

**Eradication Science Programme Co-funding**  
**Interim report to PF2050, June 2020 - June 2021**

29/6/2021

This report addresses Milestones 1.1 and 1.2, and Decision Points 1 and 2, of contract 1920-28-021H between Predator Free 2050 Ltd (PF2050) and Manaaki Whenua – Landcare Research (MWLR). The contract has a start date of 1 July 2020 and an end date of 1 October 2022.

**Milestone 1.1:** Test the effectiveness of novel and innovative smart devices in:

- differentiating between target and non-target animals
- automatically disarming in the presence of non-target animals
- integrating detection and behavioural manipulation by identifying the target animal, then deploying an appropriate sensory lure

**Milestone 2.1:** With research partners, develop AI-supported devices to deliver a range of sound, visual and odour cues depending on pest species and prevailing conditions. Carry out initial pen trials to allow subsequent field testing.

**Decision Point 1:** MBIE Programme meeting with key stakeholders held, facilitating their input to programme design. Due date: 31/12/2020

**Decision Point 2:** Brief interim reports from Milestones 1.1 and 2.1 demonstrate sufficient progress to date, to the satisfaction of PF2050. Due date: 30/06/2021

**Progress to date:**

***Governance group meeting***

An Eradication Science Governance Group virtual meeting was held online on 28 September 2020. Attendees were Brent Beaven, Richard Curtis, Phil Bell, Sam Brown, Steve Ellis, Patrick Garvey, Al Glen, Nikki Harcourt, Jo Harawira, Graham Hickling, Chris Jones, Campbell Leckie, Grant Norbury Ali Meade, Dan Tompkins and Mahuru Wilcox. Apologies from Bruce Warburton. A 2-page summary of progress to date was circulated ahead of the meeting, and summary slides of the presentations on the day was circulated soon thereafter.

***Trapping effectiveness***

MWLR is collaborating with Cacophony, who are developing a smart device designed to capture only target pest species. The Cacophony trap, when completed, will use artificial intelligence to determine when a target animal has entered, triggering the trap to close. A sensor mounted onto the ceiling of the Cacophony trap will distinguish between mammals and birds so that non-target captures can be avoided.

During the contract period, Cacophony have deployed their prototype trap in the field and demonstrated that it can successfully capture possums, feral cats and hedgehogs. In parallel, MWLR has tested the prototype trap on stoats and ferrets at the MWLR animal facility (November - December 2020).

Of the 5 stoats tested, 4 were captured by the trap. Once the primary trap doors triggered, all 4 stoats entered the cage trap at the back of the device (where a kill trap will be located once the trap becomes fully operational). The single stoat that was not captured during entered the trap prior to

the trap's 'live' period. Trail camera footage showed that the sensor light on the control box was triggered, indicating that this animal also would have been captured had the device been active.

The trap also was trialled on one ferret in January 2021. Trail cameras showed the ferret entered the trap without hesitation prior to the 'live' period and a light on the control box indicated that the trap would have triggered had it been active when the ferret entered. Although the ferret showed no hesitation when entering the device, the trap malfunctioned and automatically triggered when the 'live' period commenced, so no capture was recorded.

During daylight hours, sun and shadows sometimes activate the trap without any animal being present. We placed the trap in the shade away from direct sunlight, but this did not solve the problem. Cacophony consequently set the device to activate 2 hours after sunset, which resolved the false triggering issue. However, since cats, ferrets, and stoats are occasionally diurnal, this problem of false triggering during daylight hours will need to be resolved if all pests are to be targeted.

### ***Testing of cues***

MWLR are undertaking visual, olfactory, and auditory cue testing on three target species – ship rats, possums, and stoats. Pen trials with 15 olfactory lures have been completed on these three target pests. Cacophony have tested sound lures on possums and rats in the field, using sound lures supplied by MWLR, and MWLR has run a sound lure trial on stoats in captivity. MWLR is about to begin testing visual lures, and combinations of lures, at the MWLR Animal Facility.

### ***Enabling AI-support***

As a first step towards discriminating target vs. non-target species, Cacophony will train their AI to differentiate between birds and mammals. This training requires large numbers of videos that are difficult to obtain in the field, so videos for software training are currently being collected at MWLR's animal facility in Lincoln.

Two Cacophony traps with ceiling-mounted cameras are currently deployed in separate pens, with a single animal placed in each pen until sufficient images had been recorded (the traps were not active during the image-gathering period). Each of the devices was monitored with an external thermal camera to confirm the species identity and behaviours associated with each image collected by the trap's internal camera.

Video collection has been completed on three species (possums, ducks, and quail). Two additional species (cats and ferrets) are being tested in coming weeks. Cacophony will report the results once trials have been completed on all five species. These videos will next be used to train the smart device's AI to identify approaching animals, discriminate between target and non-target species, and then deactivate or deploy a lure accordingly.

Graham Hickling and Patrick Garvey  
Eradication Science Programme Leaders