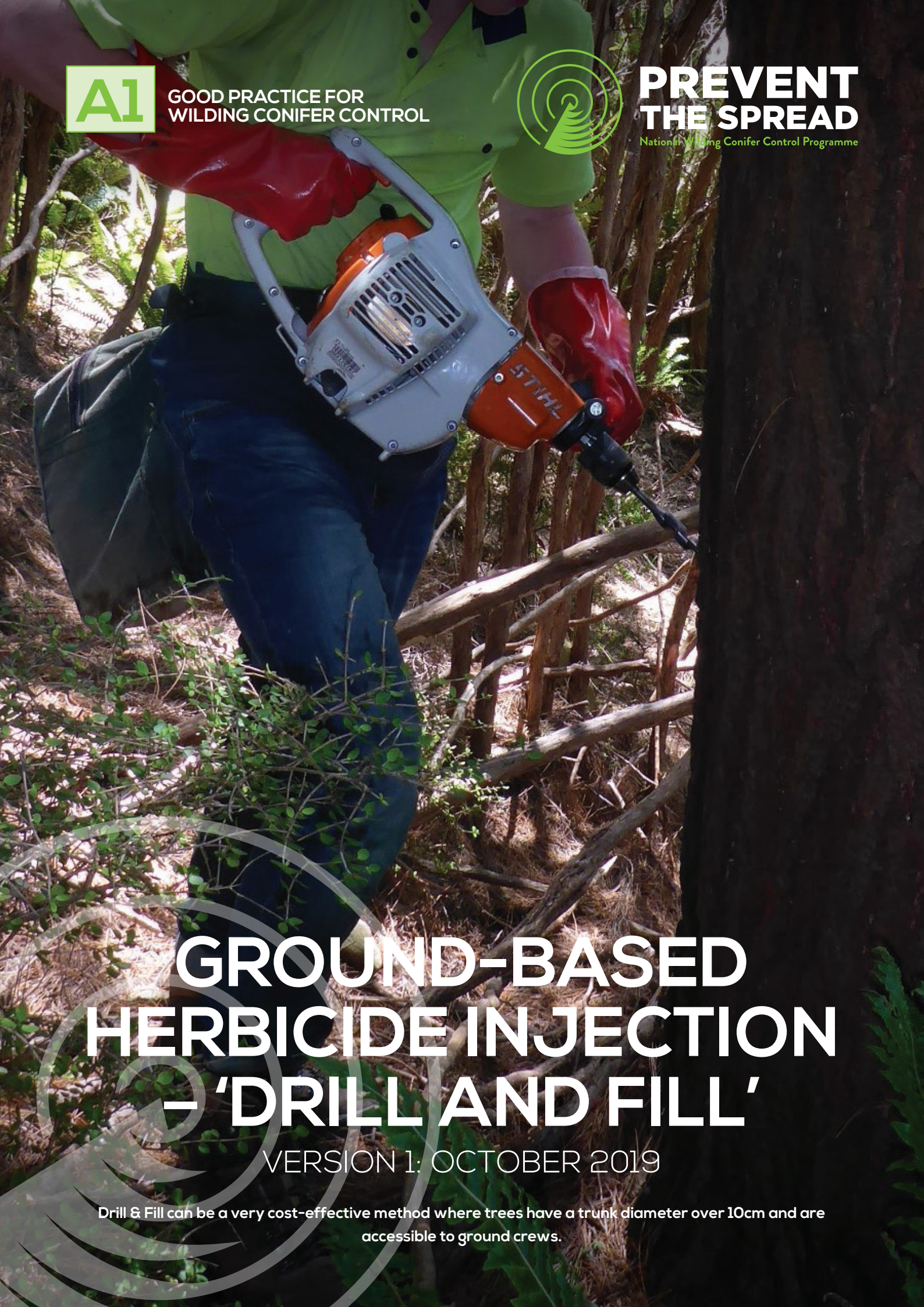

A1 GOOD PRACTICE FOR WILDING CONIFER CONTROL

PREVENT THE SPREAD
National Wilding Conifer Control Programme

GROUND-BASED HERBICIDE INJECTION – 'DRILL AND FILL'

VERSION 1: OCTOBER 2019

Drill & Fill can be a very cost-effective method where trees have a trunk diameter over 10cm and are accessible to ground crews.

CONTENTS

Photograph front cover: Drill and fill method in action, Marlborough Sounds area. (Photo source: A. Macalister)

ABOUT THIS DOCUMENT

Overall disclaimer:	The information in this publication represents the collective view of the National Wilding Conifer Control Programme (the 'National Programme'). We have made every effort to ensure the information is accurate. However, the National Programme does not accept any responsibility or liability for error of fact, omission, interpretation or opinion, nor for the consequences of any decisions based on this information. Good practice use by any reader is done so at their own risk, and the National Programme rejects all liability for any risk or loss as a result of applying this good practice information.
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VERSION CONTROL

Date	Details	Document ID and version no.	Rewrites and amendments
October 2019	Draft finalised and published	Version 1	

This document should be read in conjunction with:

WorkSafe - *Working safely with chemicals and fuels on farms*

WorkSafe - *HSNO codes of practice for hazardous substances*

1. DRILL AND FILL MATERIALS

1.1 EQUIPMENT RECOMMENDATIONS

Below are recommendations for equipment for set-up and delivery.

EQUIPMENT TYPE	RECOMMENDATIONS	IMPORTANT CONSIDERATIONS
Drilling	• 18 V drill with a 13–18 mm wood bit or auger. • Petrol-powered mechanised drill (fitted with a 20 mm auger bit).	Petrol-powered drills should not be used in environments where there is a fire risk.
Application	• A bottle fitted with a nozzle • A backpack applicator (to be used where conditions allow)	Bottles must be labelled. Backpack applicator should only be used where open conditions allow. All application equipment must comply with the Health and Safety at Work (Hazardous Substances) Regulations 2017.
Personal Protective Equipment (PPE)	• Safety glasses • Waterproof gloves (> 14 mils) • Cotton overalls (buttoned to the neck and wrist) • Waterproof boots	Personal Protective Equipment (PPE) must be used in handling, mixing, application and cleaning of herbicides and associated equipment. See the Safety Material Data Sheet.
Other	• A spill kit with a minimum capacity of 20-litre • A 400g fire extinguisher	Wherever the fire risk is above 'Low' on the Fire Danger Class System, fire extinguishers must be used.

2. HERBICIDE CHOICE AND USAGE

2.1 TRAINING

The person in charge must make sure that everyone using the chemicals are trained and, if needed, have approved handler certificates. Employers have a duty under HSE to train employees, or make sure someone who is trained supervises them, so they can do their work safely.

2.2 RECOMMENDED HERBICIDE

Before application refer to and follow the directions of the products Safety Material Data Sheet.

	METSULFURON METHYL	GLYPHOSATE	TRICLOPYR AMINE + AMINOPYRALID
Situation of Use	All wilding conifer species except for *Pinus contorta*.	When Metsulfuron methyl is not available. For all wilding conifer species except for *Pinus contorta*.	Only for control of control of Pinus contorta.
Recommended Mixing	50g of Associate or equivalent (600 g/kg metsulfuron-methyl* formulation) per litre of clean water (pH > 7).	Undiluted product (450-510 ml/L).	Undiluted Tordon Pasture Boss (a combination of 360 g/L triclopyr amine + 30 ml/L aminopyralid).

3. DRILL AND FILL METHOD

3.1 BEST TIME OF YEAR TO DRILL AND FILL

The best time to drill and fill is during active growing conditions, typically between September and February each year.

3.2 METHOD

HOLE NUMBER AND DEPTH

The number of holes drilled depends on the size of diameter at breast height (DBH), herbicide mix used, and the wider surrounds of the tree.

Table 1: The recommended number of holes to DBH measurement for different tree species.

SIZE THRESHOLDS DBH (CM)		10	20	25	35	50	80	100	105	110	120	125	135	140	160
Number of holes to be drilled for each herbicide mix	1. Metsulfuron methyl	1	1	1	1	1	1	1	1	1	1	2	2	2	2
	2. Glyphosate	1	1	2	3	4	6	8	8	8	9	10	11	12	13
	3. Triclopyramine + aminopyralid	1	2	2	3	3	3	3	4	4	4	4	4	4	4

Important considerations:

- On Multi-stem trees, each stem should be treated as a separate tree.
- When the tree to be controlled sits in open area and therefore, likely to have more foliage an additional two holes per tree should be added to the recommended number

DRILLING

Holes should be drilled at even spaces around the trunk to ensure an even distribution of the chemical throughout the tree.

Holes should be drilled into the base of the tree or prominent feeder roots as near to the ground as possible, while still being safe (a comfortable height to work at for long periods).

The holes should be drilled:

- on a downward angle (approx. 45° down), and
- slightly out (30° from the horizontal cross section) , and
- to a depth of 4 cm deep (excluding bark) and no more than 8cm.

HERBICIDE APPLICATION

The hole should be filled with 10mls of the herbicide immediately after drilling. The herbicide should reach up to the cambium layer at the outer edge of the sapwood. It is not necessary to plug the holes after filling as the hole is drilled at a slight downward angle.

GPS RECORDING

The location of all trees treated should be recorded as a GPS waypoint so that treated trees can be relocated to accurately assess the success of the control operation.