Monitoring wilding control on Flock Hill station

(MPI's Craigieburn Management Unit)

Thomas Paul (Scion)

Nick Ledgard (WELRA)

NZWCG Conference,
Rotorua,
November, 2020

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

- 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

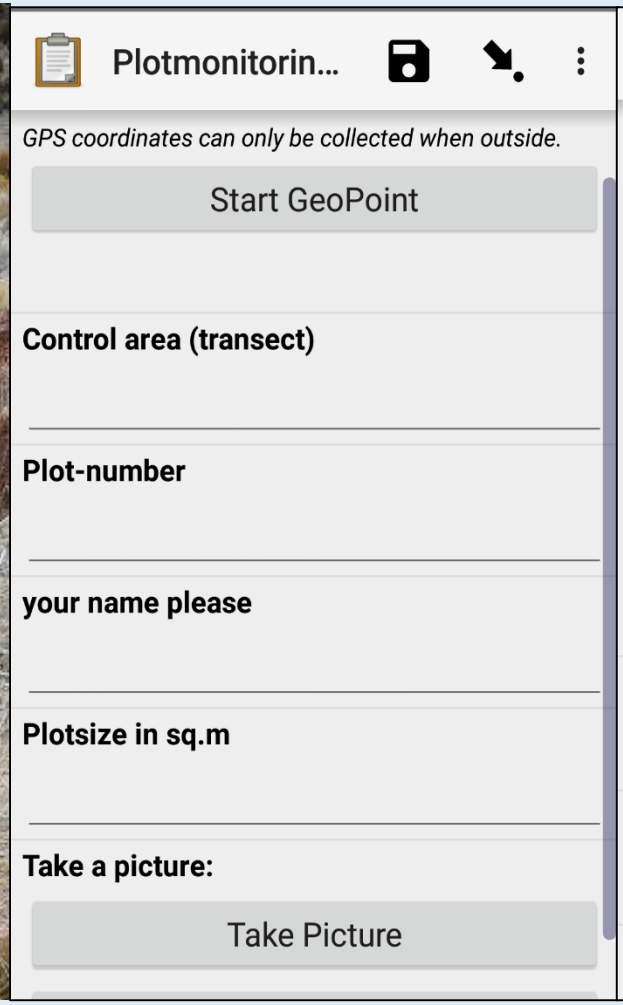
- Providing a simple tool
  - Enabler: Smartphone app (ODK) with specifically designed data entry form
- A simple design
  - Random starting points of transects; 20-30 m distance between plots of 25m^2; usually 10 plots per transect
- Upload into cloud – stored in database accessible to analyst or manager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

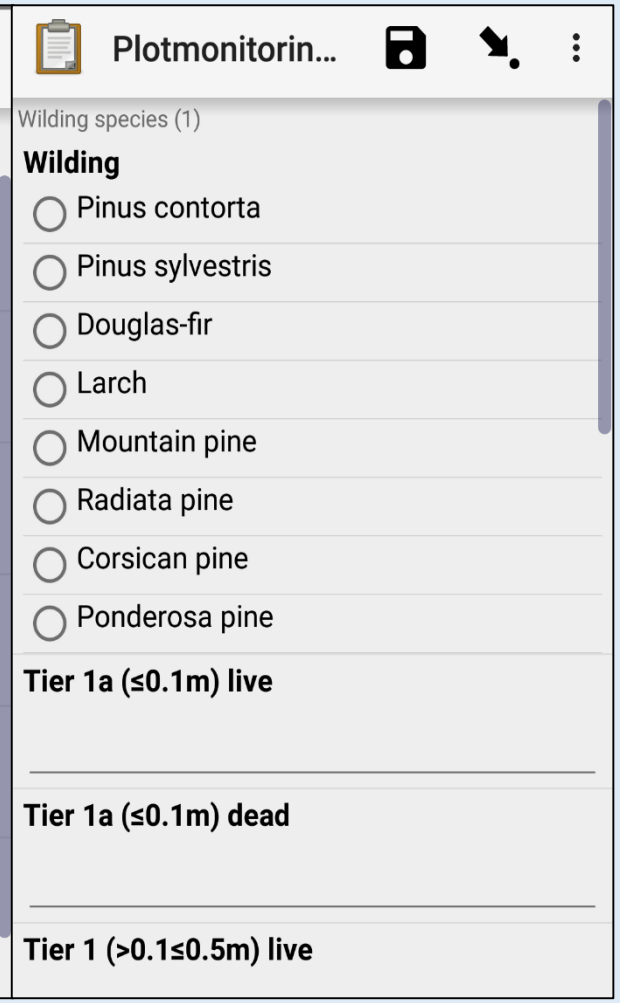
Smartphone entry form

Send to cloud database

Script to generate automatic report

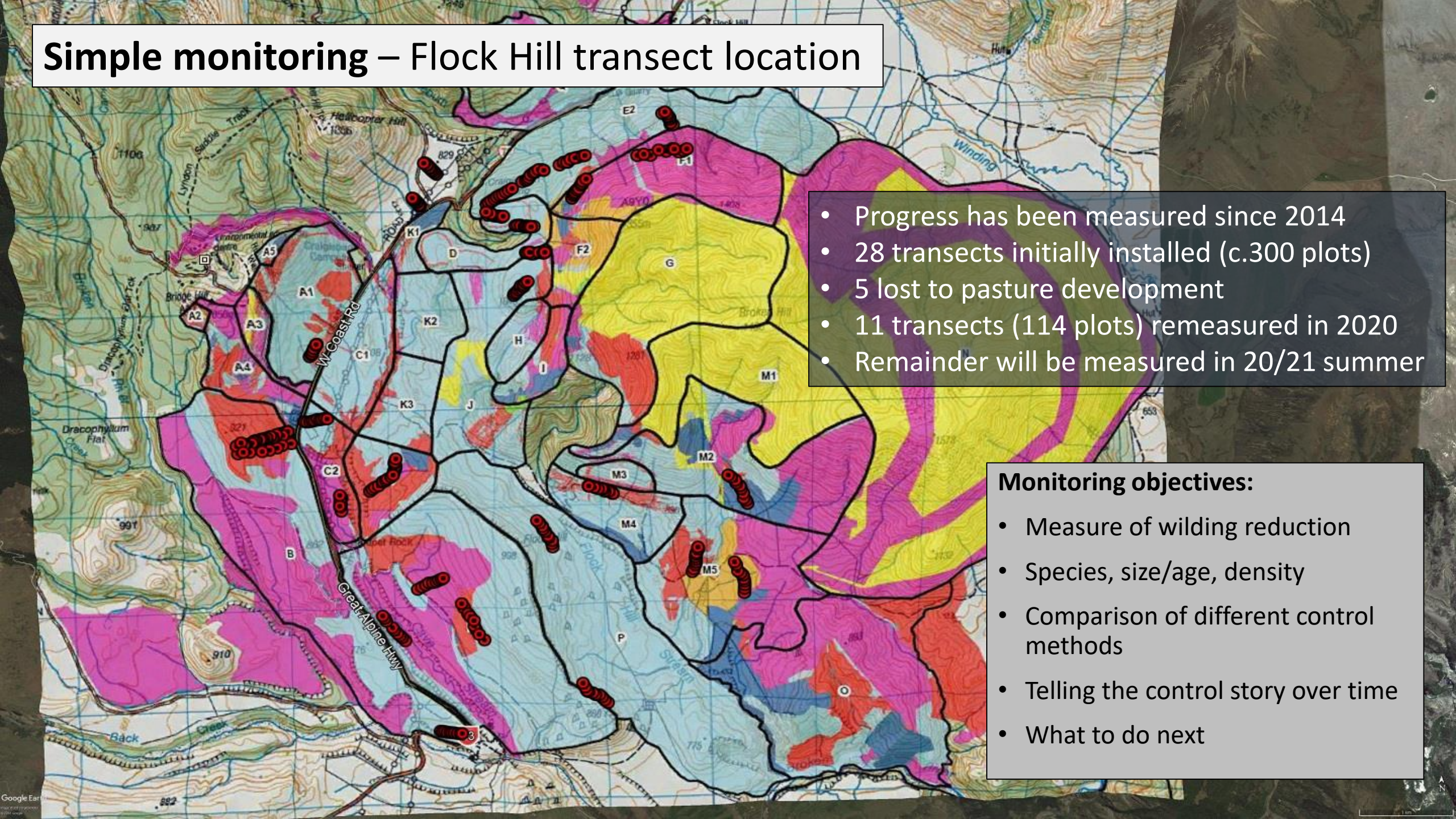
Simple monitoring – the ODK way





- Circular 25m2 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


Fire


Ground - volunteer


Ground - spray


Ground – cut

Contractors

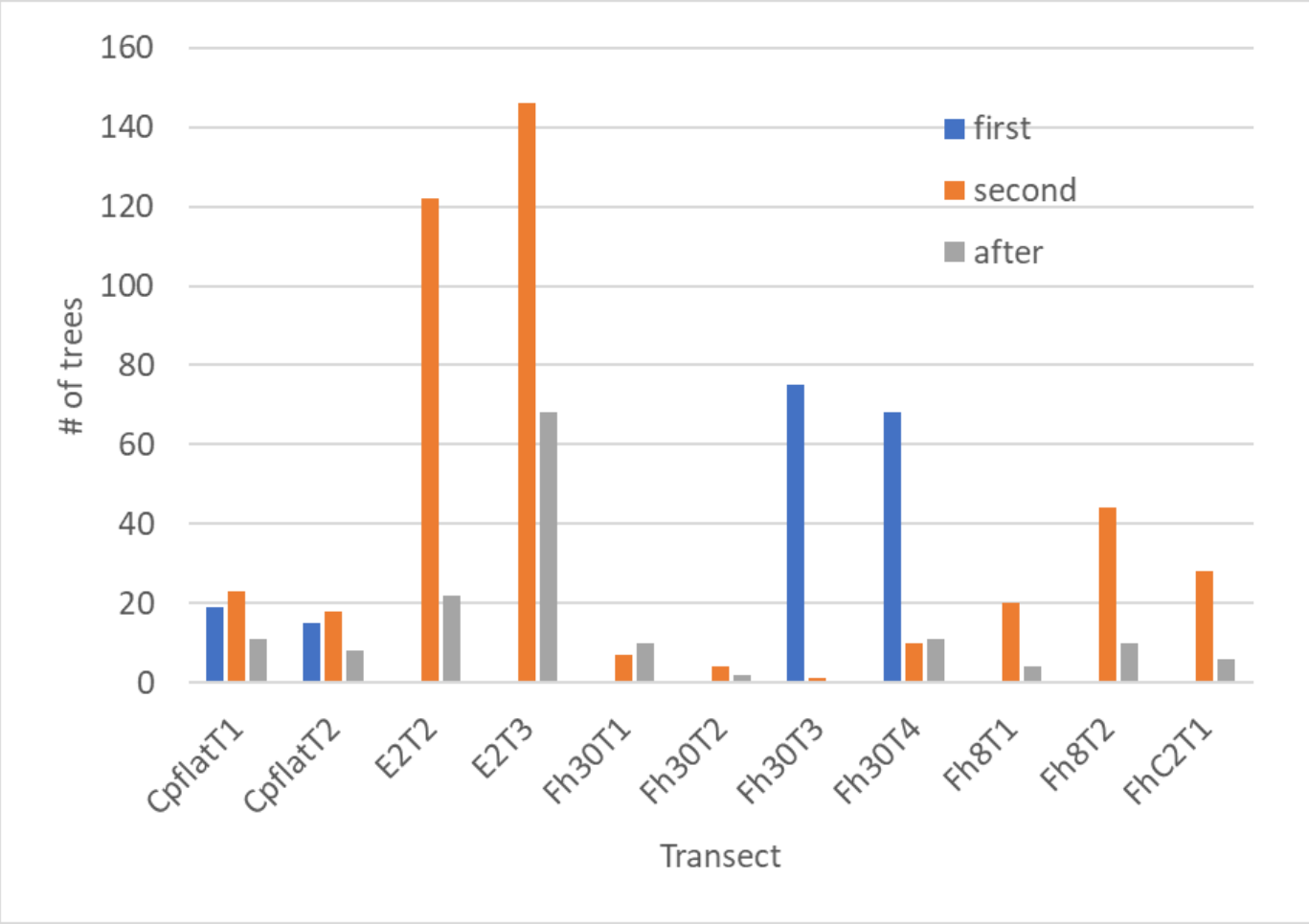
Great variability of control in a single area

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

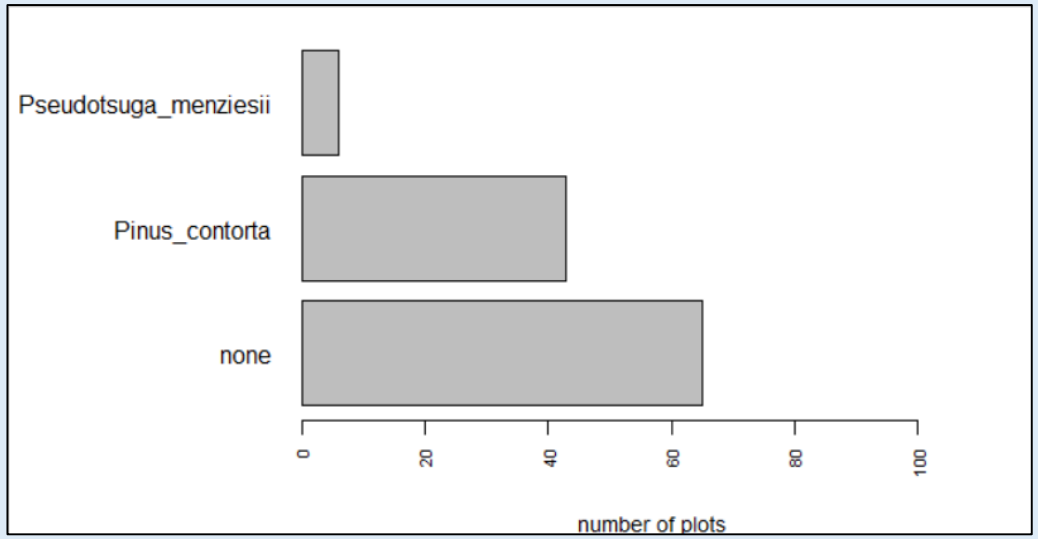


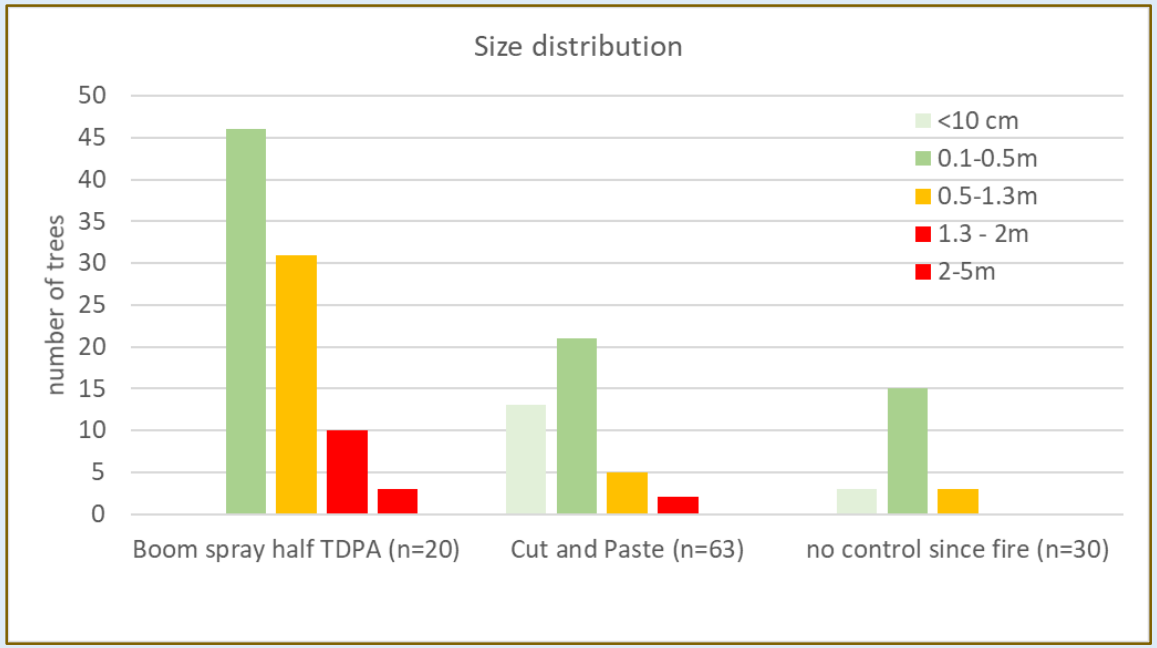
- All recent measurements showed a reduction in wilding numbers
- But still a way to go for elimination

(Two - three remeasurements available for all transects)

Results from the 2020 remeasurement of 11 transects

Species and size distribution



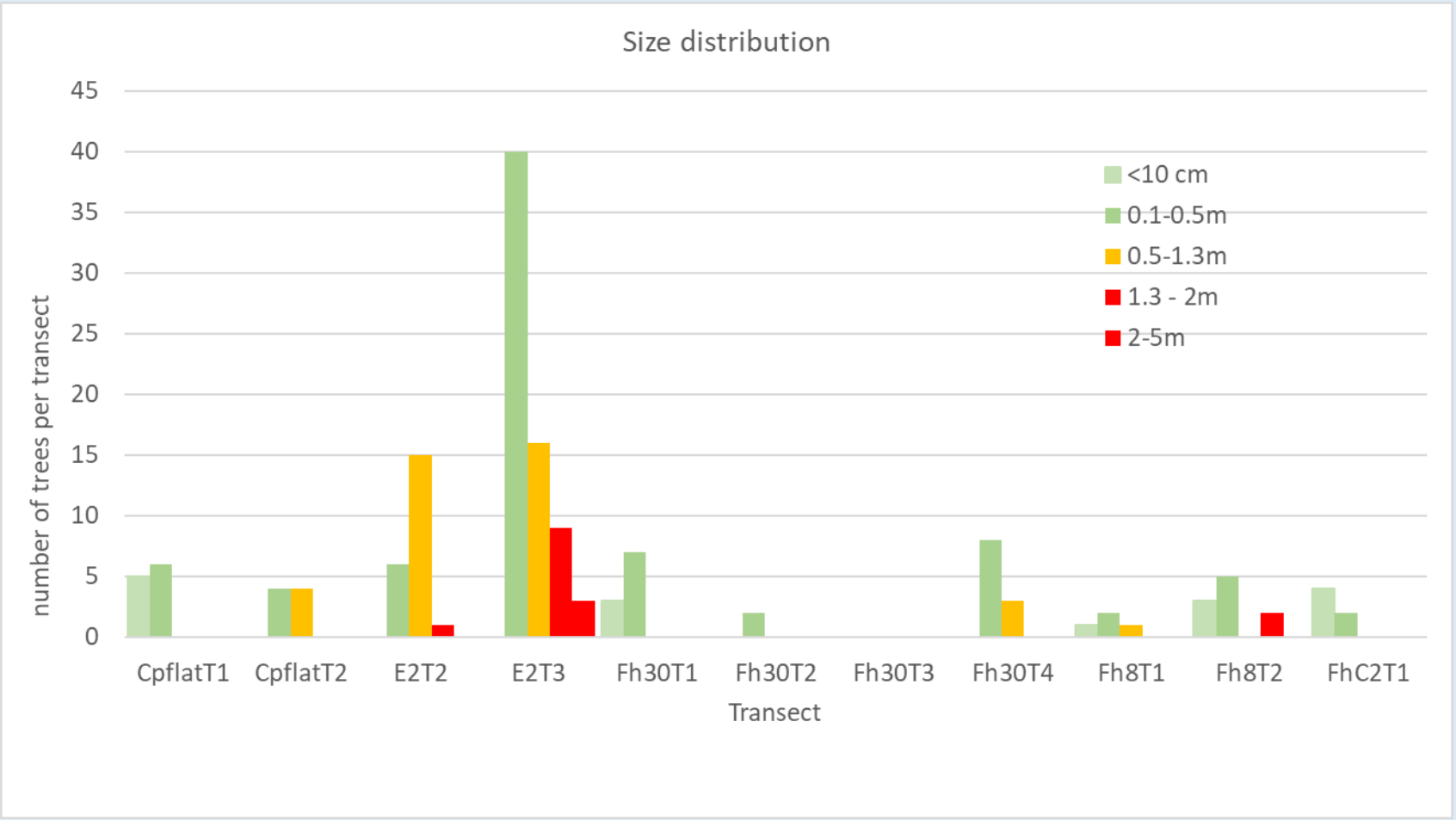


- In 2020, >50% of plots have no wildings (61% had wildings when established)
- *Pinus contorta* was present in 36% of plots (54% previously)
- Douglas fir was present in 6% of plots (13% previously)

- 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

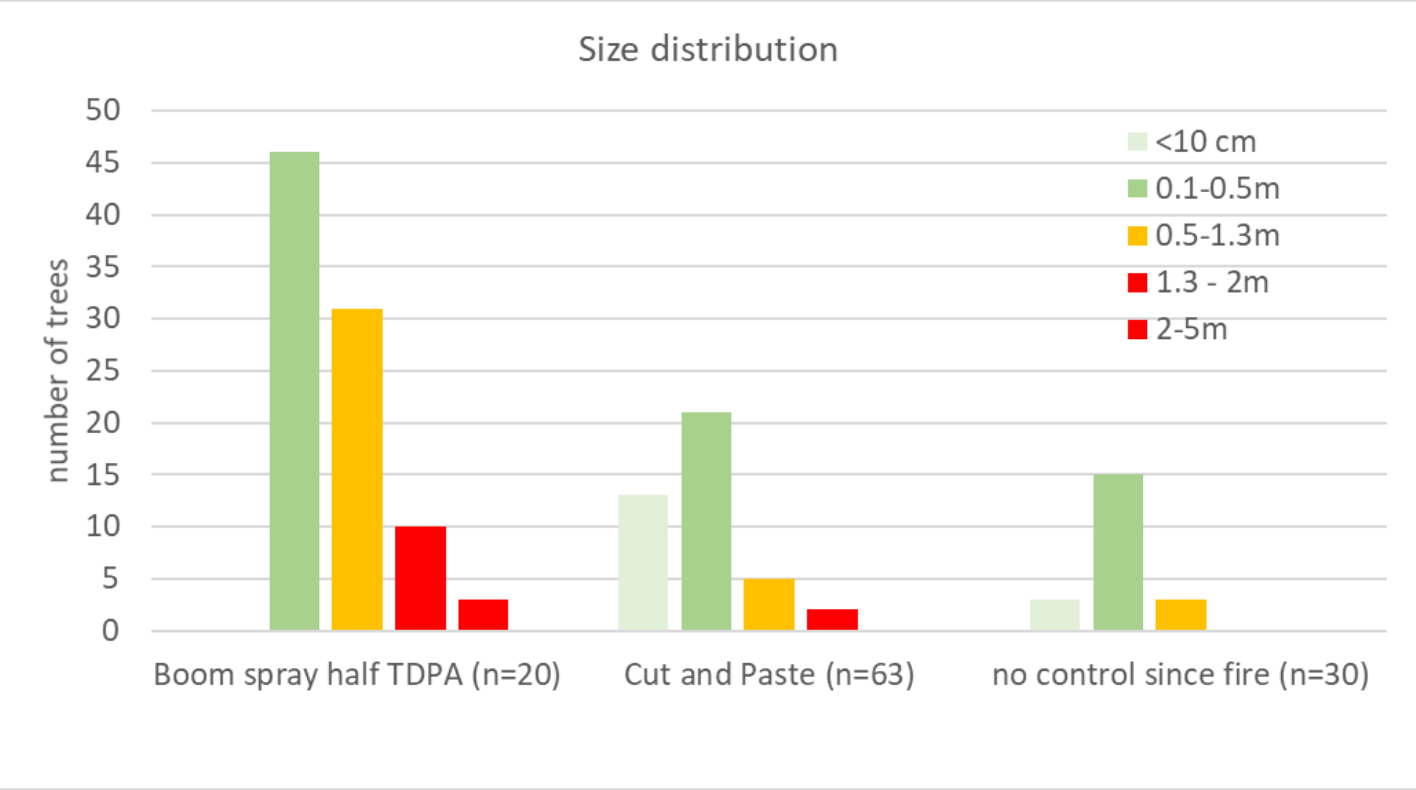
Which transects recently invaded, trees missed or about to cone?



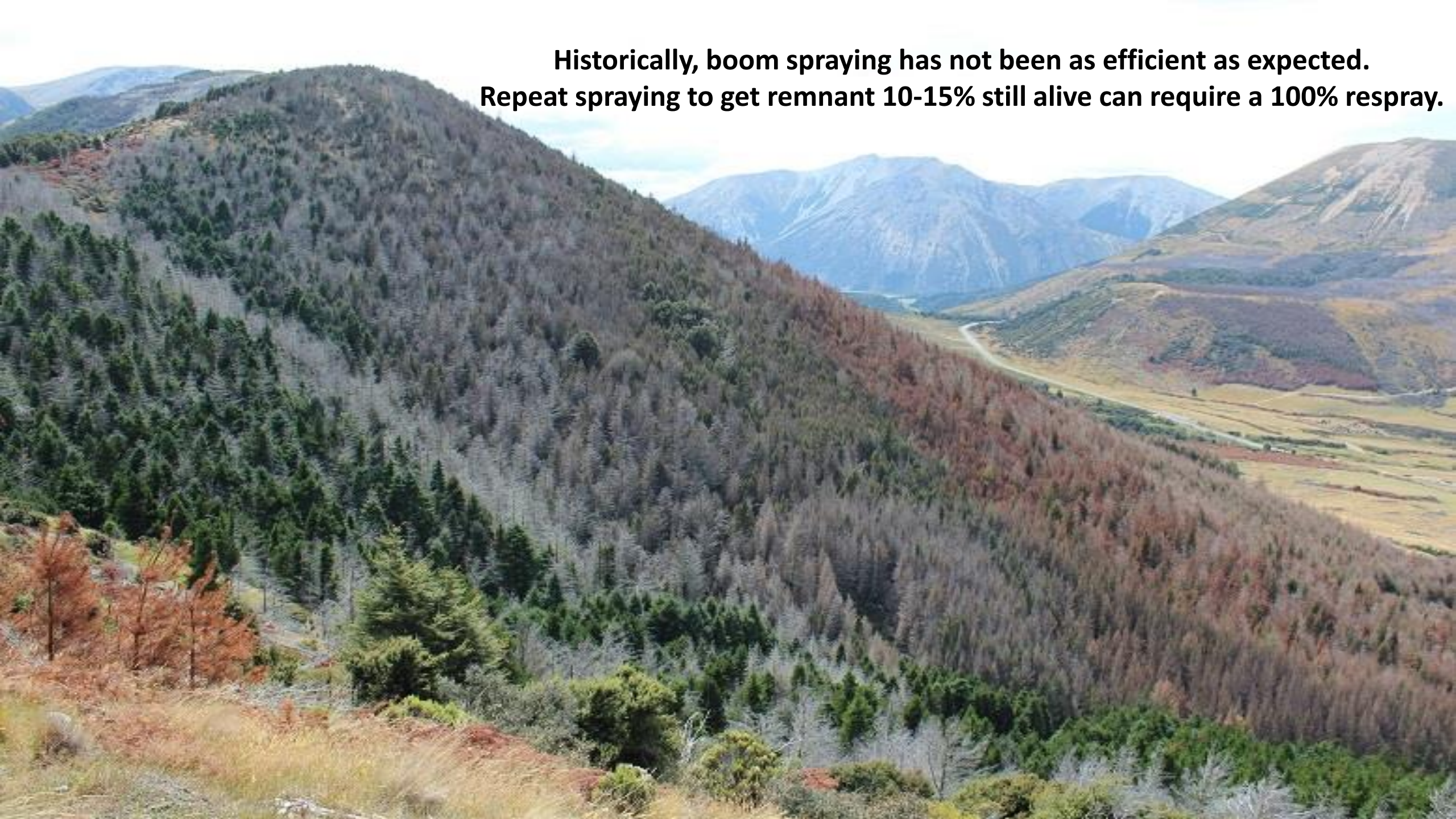
- Seedlings <10cm (1-3 years old) only present in 5 transects ie., no recent invasion
- Is seed source for these 5 transects still present?
- Trees over 50 cm (4+ years old) in six transects - should have been found by control?
- Largest trees in 3 transects coning or about to – missed, and priority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

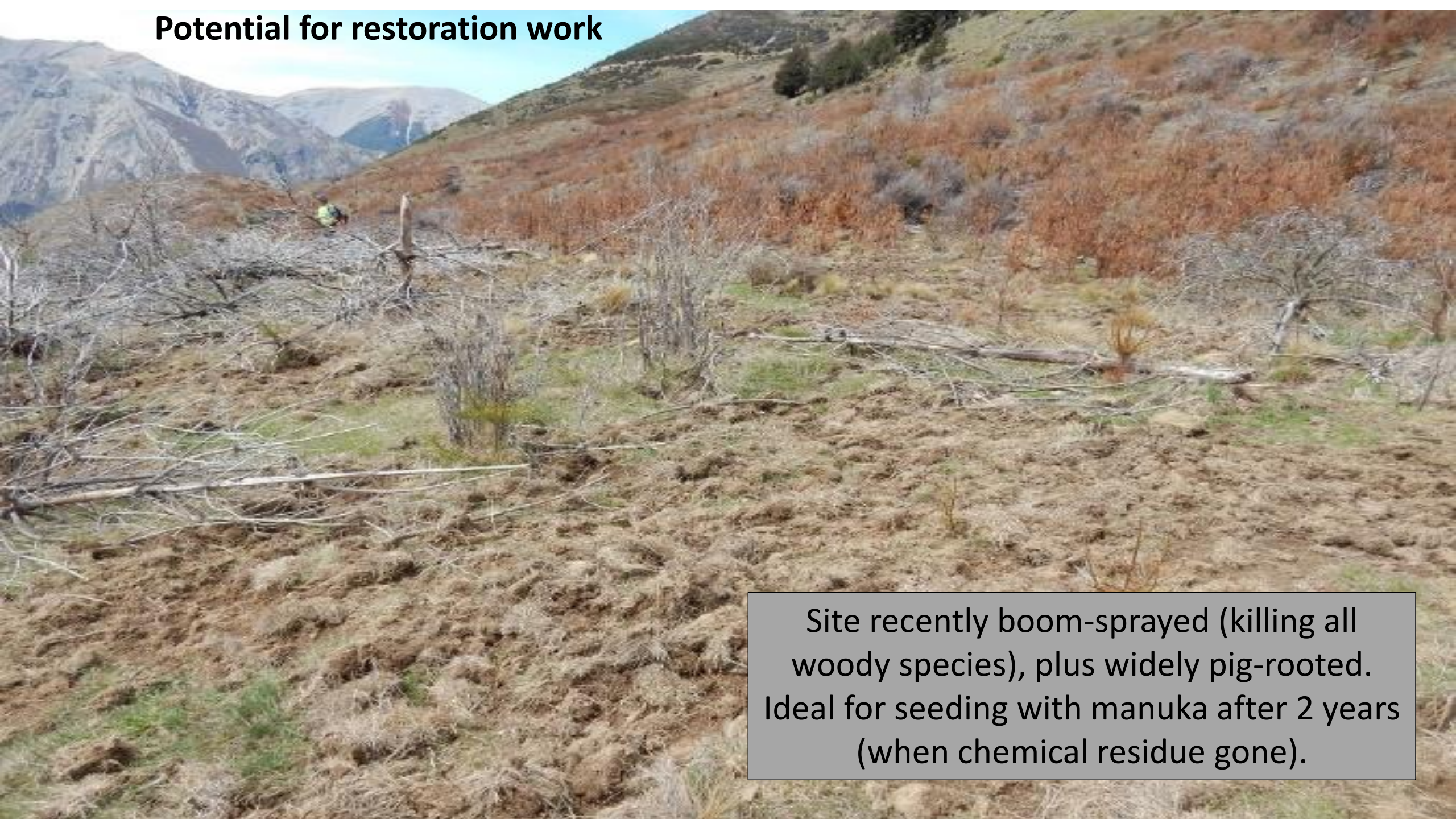
- Control has significantly reduced wilding numbers, but a way to go for elimination
- Species composition (93% contorta pine, 7% D-fir, <1% mountain pine)
- Size / age class distribution (10% <10cm = age 2-3; 80% 0.1-1.3m = c. age 5; 10% >1.3m = age 6+)
- Coning status (7%)
- Wilding density ranged 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).