# Research request: Quantifying the effect of helicopter-based boom spraying of triclopyr and dicamba and any other potentially effective herbicides on indigenous vegetation in areas under dense (~100 % canopy cover) pine infestations.

## Background

Areas that are completely covered by pine invasions are a management challenge as felling trees in this situation is very difficult. When these areas of dense pine infestation are in areas that are difficult to access, the pines cannot currently be practically controlled and represent large sources for ongoing invasions and spread. Control of dense invasions has been successfully achieved in New Zealand by using helicopter-based boom spraying (see Gous et al 2015 for details). CapeNature needs a method to control dense pine invasions that results in the maintenance and restoration of indigenous plant species. This requires evaluation of the negative effects this control method may have on indigenous species relative to the effects of the pines on indigenous species.

To this end CapeNature requests that research be undertaken to formally evaluate targeted boom spraying by helicopter of inaccessible, dense stands of pines, in particular the Mediterranean Cluster Pine (*Pinus pinaster*), for its effectiveness in killing such pine trees and for its effects on indigenous vegetation that may be present within or adjacent to such stands of pines. These stands must include a range of size classes of pine trees covering at least a range of sizes from 1 to 15 m tall. This method should investigate systemic herbicides e.g. triclopyr and dicamba applied in a way that minimises spray drift (see Gous et al. 2014 & 2015) and advise on the most appropriate concentrations for balancing effectiveness with collateral damage to indigenous species.

An additional aspect is that this research should be suitable to enable registration of this method, if it proves worth pursuing, with the DEA Registrar and adhere to all the requirements that such trial protocols require.

## Research questions

What percentage of pines are killed?

Which pine tree size classes are killed?

How long do they take to die?

What is the effect of this method on the mycorrhizae associated with the pines?

What indigenous species still remain in these dense pine stands (pre-treatment)?

What indigenous species are affected by the herbicide?

What proportion of indigenous species are affected by the herbicide?

What is the level of the effect on indigenous species (e.g. scorching, die back, death)?

What is the rate of recovery (as measured by proportion of species represented, time to sprouting or germination) of indigenous species? This may require ongoing monitoring after the 3 year study period.

## Equipment and support

The following equipment and services will be supplied by CapeNature:

Vehicular access to test sites.

Collaboration from Scientists, Technicians, Regional Ecologists and Ecological Coordinators. Access to relevant data curated by CapeNature.

## Funding

Funding may be available to cover the costs of herbicides and helicopter flying time.

## Sample sites

Wetlands sites must be excluded from this method. Areas with populations of threatened species must not be used for these trials. A suitable area will be chosen in collaboration with CapeNature.

## Time lines

Ideally this research should be completed within a time span of three years.

## References

Gous, S., Raal, P. & Watt, M.S. 2014. Dense wilding conifer control with aerially applied herbicides in New Zealand. New Zealand Journal of Forestry Science 44:4.

Gous, S., Raal, P. & Watt, M.S. 2015. The evaluation of aerially applied triclopyr mixtures for the control of dense infestations of wilding *Pinus contorta* in New Zealand. New Zealand Journal of Forestry Science 45:1.

## CapeNature Contacts

If you are going to take responsibility for running the project then also insert your details xx.

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