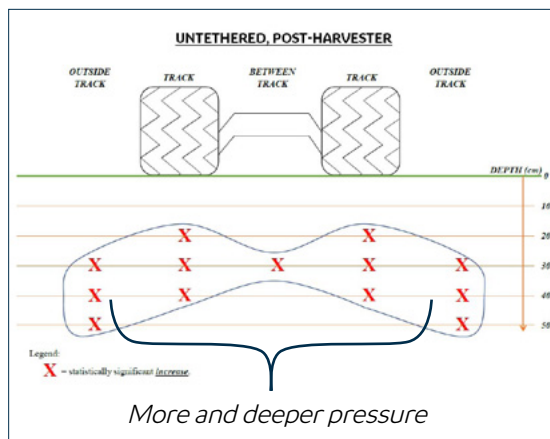
- A Ropes are carving through bund and landing fill. These need to be rehabilitated after harvesting
- B The road and landing have been engineered to control water, and reduce sedimentation as required by the NES-PF

Winch-assist has a lighter footprint than other ground base systems

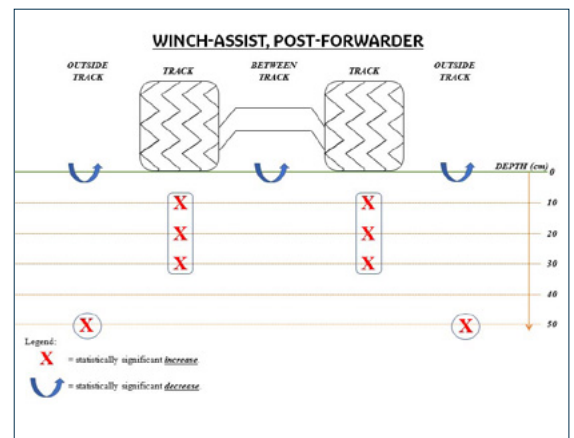
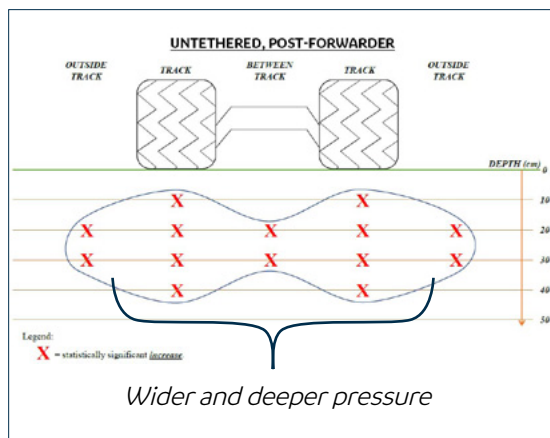
Winch-assist decreases the machine's tracks pressure on the soil. It also improves how pressure is distributed. These increase machine mobility and stability. The reduction in ground pressure and reduced track slip and rutting also helps reduce soil disturbance.

When moving downhill, tracks are engaged better throughout their entire length giving better mobility. Also, ground pressure concentrations decrease, creating less soil disturbance and more stability.

Uphill operation is improved by better distributing ground pressures.



Left: This diagram shows the pressure distribution from the machine's tracks. Right: on winch-assist both the amount of pressure reduces and the impact of soil pressure in deeper soil.



Left: An untethered forwarder has a much wider and deeper pressure distribution than a winch-assist, at right.

Five critical environmental questions for operators

Operators can make a big difference in how the job finally looks. Maintaining the soil for future forests, and reducing the impact on our waterways for kaimoana, are important operator responsibilities.

1. Is it too wet to work without heavily damaging the soil through slipping?
2. If ruts were made, would they concentrate water and scour out?
3. Could your ruts lead to sediment in a waterway?
4. Are your company's wet weather guidelines right for the location you are in, or are you stopping when it is too wet?
5. What thing can you do to minimise your machine's impact on the soil?



Don't work when it's too wet. You'll make a mess—work easier areas if possible.

Put slash on your tracks. It's easy to do.

Environmental guidelines

The National Environmental Standard for Plantation Forestry (NES-PF) requires a management plan for almost all forestry earthworks and all harvesting. Putting in tracks for the anchor machine or extracting logs is considered to be earthworks.

What the management plan says and what happens in the field need to be the same. Operations in the field need to meet the requirements of the NES-PF permitted activity conditions or the resource consent.

- Planning must incorporate the potential environmental risks of winch-assist. Understanding the impact of winch-assist on steep environmentally sensitive soils is fundamental to the task.
- Communicate site-specific environmental requirements to the harvesting contractor. Incorporate into operational paperwork.
- Monitor operations and stop when working would cause unreasonable soil compaction and erosion and sedimentation. Resume when site conditions are satisfactory. Closely monitor operations where soil compaction or erosion and sedimentation are likely to be an issue.
- Limit loss of traction. Operators must reduce slipping, e.g. maintain a constant tension and not push the machine too hard, instead rely on the rope.
- Use slash across any ruts to reduce the impact on the soil when the harvest area is not hauler logged.
- Use tire tracks on wheeled machines to help prevent wheel slip or spin.
- Rehabilitate winch-assisted machine ruts as they are finished. There is unlikely to be a cleanup machine.
- Use winch-assist on less steep ground than normal if without it would otherwise cause unreasonable soil damage.



The rope gives extra traction and reduces rutting and slipping.