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Towards a Predator Free New Zealand

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ABSTRACT: New Zealand biodiversity is highly endemic and suffers from extreme loss due to habitat destruction and invasive mammalian predators. Building on New Zealand's expertise in mammal eradications on offshore islands, the New Zealand government recently announced NZ\$28 million to initiate the process to eradicate invasive rats, possums, and mustelids from the New Zealand mainland by 2050. Predator Free 2050 Ltd was established to distribute these funds to groups who could demonstrate local eradication and landscape scale suppression of predators, and lever additional funding to achieve their goals.

Not surprisingly, this programme has raised a few eyebrows, enthralled people, angered others, or kick-started a tranche of new biodiversity protection projects across the country. Whatever one's perspective, the bar has been set very high, and consequently has engaged a lot of people in the thinking, planning, and on-the-ground action. This is one of the most exciting times in New Zealand's history to be either managing predators or studying them. The challenge is huge, and the opportunities tremendous, but we won't get there unless we address a number of important knowledge gaps. Manaaki Whenua Landcare Research is one of many New Zealand research providers helping to fill these gaps.

Achieving eradication of predators at a national scale requires quantum leaps in pest management, including: 1) new tools and strategies for removing predators; 2) more accurate methods of detecting predators at very low abundance; 3) statistical methods for declaring success; and 4) public co-operation and involvement in the programme. Manaaki Whenua scientists have recently developed a long-life novel lure using kairomones emitted by ferrets. Adding ferret odour to regular bait increased stoat detection rates by 200%, and in kill traps, ferret odour increased stoat kills by 150%. Responses were not limited to stoats, as weasel and hedgehog detections increased by similar amounts with ferret odour.

We have also developed a free decision-support tool (TrapSim) to simulate the effects of varying trapping and poisoning regimes. The tool is being further developed to include predator reinvasion and the variation between individuals in their interaction rates with control devices. We have also developed software to help managers estimate the minimum amount of surveillance needed to achieve the required sensitivity and the target probability of eradication. Declaring local eradication reliably is a critical part of moving from one eradication zone to the next. Lack of detections does not necessarily mean eradication, as this depends on the detection network and the probability that a predator can be detected if it is present. We modified software created for determining proof-of-freedom from animal diseases for proof-of-eradication of pests. This allows managers to declare the probability of eradication based on Bayesian statistical methods, given zero detections.

Motion-triggered cameras are excellent devices to detect pests at very low densities, but they suffer from the time required to process thousands of images. We are co-developing artificial intelligence that automatically culls out images with no animals and learns to identify animal species when animals are present. This will be a huge cost saver.

A key component of the success of this programme is demonstrating the biodiversity, economic, and social benefits. We conduct repeated surveys of urban and rural public to gauge the extent to which the programme affects people's lives in terms of fewer encounters with pests, more encounters with native biodiversity, perverse outcomes, and greater awareness and understanding about their local biodiversity.

Regardless of whether the programme succeeds in the next 30 years, the research and technological advances that are already happening will be hugely beneficial for pest management. Technical challenges, however, are only part of the solution. Working in a populated and agricultural landscape, maintaining the initial enthusiasm we are currently experiencing, and ensuring the majority of the population remains on board, are all enormous challenges.

KEY WORDS: pest eradication tools, pest surveillance tools, Predator Free New Zealand, proof of eradication, social licence

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