

# 'GEN ONE' DETECTION: A scaleable strategy for detecting rat incursions into predator-free landscapes

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Current best practice for surveillance and defence of rat-free islands and mainland sanctuaries requires that every invading individual be intercepted and killed to prevent the possibility of population re-establishment. However, a single invading male or non-pregnant female rat in an otherwise rat-free area would cause minimal ecological damage to healthy native species populations, and without any mating opportunities, would be functionally extinct. Zero Invasive Predators (ZIP) are investigating the viability of an alternative strategy for surveillance at landscape scale, which will focus on detecting and responding to the first breeding ('Gen One') event, rather than single invaders. This strategy is based on the assumptions that a) naïve juvenile rats will interact more readily with detection devices than adult rats, and b) the collective dispersal 'footprint' will be larger as there will be up to 10 exploring pups (compared with the lone invader). Utilising a sparse primary detection network across the landscape, a single activation of a device by any one of those rats will trigger rapid deployment of secondary detection to determine the spatial extent of the Gen One dispersal footprint for prompt spot-treatment to remove the nascent population. A key advantage of this strategy is that there is a longer window of opportunity to detect and respond to a Gen One event (~100 days from weaning of Gen One to potential weaning of Gen Two) than to a single invader (minimum of 20 days before potential Gen One is weaned). We are planning a pilot trial to measure the spatial extent of a Gen One footprint in a rat-free landscape, and are developing tools for primary and secondary detection and spot treatment that will be suitable for landscape scale deployment in accordance with New Zealand's Predator Free 2050 aspirations.