



**PREVENT
THE SPREAD**
CONTROLLING WILDING PINES

Controlling Wilding Pines

Questions and Answers

April 2020



Wilding Pines—Questions and Answers

In this document we used the term wilding pine to refer to all wilding conifer species. While ‘wilding conifers’ is more scientifically accurate, ‘wilding pines’ is better understood.

About Wilding Pines

What are wilding pines?

Wilding pines are trees which have self-seeded and are growing where they are not wanted - they are the wrong tree in the wrong place. Unlike commercial forests, wilding pines are weeds.

In fact, wilding pines are the weeds which pose the biggest threat to New Zealand’s unique environment. They are as much of a menace to our environment as stoats, rats and possums.

A conservative estimate is that wilding pines affect at least 1.8 million hectares (almost 6%) of New Zealand’s land area. Because information on wilding infestations is incomplete, the actual area affected is likely to be much larger.

How big is the problem?

Wilding pines spread fast - within 30 years they could cover more than a quarter of New Zealand. We must act now, before the problem becomes too big to bring under control. They not only threaten our natural environment but also overwhelm farmland, recreational land and areas of cultural importance.

According to an [independent report in 2018](#), unmanaged wilding pines present a \$4.6 billion threat to our economy.

How are wilding pines different from other pines?

A wilding pine is an introduced species, not native to New Zealand that is self-seeded (ie. they are weeds). The most common wilding pine species include Contorta pine, Scots pine and Bishops pine.

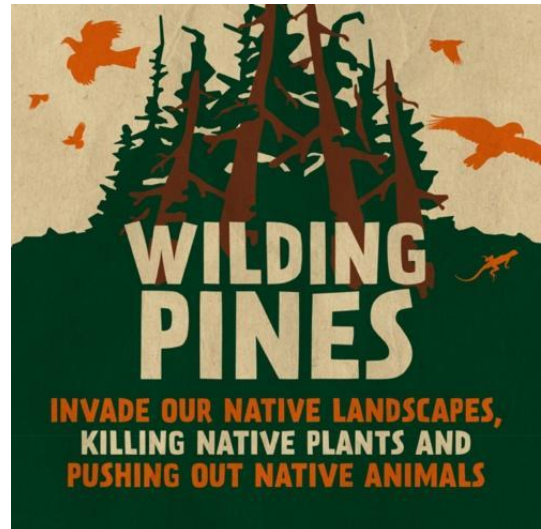
[A guide to identifying wilding pines and other conifers is available here.](#)

Why are wilding pines a threat?

New Zealand's native bush supports a wide variety of native species. In contrast, wilding pine forests generally only support only other wilding pines. They are very dense – taking the sun, water and nutrients other plants need.

Once wilding pines start to produce cones, the wind quickly spreads their seeds. As an area is infested the number of wilding pines increases rapidly, with new trees in turn produce more seeds.

If we don't act now wilding pines could cover more than 25% of New Zealand within 30 years. Every year wilding pines cost New Zealand millions of dollars every year in losses to primary production, resources spent on control and environmental costs.



Where do wilding pines come from?

Unlike pines planted for commercial forests, wilding pines are weeds. They are self-seeded and not intentionally planted. Once they get established, wilding pines spread quickly.

Which species are most invasive?

“Wilding pines” and “wilding conifers” refer to any unwanted pines or conifers that have self-seeded. The main wilding species are:

- European larch (*Larix decidua*)
- Lodgepole or contorta pine (*Pinus contorta*)
- Dwarf mountain pine (*Pinus mugo*)
- Corsican pine (*Pinus nigra*)
- Maritime pine (*Pinus pinaster*)

- Ponderosa pine (*Pinus ponderosa*)
- Scots pine (*Pinus sylvestris*)
- Bishop pine (*Pinus muricata*)
- Radiata pine (*Pinus radiata*)
- Douglas fir (*Pseudotsuga menziesii*).

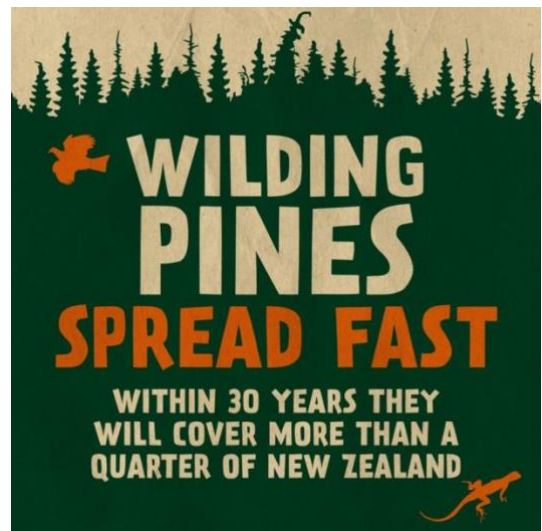
[Some trees begin seeding as early as four years.](#) The older and larger the trees get, the more seeds they can produce - so early control is best.

[A guide to identifying wilding pines and other conifers is available here.](#)

What parts of New Zealand are affected?

Around 1.8 million hectares of New Zealand's unique natural environment is known to be infested with wilding pines. This includes some of our most iconic landscapes like Mt Tongariro, the Coromandel, the MacKenzie Basin, and Kai Iwi Lakes in Northland.

Also seriously at risk are areas with low-growing native plant communities such as geothermal areas, alpine areas and coastal communities, as wilding pines quickly shade these out, forcing these species out.



Do we know where all New Zealand's wilding pine infestations are?

We need better information on infestations. The data we have is gathered from ground and aerial surveys from around New Zealand. Better data and investment in research is a priority. We're aiming to have the location, density, the degree of infestation and control activities of major wilding pine sites across New Zealand identified and monitored by the end of 2020.

Can the impact of wilding pine infestations be reversed?



The effects of wilding pines are long-lasting. Not only can they live a very long time—as much as 200 years—their impact can be far greater than other weeds like gorse.

Once wilding pines have invaded an area, it is very difficult to return things to the way they were. As they invade a landscape, they change the structure and composition of the environment. They change the acidity and the microbiome, the fungus and bacteria that live in the soil, and are at the foundation of the food chain. Over time, the wildings create a dense canopy which shades out native plants living there, forcing out the animals that need them.

The impact of wilding pines

Why are wilding pines a problem?

We could lose up to 7.5 million hectares of New Zealand to wilding pine invasion. This would have an economic cost of \$4.6 billion, due to the negative impact of wilding pines on primary production, biodiversity, hydroelectric power generation and irrigation. We must act now and remove wilding pines to protect New Zealand's unique natural environments and regional economy.

We've established that New Zealand can control the spread of wilding pines and since 2016, the National Wilding Conifer Control Programme and our partners have successfully protected 3 million hectares of New Zealand's most vulnerable land.





How do wilding pines affect the soil where they grow?

When wilding pines invade an area, they can irreversibly change the soil they grow in by altering its nutrients. This can affect what will grow there. In fact, wilding pine seedlings grow more easily on land where wildings have been cleared in the past.

This is called *invasional meltdown*. The science is not settled, but it appears that pest plants change the make-up of the soil, making it more hospitable for other pest plants.

What impact do wilding pines have on biodiversity?

Wilding pines force out native animals and plants. They form a dense canopy and deprive all other species of light and nutrients. Left unchecked, they could lead to local extinction of some species, and even the total loss of some threatened native species (ie those that are only found in these locations).

Many species are at risk—including birds, fish, insects and plants. Native species affected by wilding pines include nectar-feeding species like bellbird, kereru, sea birds like the New Zealand dotterel, geckos, native butterflies, short and long-finned eels, and native whitebait. Many plant species are critically endangered.

An [independent report for MPI in 2018](#) determined that wilding pines not only threaten our natural environment but also overwhelm farmland, recreational land and areas of cultural and historic importance. If we don't act now, wilding pines could cover more than a quarter of New Zealand in 30 years. Every year we wait, the cost of removing wilding pines rises by 30%.

How old are wilding pines when they start to seed?

Most conifer species produce seeds [within ten to 15 years](#). Some of the most invasive wilding pine species can produce cones at 4 years old.

This means it is important to remove wilding pines when they are young - before they produce any seeds - for the most effective control. This eliminates the source of seeds for new infestations.



Where are wilding pines threatening biodiversity?

All life depends on the resources and services provided by diverse biological systems—and every organism in each system plays a part in the survival of all the others. Wilding pines threaten many of New Zealand's many unique ecosystems – from Northland to Stewart Island. Three quarters of our rarest landscapes are highly vulnerable to invasion by wilding pines. Environments under threat from wilding pines include geothermal areas, seasonal wetlands, alpine herb fields, the volcanic plateau, dunes and coastal cliffs.

'Biodiversity' refers to all plant and animal life in an area, which combined, provides life-supporting systems needed for all organisms to survive – including people. Our wetlands purify water and help prevent flooding and drought. Forests provide carbon sinks, absorbing carbon dioxide from the atmosphere, and produce the oxygen we need to breathe. Forests also provide products such as timber, fuel, food and medicines.

Left unchecked, wildings are the threat to many native species, including insects, fish, birds and plants. These include nectar-feeding species like bellbird, kereru, sea birds like the New Zealand dotterel, short and long-finned eels, native whitebait and critically endangered plant species.

Our indigenous biodiversity is unique to Aotearoa New Zealand. It is part of our culture, our society and our economy. For Tangata Whenua, the connection with nature is one of whakapapa (kinship).

[For more information on biodiversity, see the Ministry for the Environment website.](#)

Don't we need these trees to tackle climate change?

While wilding pines can help with climate change, their impact on the environment outweighs any benefit they could offer. On the whole it is better for the environment to remove them.

Most wilding pines are not included in [New Zealand's Emissions Trading Scheme](#) because of the threat to New Zealand's unique biodiversity. There are better options for removing carbon from the atmosphere.

How do wilding pines impact waterways?

[Independent analysis](#) suggests wilding pines could have a strong impact on waterways. They reduce the water available within the environment for other species and for other uses. Wilding pines can decrease the amount of water that flows into rivers by 30% to 40%. This is significant enough to be a significant threat to irrigation and hydro-electricity generation.



Why do wilding pines affect water levels?

Wilding pines hold water within the soil and release water into the atmosphere through the trees' leaves. This reduces the flow of water into rivers and decreases water refilling underground aquifers.

Wilding pines can reduce the amount of water that flows into rivers by 30% to 40%. This reduced water availability negatively impacts irrigation, hydroelectricity and reduces river volumes affecting recreation.

Will the impact on water get worse with climate change?

This impact of wilding pines on waterways is likely to get worse with climate change. In some areas, climate change will increase wilding pine spread as well as lead to hotter drier conditions. This means not only will there be less water entering the environment, but there will be more wilding pines to reduce water into the river systems.

What does the impact of wilding pines on waterways mean for irrigation schemes?

Wilding pines will severely impact New Zealand's irrigation schemes. According to [an independent prepared for MPI](#) this is because the high country is one of the landscapes most prone to invasion and these areas feed our irrigation rivers.



Studies have shown that wilding pines can use 50% more water than tussock. Once the wilding pines take over there will be less water available for the rivers and therefore less available for irrigation downstream. If we do nothing, the cost to irrigation will be \$1.9 billion over 50 years.

How could wilding pines affect hydroelectric generation?

[Independent analysis shows wilding pines](#) reduce the water available within the environment. Wilding pines hold water within the soil and release water into the atmosphere through the trees' leaves. Wilding pines can reduce the amount of water that flows into rivers by 30% to 40%.

By removing water from rivers, wilding pines could reduce water within four of New Zealand's six most significant hydroelectricity catchments; Tongiriro, Waitaki, Clutha and Manapouri.

Failure to control wilding pines would result in a loss of approximately \$995 million in relation to hydroelectricity over 50 years and every year we wait, the cost of removing wilding pines rises by 30%.

How do wilding pines impact primary industries?

Wilding pines harm primary production. [An independent report for MPI indicates agriculture, horticulture and apiculture \(honey production\) are all adversely affected by wilding pines overtaking land intended for primary production.](#)

The National Wilding Conifer Control Programme intends to control wilding pines on 1.5 million hectares of productive land. This active control will then protect a further 7.25 million hectares of productive land from the spread of wilding pines.

What are the benefits of wilding pine control for farmers?

When wilding pines are controlled, farmers can use that land for primary production and can also plan for new land use in the future. [Independent analysis](#) indicates that controlling wilding pines also protects irrigation as wilding pines can reduce river water flows by 30% - 40%.



Wilding pine control

How do we control wilding pines?

Wilding pines are controlled by killing the tree – either by pulling out seedlings, felling or herbicide. Removing wilding pines when they are seedlings is best because it is easier and cheaper (less than \$10 per hectare), and land can be returned to its original use much quicker. If the wilding pines are removed before they form cones, they do not spread.

[The Department of Conservation website has information on the cost of control techniques.](#)

Why is it better to remove younger trees?

Once a tree starts to produce cones, the wind will quickly disperse seeds over a wide area and allow the wilding pines to overwhelm more land. The increased density of trees increases the size of the problem by increasing the number of trees producing seeds, but it also makes the control process more expensive and makes it harder to restore the affected area.

What methods are used?

After removing seedlings, the most common ways to control wilding pines generally involve felling the trees or using herbicides. The method used depends on how many wilding pines need to be controlled and where they are. Some examples of control work are:

- **Felling** by chainsaw, saw or hand-pulling.
- **Ground-based basal bark application** involves spraying herbicide on the base of the tree. This method is best in locations where plants are scattered but easily accessible by ground.
- **Cut stump with ground-based basal bark application**, where a tree is cut down and herbicide is applied to the stump.
- **'Drill and fill'** where holes are drilled in the tree and herbicide is put into the holes.

- **Aerial basal bark application (ABBA)** applying herbicide to the base of the tree from a helicopter using a long 'wand'. (where is this generally used, you mention location for ground based basal, when are helicopters used?)
- **Aerial Boom Spraying**, where a helicopter sprays herbicide on the foliage of dense stands of trees. (used in x locations because....dense wilding pines forests etc)

[Click here for the Wilding Conifer Control Programme best practice guidelines for control methods.](#)

What herbicides are used to control wilding pines?

Herbicides most commonly applied by ground workers using drill and fill, or basal bark application (applying herbicides to the tree-trunk) are glyphosate (like Round-Up). We have also trialled other herbicides.

Aerial boom spraying usually involves metsulfuron-methyl.

[Click here for the Wilding Conifer Control Programme best practice guidelines for control methods.](#)

Are the sprays used harmful?

The herbicides used may be harmful and can only be used by trained professionals. Our programme is committed to health and safety – both for people doing control work and for people in the nearby environment. All risk from herbicides is managed through strict health and safety management systems.

[Click here for the Wilding Conifer Control Programme best practice guidelines for control methods.](#)

Do any of the herbicides used contaminate waterways?

Scientists have examined herbicide levels in waterways surrounding sprayed areas. No herbicides were found in nearby stream sediment. Sometimes herbicide may be found in nearby waterways, if there has been recent significant rainfall.

Does helicopters-based control put nearby plants and trees at risk?

Helicopter-based boom spraying is used to manage dense wilding pine forests, where it's rare to find native plant species. Contractors are careful to ensure herbicide is only applied to wilding pines. The

programme also generally uses sprays that do not affect native grasses like tussock, which often are the vegetation that borders wilding pine forests.

Occasionally there can be some accidental herbicide drift and non-target vegetation is sprayed. Everything possible is done to avoid this.

Is the herbicide used to control wilding pines harmful to the soil?

Research shows that spraying wilding pines with herbicide does not affect the soil. Low levels of herbicide may be present in pine needles on the ground and little to none is found in the soil beneath them. Residual herbicide is 'locked in' to the needles, which helps prevent germination of pine seedlings on the forest floor. This residue slowly degrades over time.

Does successful control mean wilding pines will be completely eradicated?

Controlling wilding pines will not get rid of them completely. But we will bring them to a point where they can be managed easily by the landowner.

[Our goal is to get to a point where 95% of all landowners can manage wilding pines themselves.](#)

What do we do with the land after wilding pines have been removed?

This depends on the location, but generally we can restore land for productive pasture or support native vegetation.

Options include restoring native trees (i.e. on public land), using it for pasture and grazing, or replanting it with alternative(native?) trees. Regardless, restoration takes time and is costly. It is far better economically and ecologically to prevent wilding pines from growing and spreading than to restore the land after removing them.

How can we prevent future spread?

Apart from removing seed sources, the main way to prevent future spread is through careful planting of pines and other conifers. The [National Environmental Standards for Plantation Forestry](#) have a [Wilding Conifer Risk Calculator](#) to determine low-risk areas to plant plantation forests. The *Winning against Wildings Programme* is also researching a new variety of conifer that could produce fewer seeds.



Do landowners have to control wilding pines on their land?

Once a site is controlled, landowners are obliged to control wilding pines, and their spread to adjoining properties, under the [good neighbour rules](#) of the [Biosecurity Act \(1993\)](#).

General questions

What effect do wilding pines have on fire risk?

Wilding pines increase the amount of resources needed for fire prevention. [Independent analysis by the Sapere Group](#) suggests controlling wilding pines will dramatically reduce the amount of money needed for fire prevention. It is estimated it will save \$654 million on these costs over 50 years.

Where are the areas with wilding pines that are threatened by wildfires?

Wilding pines spread fast and left unchecked could cover more than a quarter of New Zealand in 30 years. If this were to happen, there would be a significantly increased fire risk. [An independent report shows this risk is not just to rural and conservation land](#). Wilding pines often grow close to areas where people live, putting people and property at risk of wildfires.

A recent example is the Flock Hill fire in January 2015, where fire in 330 hectares of land, largely occupied by wilding pine forest, threatened Castle Hill village and Craigieburn Forest.

Do wilding pines increase the risk of wildfire?

[Independent analysis](#) shows that areas of dense wilding pines increase the intensity and impacts of wildfires. Wildfires from wilding pines have been shown to be more severe than fires involving the vegetation they replace. Wilding pine forests don't have firebreaks or fire ponds. They can grow in remote and difficult terrain and so are much more difficult to fight.

Fires in wilding pine forests are likely to burn hot and this can increase the threat to adjoining native bush, commercial forests, infrastructure and human life. For example, the Flock Hill fire in January 2015, saw a fire affecting 330 hectares of land, largely occupied by wilding pine forest, threatened Castle Hill village and Craigieburn Forest.



The larger the area that wilding pines invade, the more New Zealand needs to spend on wildfire prevention. Wilding pine control could save the country more than \$650 million on fire prevention over 50 years.

Why is it better to remove wilding pines, rather than use them to fight climate change?

Wilding pines could offer some benefit in terms of carbon removal, but their invasive properties mean it is better for the environment to remove them and prioritise protecting New Zealand's unique biodiversity.

All plants remove carbon from the atmosphere and so reduce greenhouse gases. Wilding pines, like any plant, act as a "carbon sink" and remove carbon from the atmosphere. However the environmentally destructive nature of wilding pines, combined with New Zealand's obligations under a number of international agreements, mean it is better to remove them.

Our international climate and biodiversity agreements do not support the use of wilding pine species as carbon sinks. The United Nations Framework Convention on Climate Change, the Kyoto Protocol and the Paris Agreement require active planting of forests for carbon removal. This means the vast majority of wilding pines in New Zealand aren't part of carbon calculations.



The National Wilding Conifer Control Programme

What is the National Wilding Conifer Control Programme?

The National Wilding Conifer Control Programme was established in 2016, to deliver a 15-year strategy to reduce wilding pine infestations to a locally-manageable level.

Over the first three years our programme partners have completed \$22 million of work, searched and controlled more than 1.6 million hectares of land—and protected 3 million hectares of our most at risk landscape from invasion.

Who is involved in the programme?

The programme is led by Biosecurity New Zealand, working with the Department of Conservation (DOC) and Land Information New Zealand (LINZ). Other key players include the Defence Force, regional and local councils, local communities, researchers, industry and private landowners. Since 2016, in its first three years, the programme spent \$16 million on work to control wilding pines in 1.5 million hectares of New Zealand's most vulnerable iconic landscapes.

The New Zealand Wilding Conifer Management Strategy (2015) proposed a coordinated, multi-agency approach to achieve sustainable management of wilding conifers. It laid out a 15-year programme to bring wilding pine infestations to a level where they can be managed locally.

Why is a national programme needed?

The programme was introduced to bring a more systematic, efficient and planned approach to national wilding pine management. We coordinate and prioritise efforts across territorial authority boundaries and land tenures. We also support stakeholders with best practice information and scientific findings, to support operational planning.



What is the aim of the National Wilding Conifer Control Programme?

The aim of the National Wilding Conifer Control Programme is to prevent wilding pines overwhelming New Zealand's unique natural landscapes and protect land intended for other uses e.g. farmland, recreational land and land of historic or cultural importance.

By 2030 all wilding pine stands will have their spread contained.

Has the National Wilding Conifer Control Programme been successful so far?

Since the programme was established in 2016, we have successfully controlled wilding pines in 1.5 million hectares of New Zealand's most vulnerable iconic landscapes.

Areas where we've actively begun wilding pine control include the central North Island, Marlborough, Canterbury, Otago and Southland. We have proven that with the right techniques and a coordinated approach, we can control wilding pines.

What research supports the National Wilding Conifer Control Programme?

Working with our partners, we have invested extensively in research and improving data. For example, the programme is developing a machine-learning algorithm which can detect wilding pines from aerial images. This will mean we can plan the programme's control activities more efficiently. We are also at the forefront of improvements in herbicide use.

The programme has developed a system to help manage wilding pines and their control - the [Wilding Conifer Information System](#) (WCIS). This will help to inform us where the problem is, how big the problem is and how well the control efforts are working. WCIS will help us protect the greatest areas of New Zealand most efficiently. The Winning Against Wildings Government Science Challenge has found ways to reduce the amount of herbicide needed to control wilding pines. This makes spraying safer for the environment, as well as cheaper.

The *Winning against Wildings* research programme has looked at how to predict the risk of wilding pines spreading, wilding pine detection and monitoring, invasion impacts and ecosystem effects.



Finally, the *Wilding Conifer Control and Beyond* project is researching post-control site recovery. This is funded by the Ministry for Primary Industries (MPI) and New Zealand Wilding Conifer Group (NZWCG).

How does the National Programme use the latest science/research to inform its actions?

The National Wilding Conifer Control programme is committed to using the latest scientific findings in our operations, and sharing information with our partners to guide their practice.

For example, the national programme is developing a machine-learning algorithm which can detect wilding pines from aerial images. This will mean we can plan the programme's control activities more efficiently. We are also at the forefront of improvements in herbicide use.

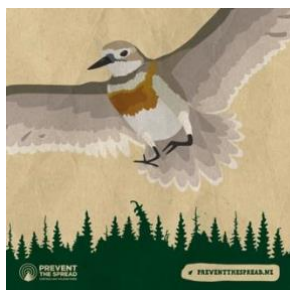
More information

Case studies

We've prepared case studies on wilding pine projects throughout New Zealand. You can find these at wildingpines.nz/case-studies

Awareness toolkit

We've developed a range of free resources to support programme partners and others to raise awareness about wilding pines and control work in their area. For a wide range of print and online resources – including posters, social media graphics, photos and more visit wildingpines.nz/get-involved



Contact us

For more information about wilding pines, or about the wilding conifer control programme, email us at wilding.pines@mpi.govt.nz