

# Monitoring wilding control on Flock Hill station

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# Objective of wilding control on Flock Hill

Elimination on 90% of the property

2011

To try to return from this  to this 

1979





# Monitoring is vital to prove objective is being achieved

**To be believable it *must be evidence based*.**

Must be convincing - anecdotes will not ensure on-going funding

Desired monitoring outcomes:

- Quality assurance for management (is control working?)
- Composition of wildings (species, age/size, density etc)
- Comparison of control methods (efficacy)
- Future planning (prioritisation)
- Knowledge gains

# Different intensities of monitoring



Increase in effort (cost) BUT real time  
and knowledge gain

- Measuring related variables such as costs and their trend over time

*“costs are minimal for such desk-top monitoring, but money spend does not measure quality or efficacy, just effort; also requires multi-year data”*

- Single assessment after control

*“provides a simple measure of control and shows what has been missed (# alive trees found)”*

- Baseline assessment, plus remeasurement over time

*“Highlights trends over time, and areas of weakness eg., missed wildings, ongoing invasion events*

# Enabling a citizen science approach

- Providing a simple tool
  - Enabler: Smartphone app (ODK) with specifically designed data entry form
- A simple design
  - Random starting points of transects; 20-30 m distance between plots of 25m<sup>2</sup>; usually 10 plots per transect
- Upload into cloud – stored in database accessible to analyst or manager
- Automated data analysis and report creation
- *Paper-less*




Send to cloud database




A screenshot of a web-based data management interface. It shows a table with columns for various data points, including a unique identifier, date, time, and several numerical values. There are also checkboxes and a 'View' button for each row. The interface is titled "PilotmonitoringV1" and includes a search bar and a filter dropdown.

Script to generate automatic report

# Simple monitoring – the ODK way



The image shows a person wearing a hat and a dark jacket, standing in a field of dry grass and shrubs, looking at a mobile device. To the right of the person is a screenshot of the 'Plotmonitorin...' mobile application interface. The app has a white background with a top bar containing icons for a clipboard, a save icon, a location pin, and a menu. The main screen is divided into two panels. The left panel contains a message 'GPS coordinates can only be collected when outside.' above a 'Start GeoPoint' button. Below this are input fields for 'Control area (transect)', 'Plot-number', 'your name please', and 'Plotsize in sq.m', followed by a 'Take a picture:' label and a 'Take Picture' button. The right panel is titled 'Wilding species (1)' and lists several species with radio buttons: Pinus contorta, Pinus sylvestris, Douglas-fir, Larch, Mountain pine, Radiata pine, Corsican pine, and Ponderosa pine. Below the list are three more input fields labeled 'Tier 1a (≤0.1m) live', 'Tier 1a (≤0.1m) dead', and 'Tier 1 (>0.1≤0.5m) live'.

Plotmonitorin...   

GPS coordinates can only be collected when outside.

**Start GeoPoint**

**Control area (transect)**




**Plot-number**

**your name please**

**Plotsize in sq.m**

**Take a picture:**

**Take Picture**

Plotmonitorin...   

Wilding species (1)

**Wilding**

☐ Pinus contorta

☐ Pinus sylvestris

☐ Douglas-fir

☐ Larch

☐ Mountain pine

☐ Radiata pine

☐ Corsican pine

☐ Ponderosa pine

**Tier 1a (≤0.1m) live**

**Tier 1a (≤0.1m) dead**

**Tier 1 (>0.1≤0.5m) live**

- Circular 25m<sup>2</sup> plots
- Cattle tag plot marker
- 20-30m apart on a 10-plot transect
- All plots GPS'ed and photographed
- Data gathered on species and size classes, coning
- Can also gather data on vegetation cover
- All data sent to processor at day's end (no transcribing)
- Report generated automatically (with map)



# Simple monitoring – Flock Hill transect location

- Progress has been measured since 2014
- 28 transects initially installed (c.300 plots)
- 5 lost to pasture development
- 11 transects (114 plots) remeasured in 2020
- Remainder will be measured in 20/21 summer

## Monitoring objectives:

- Measure of wilding reduction
- Species, size/age, density
- Comparison of different control methods
- Telling the control story over time
- What to do next



# Nearly all the Flock Hill plot areas have received some sort of control



Aerial boom spray



Ground - spray



Ground - cut



Fire



Ground - volunteer

Contractors



**Great variability of control in a single area**



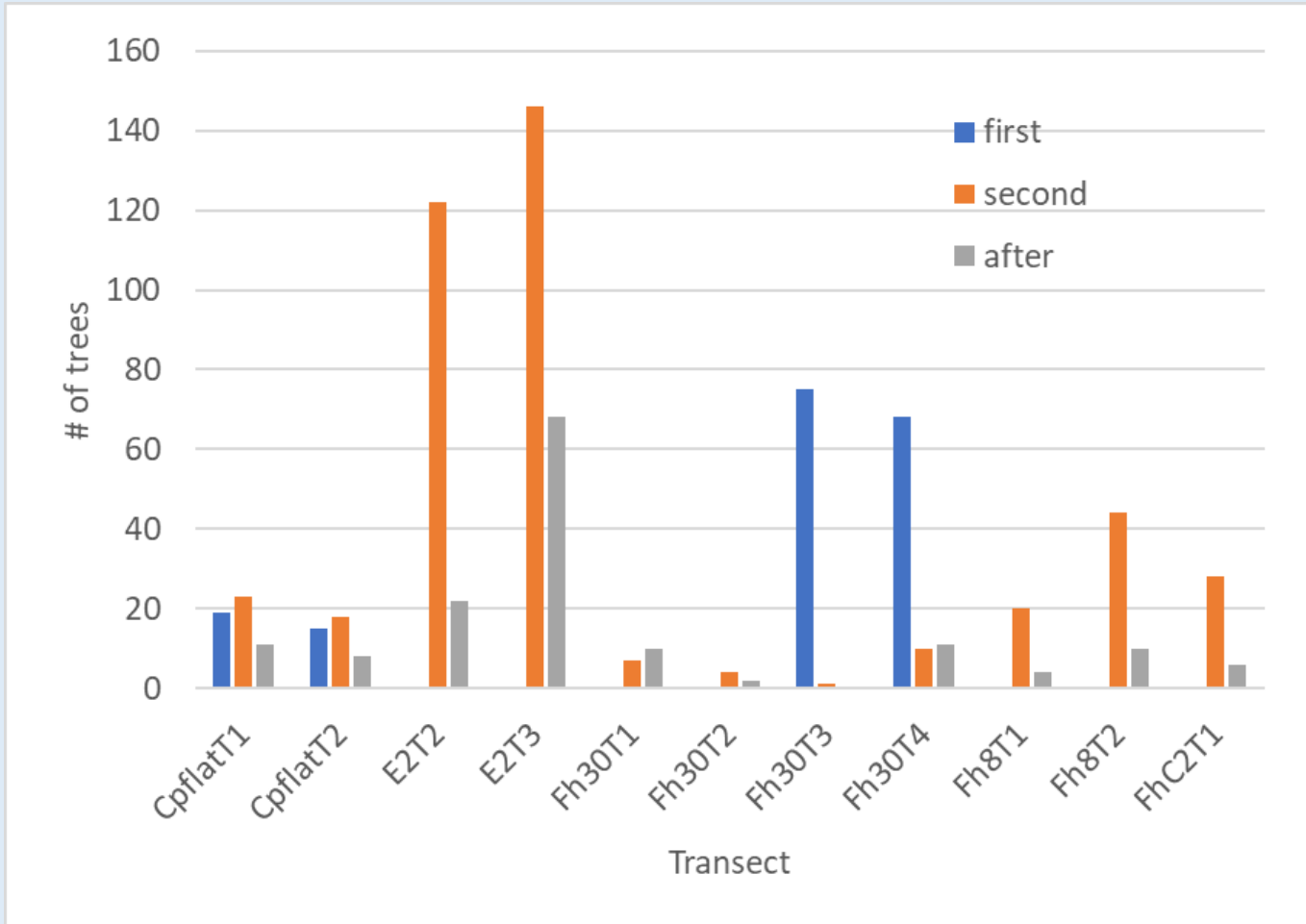
National challenge – how to standardise reporting of wilding control outcomes



# Results from the 2020 remeasurement of 11 transects

*NB. These results only deal with 40% of transects - remainder yet to get a recent measurement*

As a QA tool



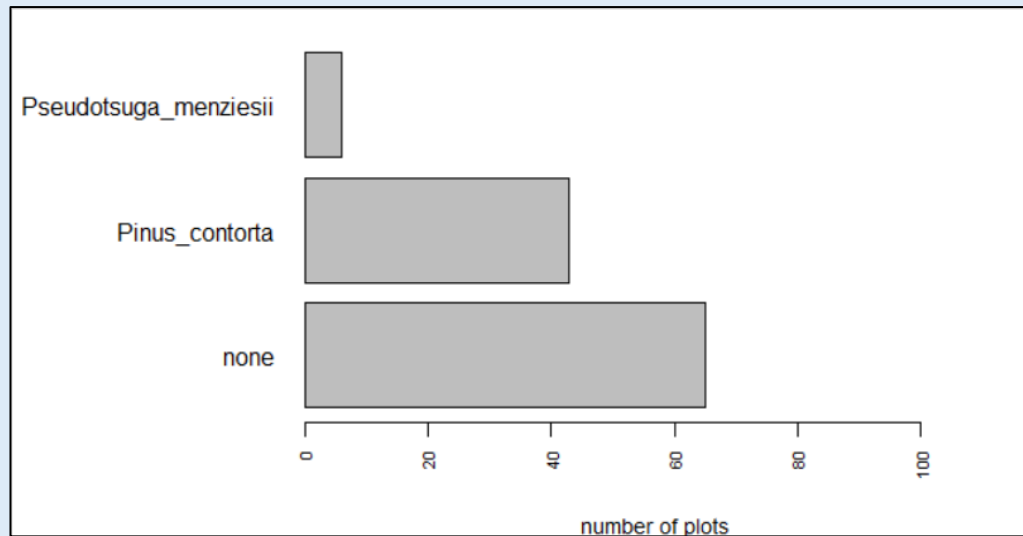
- All recent measurements showed a reduction in wilding numbers
- But still a way to go for elimination

(Two - three remeasurements available for all transects)

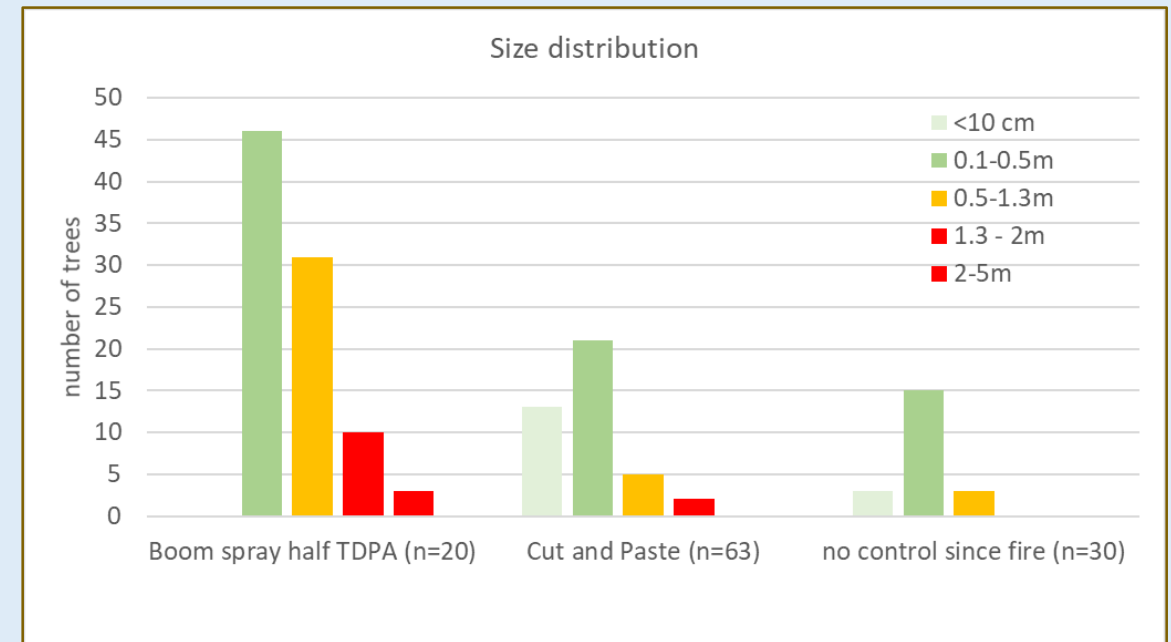


# Results from the 2020 remeasurement of 11 transects

## Species and size distribution



- In 2020, >50% of plots have no wildings (61% had wildings when established)
- *Pinus contorta* was present in 36% of plots (54% previously)
- Douglas fir was present in 6% of plots (13% previously)

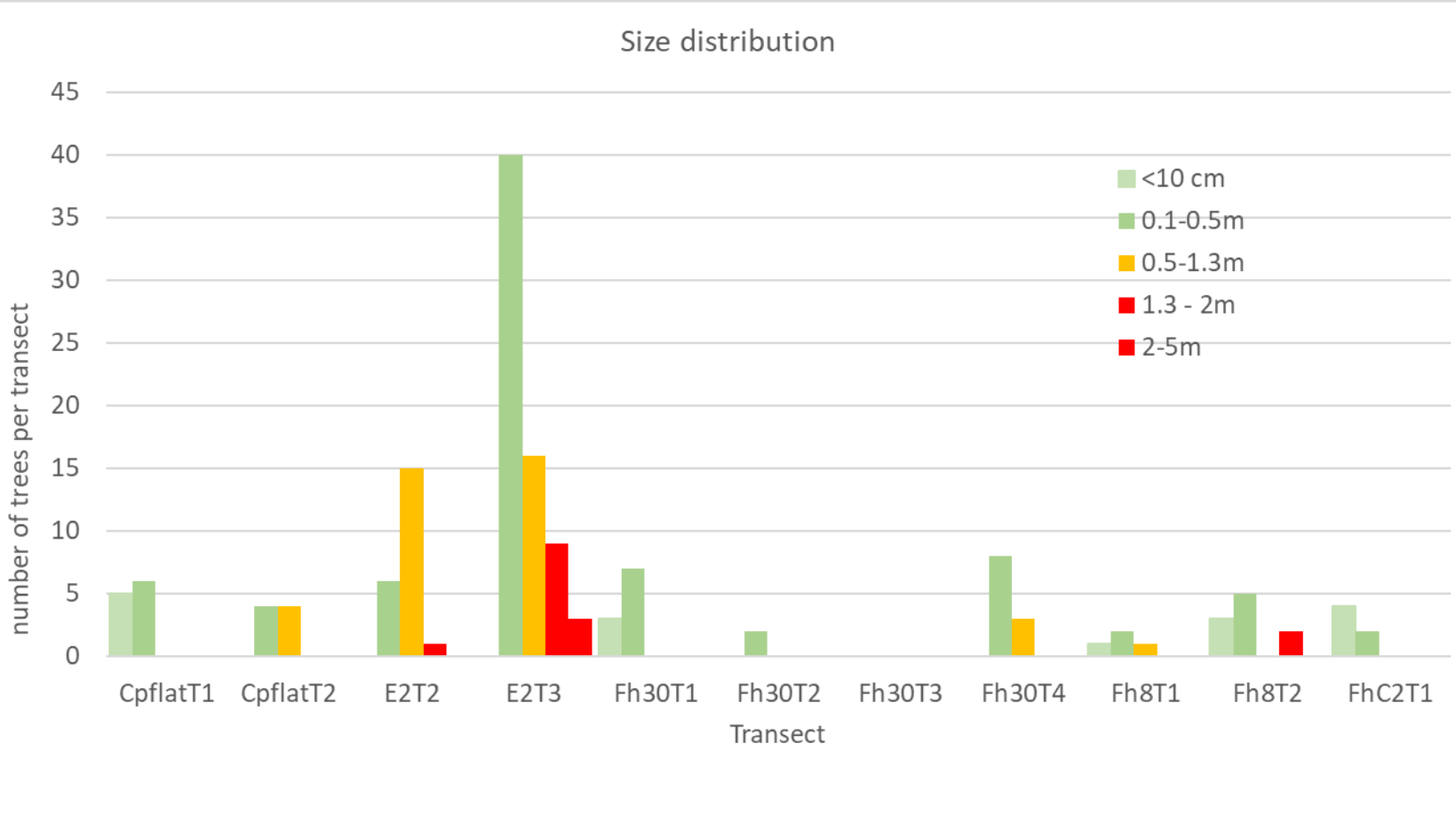


- Small number of <10cm seedlings (2-3 years old)
- These seedlings important, as indicate recent seed rain (ie., presence/absence of seed sources)
- Trees taller than 50 cm probably missed by control
- Douglas fir trees are mostly new and small seedlings



# Results from the 2020 remeasurement of 11 transects

Which transects recently invaded, trees missed or about to cone?



- Seedlings <10cm (1-3 years old) only present in 5 transects ie., no recent invasion
- Is seed source for these 5 transects still present?
- Trees over 50 cm (4+ years old) in six transects - should have been found by control?
- Largest trees in 3 transects coning or about to – missed, and priority for removal in near future.



# Results from the 2020 remeasurement of 11 transects

## Efficacy of control methods



- Boom spraying of dense conifer stands not as efficient as expected - some larger trees still alive (seeders?)
- Cut and paste of scattered trees has mostly smaller wildings - either missed or still emerging (<0.5m tall)
- The burned site shows some new wilding emergence after 4 years, but generally good control despite variability of fire intensity - due to being an accidental (not managed) burn



**Historically, boom spraying has not been as efficient as expected.  
Repeat spraying to get remnant 10-15% still alive can require a 100% respray.**







Fire, even accidental, can be a very efficient control means – but must return to remove missed trees. A well managed burn can ensure no missed trees



Fire is most effective if followed up by seeding of grasses / legumes



# Importance of young seedlings



Young seedlings (<10cm tall) tell us that reinvasion is on-going



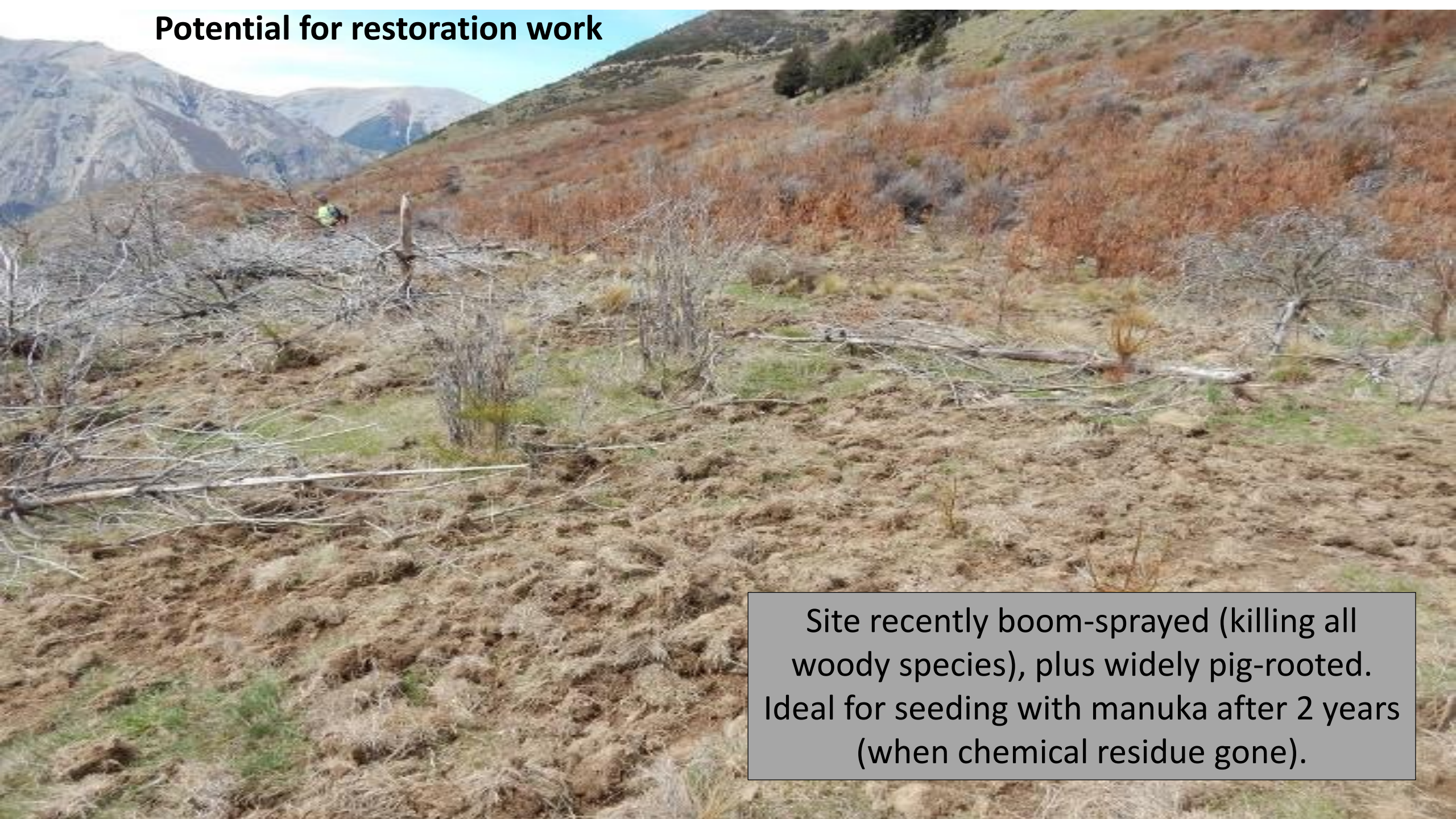


# What have we learnt from the Flock Hill ODK plots?

- Control has significantly reduced wilding numbers, but a way to go for elimination
- Species composition (93% contorta pine, 7% D-fir, <1% mountain pine)
- Size / age class distribution (10% <10cm = age 2-3; 80% 0.1-1.3m = c. age 5; 10% >1.3m = age 6+)
- Coning status (7%)
- Wilding density ranged from 0 - 3000 stems/ha
- Reinvasion likelihood
  - On-site: coning, or likely to cone soon (27% of control area)
  - Off-site: proximity of seeding trees - number of small (<10cm) seedlings on-site (45% of control area)
- Priority for future control
  - On-site*
    - Immediate – wildings coning/about to cone (transects E2T2&T3, FH8T2)
    - Near future – wildings coning within 3-4 years (CpflatT2, FH30T4, FH8T1)
    - Later – wildings younger than 2-3 years old (CpflatT2, FH30T4, FHC2T1)
  - Off-site*
    - Immediate. Upwind from 'later' group wildings – transects where young wildings (<10cm) are occurring
- Potential for restoration work (such as seeding)
- Cost for ODK establishment and measurement: approximately \$10-15/plot for 2-person team (\$100-150 per transect)



## Potential for restoration work



Site recently boom-sprayed (killing all woody species), plus widely pig-rooted. Ideal for seeding with manuka after 2 years (when chemical residue gone).