

Hunt for the wilder pine

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Abstract

Wilding conifers are a serious established pest in New Zealand, reducing the productivity of primary industries and damaging the environmental, social, cultural and landscape values that this country is renowned for. This paper examines how wilding conifers became established, how they are being controlled, and the impact they are having on planted forests. It also describes the first year of the national Wilding Conifer Management Programme.

Wilding conifer management in NZ

Pest wilding conifers are invading New Zealand's high country, threatening natural areas and transforming our iconic tussock landscapes. Funding from the government recognises this serious problem and is making a real start to contain the spread.

Wilding conifers are a serious established pest in this country. They reduce the productivity of primary

industries and damage the environmental, social, cultural and landscape values that New Zealanders value highly. Already more than 1.8 million ha of New Zealand – an area larger than the country's commercial forests combined – is invaded by wilding conifers. Many of the areas affected are large with sparsely scattered seedlings. If left, many of these will become dense wilding conifer forests.

The National Wilding Conifer Control Programme was established with additional government funding in 2016. The Ministry for Primary Industries (MPI), the Department of Conservation (DOC) and Land Information New Zealand (LINZ) have come together for this programme to work with local government, the New Zealand Defence Force and community groups to prevent the spread of these tree pests and to progressively remove them from the land already invaded.

'About 20% of New Zealand would have been affected by unwanted wilding conifers within 20 years if we hadn't taken increased action to slow their spread,' says Sherman Smith, the National Wilding Conifer Control Programme Manager at MPI.



P. contorta, Jollies Pass, Hanmer Springs. Source: Clayson Howell, DOC

Conifers were first introduced in the early 1800s for purposes including timber production, farm shelter and amenity. In later years, other plantings were for pulp and paper production, soil conservation/erosion control, research and carbon sequestration.

Few people anticipated how quickly some of these conifers would spread across New Zealand's landscape, although there were some early warnings (e.g. Benecke, 1967). Conifers often had a competitive advantage over native shrubs and grasslands. The wilding trees can be prolific seeders and the masses of windblown seeds can travel many kilometres, especially in major wind events. Unfortunately, wilding conifers were already spreading and producing significant amounts of seed before they were recognised as a serious and expanding problem.

New Zealand is not alone in this wilding conifer crisis. Other southern hemisphere countries, including South Africa, Australia, Chile and Argentina, introduced spread-prone conifer trees for commercial and erosion control purposes, and wilding trees are becoming increasingly problematic (Richardson & Rejmánek, 2004).

The right tree in the right place

The Right Tree in the Right Place – The New Zealand Wilding Conifer Management Strategy 2015–2030 (MPI 2014) was approved by the Minister for Primary Industries in 2014. This strategy seeks to balance the good and the bad of conifers, and sets out a collaborative approach to minimise the negative impacts of wilding conifers while retaining beneficial conifer plantings.

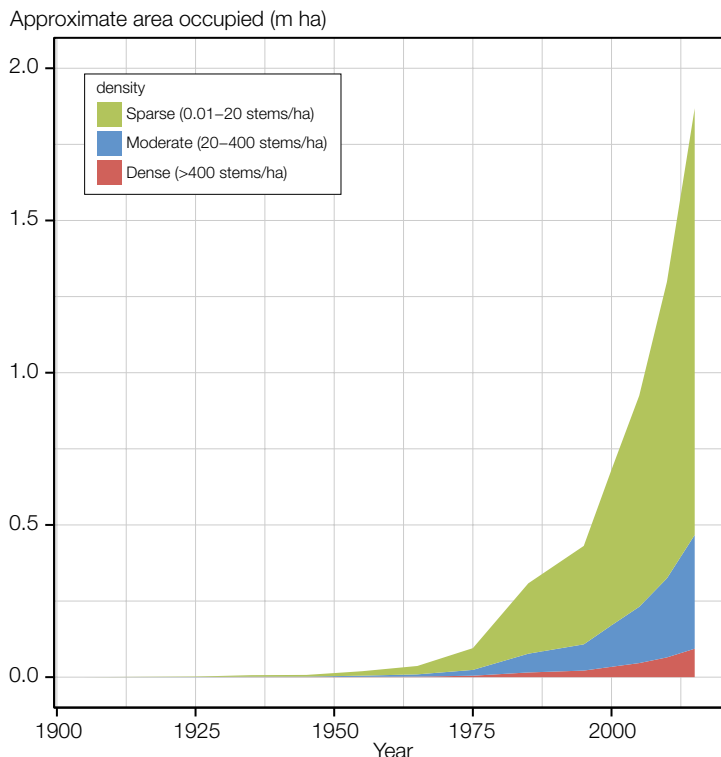


Figure 1: National Wilding Conifer Programme – 2016/17 control areas



Wilding spread (*P. contorta*) at Makuratawhai, Molesworth. Source: Clayson Howell, DOC

Planted in the right place conifer trees provide timber, store carbon, decrease erosion, filter soil nutrients, improve water quality, and provide shelter and shade for stock. However, in the wrong place they are a major threat to our ecosystems, landscape and farms. They out-compete native plants and animals, remove up to 40% of water from a catchment (Mark & Dickinson 2008), limit productive land use options on high country farms and severely alter natural landscapes. Wilding conifers may also increase the risk of wild fires and may be a reservoir for disease (Velarde et al., 2015).

What are wilding conifers?

DOC considers 15 wilding conifers as significant environmental weeds (Howell, 2008). However, 10 introduced conifer species are responsible for most of the affected area (Froude, 2011) – see sidebar on page 22. Two of these, radiata pine and Douglas fir, are also important commercial species, but wilding forests of even these species generally have no commercial value.

One species, the contorta pine, has been declared an unwanted organism under the Biosecurity Act 1993, which means it cannot be bred, propagated, distributed or sold.

Pinus contorta is a hardy pioneer species that easily invades open and disturbed areas, including lightly-grazed farmland, tussock lands and sub-alpine vegetation. Douglas fir is more shade tolerant and can also establish in shrublands and even in beech forest.

A conservation priority

The area affected by wilding conifers has increased rapidly (Howell, 2016). 'From a conservation viewpoint, the impact of wilding conifers is devastating,' says the Director of DOC's Threats Unit, Allan Ross. 'Wilding conifers are a major problem in areas where there is no native forest, such as above the bush line, in mineral belts and tussock grasslands. In these areas, wilding

conifers transform the natural ecosystems so much that native plants and animals are evicted and the unique New Zealand landscape is lost.'

It was estimated that by 2035 about 2.24 million ha of public conservation land would be infested, which is 26% of the conservation estate. The area of infested land not managed by DOC would total 3.2 million ha. Private land was going to be increasingly invaded by seedlings spreading from DOC land already infested (Verlarde et al., 2015). It is no surprise then that DOC has targeted wilding conifers as public enemy number one in its War on Weeds.

'Wildings are the most significant weed problem New Zealand faces – and the number one target of the War on Weeds,' says Allan Ross.

Prevention is the best form of management

Despite the scale of the issues, wilding conifers are one of the easiest weed problems we have to deal

with. It is more practical to control wilding conifers than many other pest plants because their spread is predictable and visible and the seeds do not last long in the soil. The best approach is to kill small trees before they start producing cones. As wilding conifers increase in age, size and abundance they become more costly to control. The cost of control increases exponentially at around 30% a year. Work that has been carried out shows that removing young initial invading seedlings can cost as little as \$1/ha, but treating dense infestations can cost over \$10,000/ha.

'When planting trees it's important to choose the right species for the situation and not to exacerbate the wilding conifer problem,' says Sherman Smith. 'Choosing the wrong tree species could create an expensive problem for you and your neighbours.' The Wilding Spread Risk calculator available at www.wildingconifers.org.nz helps foresters and landowners determine the risk of spread occurring from new conifer plantings.

Wildings create problems for planted forests

'Wilding conifers make it more expensive, time-consuming and difficult to develop farm and, to a lesser extent, forestry land,' says Sherman Smith. If wilding conifers are left to spread unchecked, New Zealand's reputation as having the highest standards of sustainable silviculture and environmental practice may be compromised. Local communities may be less willing to support managed conifer plantations out of concern they will pick up the cost of controlling wilding conifer spread.

Harvesting them is rarely an option either. Many wilding conifer areas are dominated by species or trees that are not commercially valuable. Unlike commercial forests where trees are planted in rows, thinned and there is good road access, wilding conifer forests are generally dense and basically impenetrable. Wilding trees have uneven age structure and form, and poor access means that the cost of harvesting them is greater than what they are worth.

Larger areas of dense wilding conifers increase the intensity and impacts of wild fires. Wilding conifer forests do not have firebreaks or fire ponds, are untended and are often in remote and difficult terrain. Fires in mature, unmanaged wilding conifer stands are likely to burn hot and can threaten adjoining indigenous ecosystems, planted forests, infrastructure and human life. A recent example is the Flock Hill fire in January 2015 where fire in 330 ha of land largely occupied by wilding forest threatened Castle Hill Village and Craigieburn Forest. There are also some useful findings in the report from the 2008 Mount Cook fire (Clifford & Pearce, 2009).

On top of the increased fire risk wildings could become a reservoir for forestry pests and diseases. New pests and diseases could establish in wilding conifer forests because there is scant surveillance to detect new incursions. 'This could threaten the feasibility of eradicating new pests arriving in New Zealand or increase



Two species of wilding conifer side by side at Molesworth Recreation Reserve – *P. nigra* (right) and *P. contorta* (left). Source: Clayson Howell, DOC

the cost of control of those pests if ongoing control is required,' says Sherman Smith. 'Forest owners have been steadily improving their management of wilding spread from plantation forests and are an important partner in tackling the wider wilding conifer problem.'

'The New Zealand Forest Owners Association is progressing research to minimise future spread. By working together with the forestry industry, MPI, DOC, LINZ and local government hope to control the unwanted spread of conifer seed and thereby reduce the risk to planted forests, farmland and the environment. It's a win-win situation.'

Wilding conifer control methods

DOC has been proactive in developing a range of control tools over many years (Briden et al., 2014). To determine the most appropriate tool for controlling wilding conifers, each site is assessed to understand the size of the wilding conifers in the area, how dense they are, and how difficult the terrain is.

Control methods include:

- Precision aerial spraying using a spray wand from a helicopter – also called aerial bark application and it is used for trees far apart and/or on difficult land
- Applying herbicide directly onto the bark of the tree by hand – called ground basal bark application
- Aerial boom spraying from a helicopter, which is used on dense infestations
- Cutting down trees
- Scrub bars – a tool similar to a weed eater, with a circular blade, and herbicide is applied onto the stump after cutting
- Pulling small trees out by hand
- Grazing – stock can be managed so that they eat the wilding conifer seedlings.

It is worth noting that in some cases silviculture and management of forests to less spread-prone species may be the best control option. Most management tools can be used on any species of wilding conifers, but the herbicide formulations used in boom sprays are adjusted depending on the species of wilding conifer present.

Sprayed wilding conifers can take two to three years to die. How long they remain standing varies depending on size, rainfall, humidity and the amount of sunshine. Treated conifers will tend to 'melt' rather than just fall over; the limbs come off first, then the top section, and so on.

Where standing dead trees could fall and create risks to high public use areas, such as tracks, roads or buildings, they are best controlled by felling. For example, in Otago, the Wakatipu Wilding Conifer Control Group removes any trees near the township or roads that may pose a safety hazard as they break down.

Where safety is not an issue, standing dead wilding conifers provide shade and shelter for native plants, promoting recovery. Felling causes disturbance and is more likely to result in wilding conifers re-establishing.

How forest owners and farmers can help

Wilding conifers are hard to get rid of once they become established. Farmers and forest owners can discourage wilding conifers by:

- Carefully selecting which conifer species is planted and where
- Removing wilding conifer saplings that have established outside planted areas before they develop seed cones
- Working with neighbours to control wilding conifers that have spread across property boundaries.

Wilding Conifer Management Programme

New Zealand spends about \$11 million each year on wilding conifer control nationwide. This includes around \$5 million by central government agencies (DOC, LINZ and the New Zealand Defence Force), more than \$1.2 million by regional councils, and a similar contribution by landowners and communities.

In May 2016, the government pledged an extra \$16 million over four years for the first phase of a national control programme. This programme aims to prevent the spread of these tree pests and to progressively remove them from much of the land already invaded. *The Right Tree in the Right Place: The New Zealand Wilding Conifer Management Strategy 2015–2030* provides the framework for this programme.

'In the first phase, we are targeting species which are most prone to spreading in the areas with the greatest vulnerability to invasion,' says Sherman Smith. 'We have focused on containment, removing scattered wilding conifers to prevent further spread. The programme has met its first-year target of controlling approximately 1 million ha.'

In the first year, the national control programme has supported control work across 14 areas in the Central North Island, Marlborough, Canterbury, Otago and Southland (see Figure 2). 'These are areas where control is most cost-effective. We will also be protecting farmland, biodiversity, iconic landscapes and sensitive water catchments,' he says. Further areas will be added to the programme as it progresses.

The programme is being implemented by MPI, DOC and LINZ in partnership with other central government agencies, local government, forestry and farming industries, landowners, researchers, iwi and communities.

'The invasion of wilding conifers is a problem that affects us all, and we all have an important role to play in fixing it,' says Sherman Smith.

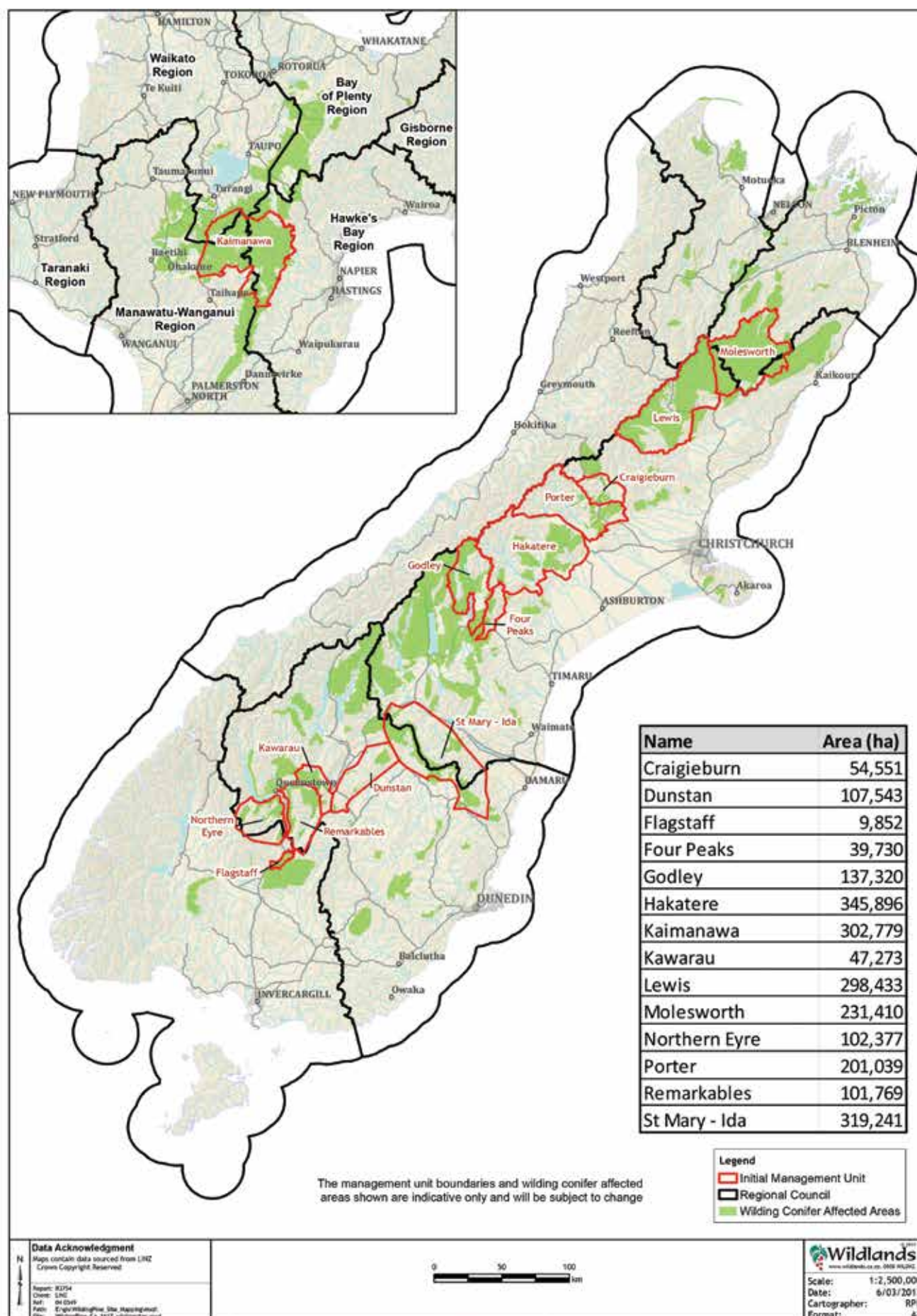


Figure 2: National Wilding Conifer Programme – 2016/17 control areas

Which conifers are causing the wilding conifer problem?

Most wilding conifers are one of the species below. You can find more information on the New Zealand Plant Conservation Network website: www.nzpcn.org.nz.

Contorta pine (*Pinus contorta*)

The most aggressive species with the youngest coning age and farthest spread. Has been declared an unwanted organism under the Biosecurity Act 1993 since 2001, which means it cannot be bred, propagated, distributed or sold.

Douglas fir (*Pseudotsuga menziesii*)

The second most common commercial timber species, but can spread rapidly in montane areas and may succeed contorta pine as it matures.

European larch (*Larix decidua*)

A distinctive deciduous conifer, which can be invasive in wetter areas.

Dwarf mountain pine (*Pinus mugo*)

A short bushy species that was planted in alpine areas, has spread slowly, but is very hard to kill.

Corsican pine (*Pinus nigra*)

Slower to mature than contorta pine, but can spread very large distances.

Maritime pine (*Pinus pinaster*)

Very large tree that often grows in association with radiata pine in coastal areas.

Ponderosa pine (*Pinus ponderosa*)

Historically grown as an amenity tree in very dry areas where it often spreads.

Scots pine (*Pinus sylvestris*)

Foliage has a bluish tinge and spread can be prolific in montane areas.

Bishop pine (*Pinus muricata*)

Introduced as a high country alternative to *Pinus radiata*. Now rarely grown for timber, but has spread from early trial sites.

Radiata pine (*Pinus radiata*)

The most common commercial timber species, but can spread in lowland situations and affect native bush regeneration.

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