Manaaki Whenua
Landcare Research

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Short webinars for environmental policy-makers and practitioners

New Zealand's Worst Weed Problem

The following questions were asked during our live webinar with Duane Peltzer and Rowan Sprague but due to time restrictions, we were unable to answer these in the session.

In areas where the ideal outcome is native conifer forest could we use wilding conifers as the nurse crop to establish a forest canopy and create that shading native species need to establish then target/prioritize control in the grassland & most vulnerable ecosystems?

In some areas where there is a surrounding native seed source, we have found that when we control wilding pines and leave them standing dead (using the drill and fill control method), they can facilitate native regeneration by providing shade for native seedlings to grow. However, I wouldn't go so far as to say that wilding pines could be a nurse crop because they often out-compete the natives when they are alive. From what we've seen when exotic pine plantations are converted to a native forest, this is a long process and anecdotally, it seems to work best when pine trees are removed slowly, allowing for natives to regenerate in the understory.

What would you say are the key outcomes of your programme in terms of improving management?

This is a great question. There are a range of outcomes and impacts planned from the winning against wildings programme. The overall impact of our work is to help achieve the national goals articulated by the national strategy for the management of wilding conifers in NZ; that is, wilding invasions are contained or new invasions prevented by 2030. Our tangible short-term outcomes are to improve operational control methods through improved best practice, reducing spray use etc; using our ecological research to update spread risk assessment and the benefits of controlling wildlings; and long-term, preventing future invasions through plantation design, sterile or low-spreading trees and the like. It's a complex set of research projects, but most results are taken up and implemented directly through the central government partnership in charge of operations: the national wilding conifer control programme. The "wilding conifer group' is also an important and independent group of practitioners, landowners, community trusts etc that are directly doing management at local to regional scales. Always happy to provide more detail and examples here, or in future webinars too!

You mentioned that there are implications to soil nutrient cycling when conifers invade. Can that be returned to normal once they are removed and how long would that take?

Wildings increase soil nutrient cycling rates, increasing the availability of nitrogen (as nitrate nitrogen) and phosphorus. Wildings also change the fungal and bacterial soil communities, which also affects nutrient cycling. It can take a long time for soil to return to its 'original' state pre-wildings. In a study done by Dickie et al. in 2014 (I can provided the reference if you are interested), researchers found that wildings could leave a long legacy in the soil, potentially making it very difficult to return soils to their original state even after the removal of wildings.

What is your research showing about the coinvaders with wilding conifers - the animals but especially the fungi and the role they play in reinvasion after control efforts?

This is a great question, it's probably best to have Ian Dickie (U Canterbury) speak to this in a future webinar, but briefly, we have published on co-invasions of both lodgepole pine and douglas fir, but not directly on how fungi or animals facilitate reinvasion following wilding control. That said, there's two key points worth raising here: 1) fungal spores persist for decades, so once wildings invade then we expect that the next generation of wilding trees won't be mycorrhizal-limited and will establish (and perhaps grow) better when re-invading and area. 2) Douglas fir is a bit more complex than the pines because some native mycorrhizal fungi we'd see in beech forests are associated with seedlings; whereas no native mycorrhizas are on pines... this might help to explain why Douglas Fir can invade forests better than pines (alongside it's better shade tolerance).

There seems to be quite a lot of wildings coming from old shelterbelts (i.e. contorta) that have been felled a few years ago. Also, a lot of wildings coming from forestry areas. I was wondering if there are any laws that require forestry companies to deal with any wildings that might come up/grow in their vicinity, or adjoining landowners?

Yes, there are several regulations which pertain to wildings and landowner obligations to remove them. First, there are the National Environmental Standards for Plantation Forestry - this legislation regulates where a new plantation can be planted. As part of these regulations, there is a wilding conifer risk calculator, designed to assess the spread risk of a plantation. If a plantation is above a certain score and would have a high probability of spreading wildings, then the plantation owner needs to apply for a resource consent to plant the plantation. This process isn't perfect, and we are hoping to improve it using new results from the Winning Against Wildings programme. There are also Regional Pest Management Plans, which lay out a landowner's obligations to control wildings on their land. There are some gaps in this legislation unfortunately because a landowner doesn't have to remove wildings from their land in all circumstances. Essentially, wildings need to be shown to be spreading and public money needs to have been spent in the past either on the landowner's land or on surrounding land. I'm happy to send you more information about landowner obligations if you'd like! Finally, we have the Biosecurity Act as our final piece of legislation for wilding control. This Act is currently under review and we hope that the review will enable us to more easily identify the 'polluters' and the 'benefactors'.

The steering group has only the 1 rep from the North Island I think? How do other regions get their voices heard? And will the additional funding for wildings be distributed equitably with regards its control measures?

Before the Budget 2020 announcement, the National Wilding Conifer Control Programme funded wilding control in 5 regions (Manawatu-Whanganui, Marlborough, Canterbury, Otago, and Southland). With the big increase in funding from Budget 2020, the National Wilding Conifer Control Programme will expand the areas where it will fund. We expect the National Programme to announce where it will allocate this money in the next few weeks. The New Zealand Wilding Conifer Group is the Stakeholder Advisory Group of the National Programme, so regions and communities are represented and have their voices heard through this group as well. We are trying to increase representation and ensure that everyone is heard equally though, so this is a great question.

Just within the last year I noticed that a large block of private land near the village was planted with small pines or conifers right opposite DoC land. Are there any regulations on what a private person can plant?

Yes, there are regulations on what a person can plant, but there are gaps in these regulations unfortunately. For plantation forests, there are the National Environmental Standards for Plantation Forestry, which regulate where plantations can be planted. For shelterbelts however, the NES-PF doesn't apply. Once the trees are planted and if they are spreading, potentially the landowners would need to remove wildings to comply with the Regional Pest Management Plan. In Canterbury's RPMP, there is a broad definition of a wilding conifer, but landowners aren't obligated to remove wildings unless the trees are spreading and there has been public money spent to control wildings on the property or the surrounding land. I'm happy to send you more information about landowner obligations if you'd like!

What kinds of economic incentives exist which may encourage community groups to want to harvest or pull wildings themselves? I have heard of oil produced by wildings being put through presses, are there any other examples from around the world.

This is a great question, and briefly... yes, there are some attempts to produce products etc from invasion pines, but most if not all aren't profitable or widely undertaken. Depending on the species and location, wildings can be harvested for timber or firewood. We don't expect to make a profit in these circumstances, but it can help offset the cost of control. There is a company in NZ that makes essential oils from a couple of wilding species, and sells this to fairly high end cosmetic or personal care products, but this is at a fairly small scale. There is also interest in using wildings as a biofuel resource - there's still a lot that we don't know about wildings as a biofuel but several landowners and companies are exploring this possibility. Across the world and in NZ, the economic benefits of wilding control are long-term. Wildings affect water yield, so particularly in water-sensitive catchments (such as the Waitaki), lower water yields caused by large wilding infestations can affect hydropower generation and irrigation. In South Africa, there was a large-scale wilding pine (and other woody weed) control programme to increase water yields.

How about a webinar on forest fire risks?

Great suggestion! There is a research team at Scion studying extreme fire behaviours, and as part of their research, they will burn a wilding infestation to see and understand wildfire risk. They have done one burn trial and will do another this spring, so in summer/autumn we will ask them to give a webinar!

Duane mentioned a whole lot of initiatives to tackle wilding pines. Does anyone have a comprehensive list of these initiatives and who to contact (for people who might want to get involved)?

The New Zealand Wilding Conifer Group has formed a network of community and landowner groups involved in wilding pine control. Please email me at rowan@nzwildingconifergroup.org if you'd like to get involved in a group!

In the days when native forest was cut down to plant pine trees, native Armillaria species were pathogenic to the young pines - possible as a biocontrol early in an invasion?

This is a great suggestion, and not something that we're currently working on in the wildings programme. We have done some preliminary scoping of potential insect biocontrol agents, and surveys of whether people support this as a new potential control tool, but we haven't considered the possibility of using native fungi as a biocontrol to date.

Is most of the area being invaded [in the South Island] going back to an earlier ecosystem (forests)? If so, what are the implications for native forests restoration?
Could wildings be used as nurse crops for natives?

There is speculation that NZ's tussock grasslands are reverting back to woody plant cover - in the case of wilding pines, the woody plant cover is a weed. One of the researchers in the Winning Against Wildings programme has suggested that instead of protecting grasslands from woody weed invasions, maybe we should plant grasslands with native woody cover - here's his blog post about it if you are interested: https://ecosystemmycology.wordpress.com/2019/08/02/the-role-of-mycorrhizal-fungi-in-plant-invasions/.

About wildings being a nurse crop, in some areas where there is a surrounding native seed source, we have found that when we control wilding pines and leave them standing dead (using the drill and fill control method), they can facilitate native regeneration by providing shade for native seedlings to grow. However, I wouldn't go so far as to say that wilding pines could be a nurse crop because they often out-compete the natives when they are alive. From what we've seen when exotic pine plantations are converted to a native forest, this is a long process and anecdotally, it seems to work best when pine trees are removed slowly, allowing for natives to regenerate in the understory.

If fencing is many times needed to protect pine plantations from livestock, have you tested how livestock could help in tackling wildings?

Nick Ledgard did some work on grazing as a control method for wildings and he ranked the palatability of wildings for livestock too. However, grazing is only effective for young seedlings before they become too woody and unpalatable. Here are a couple of references on this work: Ledgard N and Norton D. 2008. The impact of browsing on wilding conifers in the South Island high country. NZ Journal of Forestry, 52(4), 29-34.

Crozier, E.R. and N.J. Ledgard. 1990: Palatability of wilding conifers and control by sheep browsing. In Basset, C., L.J. Whitehouse and J.A. Zabkiewicz. (Eds) "Alternatives to the chemical control of weeds". Proceedings of International Conference, Rotorua, July 1989. Ministry of Forestry, Forest Research Institute Bulletin No 155: 139-143 The other complication is that palatability varies widely among the different wilding conifer species, and so a good knowledge of grazing practice and species that might be controlled is needed here. Martin Nunez has summarised what is known internationally for this as well (as yet unpublished though).

By prevention do you mean genetic manipulation to avoid trees becoming fertile in the first place?

Prevention can take three approaches: 1) Looking at plantation placement and ensuring that plantations are planted in the right place (and the right species is planted); 2) Surrounding Land Management - using grazing and fertiliser application to reduce/ contain spread - this only works in some contexts though as it depends on the surrounding land management; 3) Conifer sterility and low-seeding trees - researchers in the Winning Against Wildings programme are looking into gene editing Douglas fir so that it will not produce viable seeds. Researchers are also looking into breeding low-coning trees.