



Controlling royal fern

A trial of ground-based methods for controlling *Osmunda regalis* L. invasion of Waikato wetlands, New Zealand

What we know

More than 90% of palustrine wetlands in New Zealand have been lost, and those remaining face ongoing threats such as plant invasions. In the northern North Island, there is concern about widespread invasion of wetlands by royal fern (*Osmunda regalis*), a fast-growing exotic fern first introduced to New Zealand in 1890.

We compared the effectiveness of mechanical and herbicide treatments (cut-and-paste gels) for controlling royal fern invasion at three Waikato wetland sites, comprising two mānuka–willow swamps and a *Machaerina*-dominant fen.

What we found

Of the three herbicides applied, Glimax (high-strength glyphosate) was the most effective, killing 94–100% of royal fern plants at the two swamp forest sites, but only 77% at the fen site. All treatments were least effective at the fen site, where royal fern did not form trunks.

Mortality of mānuka on plots where herbicides were applied to royal fern did not differ significantly from mortality on control plots where no treatments were applied.

Background and context

Highly effective spore dispersal and rapid vegetative growth make royal fern a serious threat to wetlands throughout much of the country. For example, royal fern has rapidly colonised recently burnt areas at Whangamarino, potentially displacing native wetland plants and altering ecosystem properties.

There is an urgent need to identify cost-effective methods of control. Aerial spraying of herbicides has proved effective at controlling invasive willows but this method can also have adverse effects on non-target vegetation. Aerial application is also unlikely to be effective when royal fern is overtopped by taller, woody plants such as willow or mānuka. This motivated our decision to focus on ground-based methods of control.



What we did

Two of our study sites were located in the Whangamarino wetland complex, and the third at Lake Whangape. At each of the three sites, five plots of 20 x 8m were randomly assigned one of the following treatments:

- Glimax (high-strength glyphosate)
- picloram
- metsulfuron-methyl
- mechanical control (cutting only)
- no treatment.

Plots were revisited the following summer to record mortality of royal fern. Survival of a native plant (mānuka) was monitored to assess potential impacts of herbicide treatments on non-target species.

Conclusions

Site conditions and the growth form of royal fern plants influenced the efficacy of treatments. Herbicide cut-and-paste treatments (especially Glimax) were most effective where royal fern formed a trunk. All methods were least effective at the fen site where plants lacked an arborescent form.

Control methods should be tailored to site-specific conditions as well as the growth form of royal fern. Further research is needed to enable a more complete understanding of royal fern invasion and optimal methods of control.

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