INTERCEPTING INVADERS: DETECTING THE 'LONELY' POSSUM

Oscar Pollard – November 2017

This project was one of a suite of projects carried out during 2015-2017, with funding from six New Zealand dairy companies: Fonterra, Tatua, Synlait, Westland Milk Products, Open Country Dairy and Miraka.

INTRODUCTION/BACKGROUND

In New Zealand, the common brushtail possum (*Trichosurus vulpecula*) has a significant impact on the survival of native biodiversity. Possums also negatively impact the dairy industry by acting as reservoir hosts for bovine tuberculosis (TB). Organisations such as the Department of Conservation and TB Free NZ are successful in reducing possum numbers to below 5% of pre-operation populations where they undertake possum control work (Morgan et al, 2006).

Individuals that survive control operations or invade a controlled area with extremely low possum densities range widely in search of breeding partners (Sweetapple & Nugent, 2009). If possum incursions are kept to an infrequent basis, their slow breeding rates (Cowan, 2005) and curious nature (Carey et al. 1997) suggest that a 'delayed' detection and control response may be all that is required to effectively prevent the re-establishment of possum populations.

Leg-hold traps are regarded as being the most effective device for possum trapping. To reduce the labour costs associated with leg-hold trapping, ZIP has developed an automated reporting system that remotely reports the status of the trapping network (e.g. a sprung trap that needs checking). At the time of this trial, we suspected that a 'lean detection network' comprising one automated leg-hold trap per 50ha may act as a sensitive and economically viable technique to detect and remove remaining individuals or invaders over large landscapes.

OBJECTIVES

The objectives of this trial were to:

- test the performance of a lean detection network of 1 leg hold trap per 50 ha on Bottle Rock Peninsula to detect possum incursions and prevent their re-establishment
- measure the spatial 'footprint' of individual lonely possums within possum-low and possum-free environments.

TRIAL DESIGN/METHODS

Field Sites:
The trial was carried out at two field sites; at Bottle Rock Peninsula in Queen Charlotte Sound (Marlborough Sounds), and at the confluence of the Arawhata and Jackson Rivers in South Westland.

Bottle Rock: ZIP has undertaken the complete removal of possums at this 450 hectare site. A 'virtual barrier' system has been established to prevent the reinvasion of rats, and possums.

Eight automated reporting leg hold traps were deployed in a 'prototype' lean detection network, roughly approximating a 1 per 50 ha network. All other possum kill traps on the peninsula, beyond the virtual barrier, were disabled.

We recorded the capture of possums that 'leaked' through the 'virtual barrier' system into the 'protected zone', in addition to the movements of two possums that we released into the site fitted with collars that contained VHF/GPS transmitters. Background detection for possums across the peninsula (using chew cards) was used to measure the presence of possums within the 'protected' zone to confirm whether there was a re-establishment of a possum population.

Jackson-Arawhata: ZIP carried out the successful complete removal of possums and rats (*Rattus rattus*) from a 2,500 hectare site located at the confluence of the Jackson and Arawhata Rivers in South Westland. With this site being void of other possums, it was selected as the 'possum free' release site to observe the dispersal footprint without the influence of traps.

<u>Possum releases</u>:
Two female possums were released at the Bottle Rock study site between May-July 2017. Each possum was live captured in a Havahart live capture trap (baited with apple coated in peanut butter), and transferred into a custom-made anaesthesia box in preparation of fitting the collar. Once the possums were sedated with halothane, it was weighted, sexed, and inspected for injury before the VHF/GPS transmitter collar was fitted. Once the possum had recovered, it was released on the peninsula behind the virtual barrier.

One male possum was released at the Jackson-Arawhata site in September 2017, and a female possum was released in November 2017. The method of capture, collaring, and release were the same as at Bottle Rock. The release site at Jackson-Arawhata was on the true right of the Jackson River, where the 1080 to Zero trial had been conducted.

Possums were only released one at a time so that individuals would not 'buddy up' or distort the 'lonely' possum behaviour.

These trials were carried out under approval from the Animal Ethics Committee (#2016-28).

<u>Monitoring and recapturing:</u>
Each possum was intended to have a maximum of 30 days of 'freedom'. Radio tracking was carried out frequently (once every couple of days) during this time to ensure that individuals were alive and within the site. Where it was difficult to track individuals on the ground, the animals were tracked from a plane, using the Sky-ranger tracking technology.

To recapture the possums, individuals were tracked down via VHF then killed via shooting or after capture in a leg-hold trap. The collar was retrieved to enable GPS data to be download (and reprogrammed for use on the next possum). The data was overlaid on maps to illustrate the 'roaming' behaviour of each possum.

RESULTS

The GPS collar on the first possum released at Bottle Rock contained a programming error, and consequently it only recorded data for the 9 days. In that time, the possum covered a total of 63ha (see Appendix One). The second possum released 'roamed' for 32 days, and covered 89ha (see Appendix Two).

Both possums were not caught on the 'lean' detection network in the protected zone. The first was found dead, and the second possum was recovered via shooting.

The male possum released at the Jackson-Arawhata study site suffered a failure with its GPS collar, and only the first 7 days of activity were recorded. In this time, he covered an area of 14ha (see Appendix Three). This possum must have crossed the Jackson River at some time after the GPS failure, as it was recovered (via trapping) on the true left of the river.

The female possum released at Jackson-Arawhata had a GPS failure which meant that no data was collected during the roaming period. She was recovered by trapping on the same side of the river as she was released.

Bottle Rock Peninsula has been maintained at possum population-free for over 13 months, from October 2016 to November 2017. In this time, the lean detection network has caught 23 possums (all of which are assumed to have breached the virtual barrier).

DISCUSSION

In native forests, a possum would usually only occupy a home range of several hectares (Cowan, 2005). Both released possums at Bottle Rock Peninsula ranged much further than this. This wide-ranging behaviour was also observed by Sweetapple & Nugent (2009), with possums ranging considerable distances (50-100ha) in an area of near-zero density following aerial possum control.

The 'activity map' of the first possum (see Appendix One), dubbed 'Mauline Hanson' shows breaks in the activity polygon. We suspect this is a result of a GPS fix error, in that the transmitter was unable to receive satellite signal as the possum traversed the peninsula. We have assumed connectivity of the polygon (using the shortest distance between breaks) to make the assessment of 63 ha covered.

Mauline Hansen was found dead when we came to recover her. The cause of death is unknown. The transmitter was fitted with a mortality mode (which activates after 24 hours of no movement), however the transmitter was found to still be active when her body was found. We suspect that weka (*Gallirallus australis hectori)* were moving the carcass during their scavenging, resulting in the collar remaining in active mode.

The second possum, dubbed 'Schappele Clawby', spent the majority of her time on the Resolution Bay side of the peninsula. There appeared to be no issues with the performance of the GPS collar, with a consistent pattern of activity detected.

At the Jackson-Arawhata field site, the male possum, known as 'Steve Furwin', was caught on the true left of the Jackson River, and released within the area on the true right of the river. There were two reasons for this: 1) to release him in an area of no possums (as the area had been completely removed of rats and possums during the recent 1080 to Zero trial); and 2) to test whether the river would act as a barrier to possum dispersal. The possum stayed close to the river edge throughout his 'roaming' period, ranging up and down the true-right of the river for 2-3km, presumably in search of a crossing point to get back to the true-left where he came from and the possum density is higher (see Appendix Three). He did eventually cross the Jackson River, as he was finally recovered from the true left of the river (but the exact date of the crossing is unknown due to the GPS malfunction). This behaviour indicates that the river was somewhat of a barrier to the possum, but the motivation to 'return home' was strong enough to encourage an eventual crossing attempt.

Unfortunately, the GPS collar failed to record any data for the second (female) possum released at Jackson-Arawhata. Consequently, we cannot be sure of the area covered between release and recovery. This possum did not appear to cross the river in this instance, as she was recovered on the same side of the river as released.

Despite the lean detection network not catching either released possum during their 'roaming' time, this detection network at Bottle Rock Peninsula has proven to be successful in preventing possum re-establishment. It has detected and caught 23 'roaming' possums that have breached the virtual barrier. This result is significant as it is the 'real world' test of our ability to intercept roaming possums before they can find one another and begin re-establishing a population within the possum-free area. One aspect we have not investigated yet is the time it takes for the invading possum to get caught by the lean detection network. It is possible that, in the case of our two released possums, they were present on the peninsula for too short a time to encounter and become curious enough to interact with the sparsely-placed leghold traps.

Based on the large roaming 'footprint' of the released possums, and especially the performance of lean detection network, we now consider we have the foundations of a cost-effective means of preventing possum reestablishment in large landscapes. We intend to test and refine this system further at a large-scale field site (approx. 10,000ha) next year.

ACKNOWLEDGEMENTS

Field trials (including possum capture, collaring, release, tracking, and recovery) were carried out by Oscar Pollard. The assistance provided by Pete Morresey (Bottle Rock) and Matt Chisnall (Jackson Arawhata) through the possum collaring process and other field based tasks was greatly appreciated. Technical advice for this project was provided by the wider ZIP team (especially Tim Sjoberg, Duncan Kay, John Wilks, Ripley Dean, and Tom Agnew). The maps of the roaming footprints were made by Lindsay Chan (DOC) and Nick Mulgan (ZIP).

REFERENCES

Carey, P.W., O'Connor, C.E., McDonald, R.M. & Matthews, L.R. (1997). 'Comparison of the attractiveness of acoustic and visual stimuli for brushtail possums'. *New Zealand Journal of Zoology* 24:273–276.

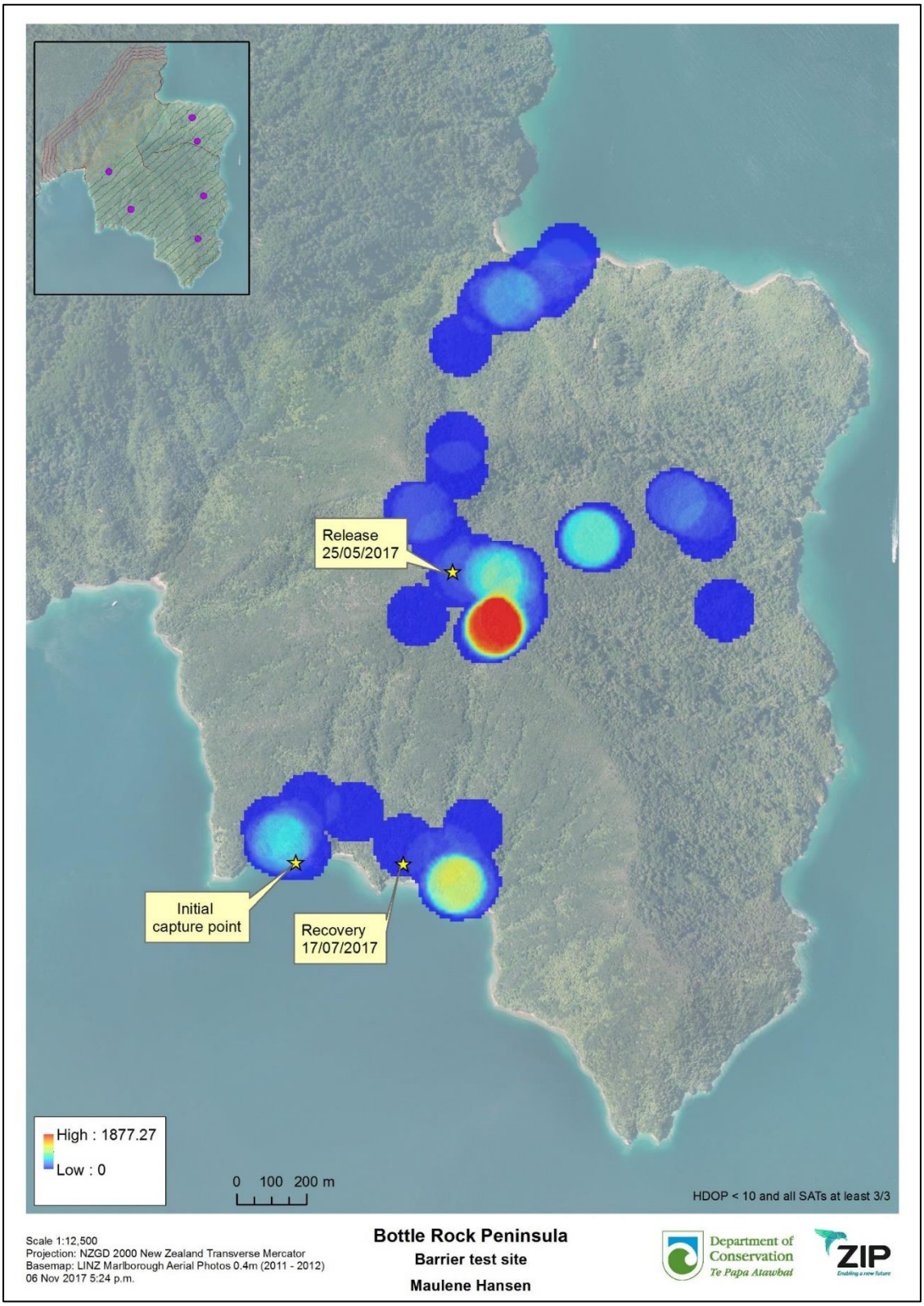
Cowan, P.E. (2005). 'Brushtail possum'. In: C.M. King, (ed). *The Handbook of New Zealand Mammals*, pp. 56–80. Auckland: Oxford University Press.

Morgan, D. R., Nugent, G., and Warburton, B. (2006). Benefits and feasibility of local elimination of possum populations. Wildlife Research 33, 605–614. doi:10.1071/WR06055

Sweetapple, P., Nugent, G. (2009) Possum demographics and distribution after reduction to near–zero density, New Zealand Journal of Zoology, 36:4, 461-471, DOI: 10.1080/03014223.2009.9651478

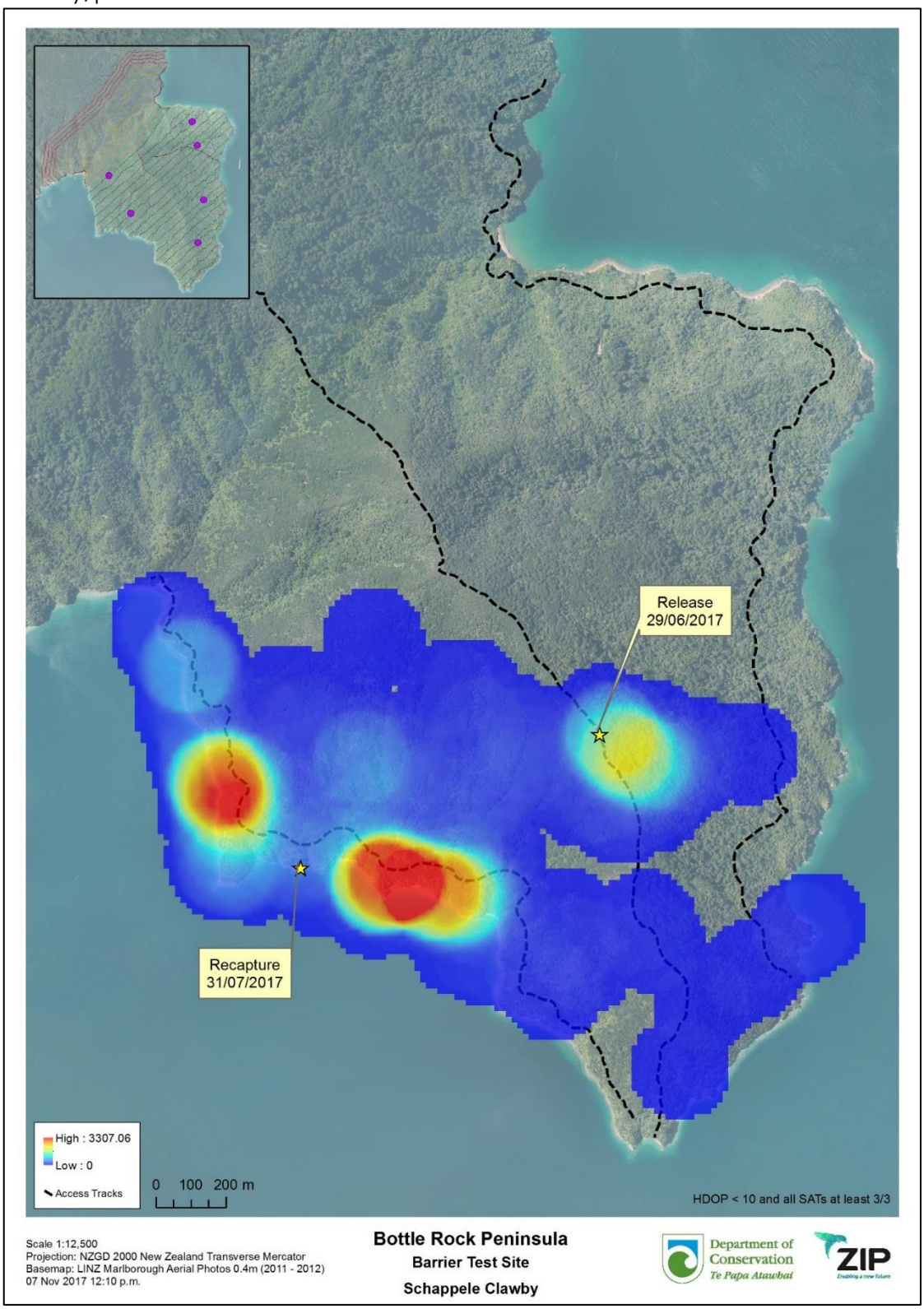
APPENDIX ONE

Activity map of roaming footprint of Maulene Hansen at Bottle Rock Peninsula. Blue represents low activity/presence in that area, while red represents high activity/presence in that area.



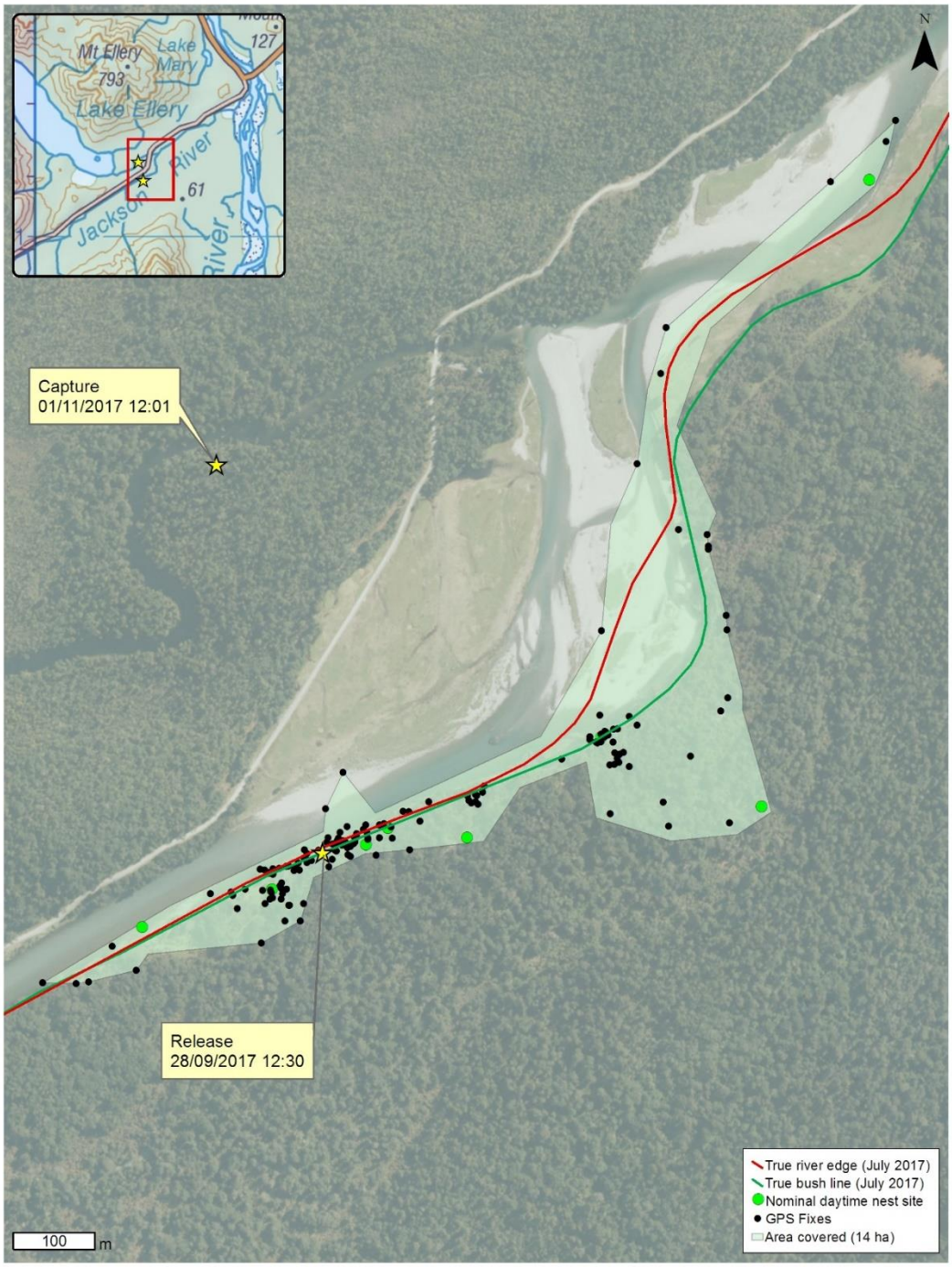
APPENDIX TWO

Activity map of roaming footprint of Schappele Clawby at Bottle Rock Peninsula. Blue represents low activity/presence in that area, while red represents high activity/presence in that area.



APPENDIX THREE

Map showing the roaming footprint of Steve Furwin, during the 7 day of GPS transmitter operation and the recovery location on the true left of the Jackson River. The black dots are GPS fix locations. The river does not follow the course shown on this map, so not all black dots signify river crossings.



Wandering possums A4 P.mxd
D:\Users\lchan\Dropbox\DOC_ZIP_GIS\Jackson_Arawhata\Wandering possums\

Jackson Arawhata
Steve Furwin
28 September- 5 October 2017

ZIP ZERO INVASIVE PREDATORS Enabling a new future

NZGD 2000 New Zealand Transverse Mercator
1:125,000
Produced: 8/11/2017
Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence