

Detailed Report on Deliverables  
*Annual Implementation Plan*  
*July 2022 to June 2023*



Project Agreement for Yellow Crazy Ant Control – Wet Tropics of Queensland



# Contents

Overview.....	1
Strategy 1: Undertake broadscale treatment to reduce yellow crazy ants to very low numbers.....	3
1.1 Use broadscale aerial and on-ground treatment with <i>AntOff</i> as required on existing and new infestations.....	3
1.2 Measure the progress and effectiveness of the treatment regime to reduce yellow crazy ants to very low numbers.....	8
Strategy 2: Detect and eradicate very low numbers of yellow crazy ants.....	12
2.1 Survey to determine absence and to detect and spot treat any remaining yellow crazy ants.....	12
Odour detection dogs.....	15
2.2 Investigate persistent infestations and areas that are difficult to access .....	20
2.3 Maintain and improve techniques and practices for survey and treatment, and data collection, processing and analysis... ..	30
Strategy 3: Seek any additional yellow crazy ant infestations .....	34
3.1 Strategically trace potential sources from known yellow crazy ant infestations.....	34
Strategy 4: Prevent further spread of yellow crazy ants.....	36
4.1 Work with industry to prevent yellow crazy ant movement .....	36
4.2 Raise community awareness of yellow crazy ants to assist in finding new infestations and to support community to prevent further spread.....	40
Strategy 5: Enhance program capability and expertise .....	46
5.1 Research, innovate and monitor to promote adaptive management and measure progress.....	46
5.2 Build partnerships and share knowledge and information .....	49
5.3 Promote staff learning and development and workplace health, safety, and wellbeing.....	52
5.4 Engage appropriate governance arrangements to inform and seek advice from experts, and ensure oversight to the Program.....	55
Appendix 1 - Detection to Eradication: Phases and Stages .....	56
Appendix 2 – Progress towards eradication: Transition to Post-treatment Validation and Eradication .....	57

## Maps

<b>Map 1</b> Areas treated for round 26 (July 2022) .....	4
<b>Map 2</b> Areas treated for round 27 (November 2022) .....	4
<b>Map 3</b> Areas treated for round 28 (March 2023) & partial round 29 (June 2023) .....	4
<b>Map 4</b> Yellow crazy ant boundary changes 2022-2023, including boundary expansion during FY23 and eradications prior to and during 2022-2023 .....	6
<b>Map 5</b> Map of infestation area, depicting Treatment Areas coloured by their stages in the eradication process .....	9
<b>Map 6</b> Surveys conducted within and around Treatment Areas between 1 July 2022 and 30 June 2023 .....	13
<b>Map 7</b> Comparison of survey results between 2016-17 and 2022-23 – Kuranda and Cairns areas .....	14
<b>Map 8</b> Odour detection dog surveys 2022-2023, Kuranda area .....	16
<b>Map 9</b> Odour detection dog surveys 2022-2023, Cairns area .....	16
<b>Map 10</b> Odour detection dog surveys 2022-2023, Cairns south area .....	16
<b>Map 11</b> Persistent, possibly persistent, and no longer persistent sites, as of the conclusion of FY23 .....	21
<b>Map 12</b> Bana Gindarja Creek canine surveys, July-September 2022 .....	25
<b>Map 13</b> Bana Gindarja Creek fine-scale luring surveys, July-September 2022 .....	25
<b>Map 14</b> Pioneer North Queensland 2023 detections .....	26
<b>Map 15</b> Movement of materials from PNQ 6 is the likely source of reinfestation in PNQ 5 .....	28
<b>Map 16</b> Traffic Light System map with FY23 survey data for the 2023 harvest season .....	37
<b>Map 17</b> Sugar cane within yellow crazy ant Treatment Areas – June 2023 .....	38
<b>Map 18</b> The cumulative probability of true yellow crazy ant absence at TA11 Veronese's (without the probability of persistence parameter) .....	60
<b>Map 19</b> The cumulative probability of true yellow crazy ant absence at TA11 Veronese's (including a probability of persistence parameter) .....	61

## Figures

<b>Figure 1</b> Hectares aerial and on-ground Treatment Areas and untreated areas for each treatment round (2014-2023) .....	7
<b>Figure 2</b> D2E stages for sites within the World Heritage Area .....	10
<b>Figure 3</b> Yellow Crazy Ant Eradication Program odour detection dog teams .....	15
<b>Figure 4:</b> Treatment Areas by detection date, with their size in hectares and their stage in the Detection to Eradication process ..	18
<b>Figure 5:</b> Total hectares in each Detection to Eradication phase as of 30 June 2023 .....	19
<b>Figure 6</b> Transition stages over time .....	19
<b>Figure 7</b> Persistent and possibly persistent sites by name, with the time since most recent detection of yellow crazy ants (days). Note that Bana Gindarja Creek was previously known as Blackfellows Creek. ....	22
<b>Figure 8</b> Bana Gindarja Creek (formerly Blackfellows Creek). The terrain in the creek is challenging for surveillance. ....	24
<b>Figure 9</b> The Hussey pit at Pioneer North Queensland Quarries. The steep, narrow benches are unsafe to traverse and are likely to provide refugia from treatment .....	27
<b>Figure 10</b> When helicopter treatment crosses the quarry, the direction of travel impacts the spread of bait. ....	27
<b>Figure 11</b> PNQ 7 (circled in red) The steep terrain has prevented effective surveillance for several survey rounds. ....	29
<b>Figure 12</b> Drone flying above the experimental paddock during the second drone trial .....	33
<b>Figure 13</b> Bus advertising .....	42
<b>Figure 14</b> Examples of display panels .....	43
<b>Figure 15</b> Taskforce Coordinator Sylvia Conway, volunteer Tim Brown and Coordinator Ciara Bridgland .....	45
<b>Figure 16</b> Taskforce Coordinator Sylvia Conway, Authority staff Lukasz Podgorski and Adam Mason-Smith, and Taskforce volunteers Paul Devine and Ellin Christie during the Owen Creek KTF survey in September 2022. ....	45
<b>Figure 17</b> Jared Barlow-Gray demonstrates an invasive ant survey technique to Townsville Queensland Parks and Wildlife staff and the Gudjuda Rangers at Cape Pallarenda Conservation Park in Townsville. ....	51
<b>Figure 18</b> The five phases and fourteen stages from detection to eradication .....	56

## Tables

<b>Table 1</b> Criteria used to define persistence .....	20
<b>Table 2</b> Persistent sites and time since detection of yellow crazy ants .....	20

This report has been prepared for the purposes of informing the Commonwealth regarding the Wet Tropics Management Authority's Yellow Crazy Ant Eradication Program and the Program's progress towards delivering on its commitments as described in the *Annual Implementation Plan* and the *Four-Year Project Plan*.

Abbreviations used in this report:

APVMA	Australian Pesticides and Veterinary Medicines Authority
Authority	Wet Tropics Management Authority
BQ	Biosecurity Queensland
D2E	Detection to Eradication (see <i>Terms used in this report</i> , below)
DAF	Department of Agriculture and Fisheries
DES	Department of Environment and Science
DNA	Deoxyribonucleic acid
E2G	Bruce Highway, Cairns Southern Access Corridor, Edmonton to Gordonvale project
eDNA	Environmental deoxyribonucleic acid
ERG	Department of Environment and Science Diversity & Inclusion Employee Resource Group
FY	Financial year
GIS	Geographic information system(s)
ha	Hectare(s)
JCU	James Cook University
km	Kilometre(s)
KTF	Kuranda Tree Frog ( <i>Litoria myola</i> )
m	Metre(s)
PNQ	Pioneer North Queensland [Quarry]
PoD	Probability of Detection
Program	Yellow Crazy Ant Eradication Program
PTV	Post-treatment validation
QPWS	Queensland Parks and Wildlife Service
SOP	Standard Operating Procedures
SWP	Safe Work Practice
TA	Treatment Area
WTMA	Wet Tropics Management Authority
YCA	Yellow crazy ant
YCAEP	Yellow Crazy Ant Eradication Program

Terms used in this report:

Detection to Eradication	<i>Detection to Eradication (D2E)</i> is a high-level design plan developed by the Authority. D2E is used as a guide to document and manage the progress of each Treatment Area from detection to eradication.
Treatment Area	When an infestation is initially delimited, a boundary is created based upon applying a buffer to the outermost extent of the area in which yellow crazy ants were detected by lured surveys. The discrete area enclosed by this boundary is designated as a Treatment Area, and treatments take place within this boundary (while follow-up surveys often extend beyond it). Treatment Area boundaries can change over time based upon survey outcomes, tracing updates, and other information.
Probability of Detection	The probability of detection is a quantitative measurement of the likelihood that a given survey (detection) method will detect the target – in this case, yellow crazy ants – if the target is present.

## Overview

The first year of the Federation Funding Agreement (Environment) for Yellow Crazy Ant Control, Wet Tropics of Queensland (2022-23 to 2025-26), has been one of continued progress towards eradication. A resounding key achievement during this reporting period was the eradication of two additional sites totalling over 48ha. This brings the total area eradicated to 90ha. Surveys were conducted over 233 days, covering 3,385.2ha (1,955.3ha inside Treatment Area boundaries and 1,429.9ha outside), comprising a total of 1.04 million survey points. Three broadscale treatments were conducted, covering 439.1ha in July 2022, 424.1ha in November 2022, and 358ha in March 2023.

### *The infestation area*

The overall area under management increased from 2,244.8ha to 2,472.8ha<sup>1</sup> due to the detection of three new infestations at *TA44 Blackwells 2* (101ha), *TA45 Green Hill* (63.9ha) and *TA46 Goldsborough* (116.9ha). The infestations at *TA44 Blackwells 2* and *TA46 Goldsborough* extend into the Wet Tropics World Heritage Area (by 83.3ha and 8.6ha, respectively), bringing the total infestation area inside the World Heritage Area to 221.4ha.

Seven sites transitioned from broadscale treatment to surveys and spot treatment. This increased the area under transition to 1,719.3ha, or 70% of the total area under management.

Eradication was declared at *TA11 Veronese's Property* (42ha) and *TA23 Harris Road* (6ha), marking a total of six sites eradicated by the Program.

### *Intensive surveys of Treatment Areas*

The Authority maintained its focus on surveying each Treatment Area at least once a year. The Authority prioritised surveys in Treatment Areas with sugar cane early in the season, while the sites were accessible due to the low stands of cane. Residential area surveys and areas inside and adjoining the Wet Tropics World Heritage Area followed as priorities. However, the two new detections in May and June 2023 – near the end of the reporting period – refocused staff resources, and weather conditions caused further delays in survey and treatment schedules. Despite these challenges, this survey season's priorities were largely achieved by the end of June 2023, and the remaining surveys are scheduled for completion before the end of the field season in September 2023.

Including the odour detection dog teams, staff intensively surveyed 1,955.3ha in areas of known infestation.

### *Scientific work*

The Authority continued to work with its research partners, both to deliver on Australian Pesticides and Veterinary Medicines Authority (APVMA) permit compliance commitments and to improve decision-making and refine strategy via cutting-edge science. The Authority's research partners at James Cook University continued biodiversity and ecological processes assessments at historic yellow crazy ant infestation sites, refined probability of detection calculations for the Authority's survey methods, developed probability of absence estimates for several of the Authority's Treatment Areas, and improved protocols to detect yellow crazy ant DNA in sugar cane, among other activities.

The Authority's Science and Monitoring team continued its research and monitoring tasks, including supporting James Cook University's projects through field work. Additional activities included maintenance of captive colonies and production of odour detection dog training aids, persistent site spot treatments, site assessments, a trial to evaluate use of an unmanned aerial vehicle (UAV) for Program baiting operations, and processing of over 900 ant samples. Moreover, the Science and Monitoring Team furthered the Authority's community engagement strategy via attendance at major community events as well as through presentations and field sessions conducted at local schools.

### *Probability of Absence and eradication*

As mentioned above, James Cook University collaborated with the Authority's GIS staff to continue refining the procedures to generate *probability of absence* maps. Probability of absence reflects the probability of detection associated with each individual survey conducted and their spatial distribution, combined to produce a visual representation of the confidence in true yellow crazy ant absence across a given Treatment Area. A proof-of-concept probability of absence map created for *TA11* yielded a confidence in absence between 90% and 95%. This result supported the Authority's decision to declare eradication at this site in

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<sup>1</sup> Overall area in hectares under management does not include area in hectares already eradicated. The boundary expansion is not the sum of the three new detections, because part of *TA33 Vico Street* is in *Blackwells 2*.

June 2023. Probability of absence mapping continues to be developed and has been adopted as a decision support tool by the Authority.

The full suite of the Authority's eradication criteria and decision support tools utilised when declaring eradication continued to expand during the reporting period. The formal 'checklist' of eradication criteria identifies all factors that could influence the confidence in true absence in a Treatment Area. Probability of absence mapping, in addition to the previously established metrics of number and density of surveys and treatment rounds, now contributes to the ultimate decision to declare eradication. Key questions, such as the appropriate probability of absence value at which eradication can confidently be declared and what environmental factors, such as habitat complexity, may influence persistence, will be investigated in more detail over the next reporting period.

### *Industry and community engagement*

#### *Industry*

As well as fostering relationships with a range of existing industry partners, many new industry connections were established during this reporting period. The focus of engagement was to prevent further spread of yellow crazy ants and encourage reporting of any new infestations. With increased urgency towards the end of the reporting period, the Authority established new connections in the Green Hill and Goldsborough area following the new detections, with the focus of communication being to mitigate the risk of spread and to trace any potential sources of spread from these areas.

#### *Community*

The Authority upkept and improved upon established community engagement relationships and campaigns. During the financial year, the Authority organised or attended numerous community awareness raising activities, including the popular Cairns Ecofiesta event and NAIDOC Day in the Park, along with presentations and field days at local schools. The Authority continued to run toolbox talks and shopping centre displays to upkeep messaging across the region, and conducted letterbox drops to provide updates to residents at 6 Treatment Areas. Many of the Authority's community engagement activities and events over the reporting period were delivered in partnership with government and community organisations. Notable partner organisation, the Kuranda Yellow Crazy Ant Community Taskforce, assisted with community outreach and additional targeted surveillance activities.

Media releases and radio interviews continued to spread the message through local newsletters and national publications. All the Authority's social media engagement metrics surrounding the Program increased significantly over the reporting period. The Authority also continued to invest in proven, successful advertising products, including bus advertising and the extremely effective dust banners. Finally, the Authority produced updated communications products, most notably a series of information display boards to be used at outreach events. The success of these products and initiatives is evidenced by high community uptake: during the reporting period, the Authority received 274 reports of suspect ants from the public. The Authority engaged key stakeholders, both periodically (through Reference Group meetings and e-Newsletters) and at the end of the reporting period (via the Annual Report Card).

The Authority continued its strong history of building partnerships and sharing knowledge and information with allied government and community organisations in the region. Partnerships maintained and developed during the reporting period included connections with Traditional Owner groups associated with lands in the infestation areas, a strong working partnership with Biosecurity Queensland's National Electric Ant Eradication Program, participation in the International Yellow Crazy Ant Forum, and advising regional Councils, including Townsville City Council, about yellow crazy ant management. The Authority collaborated with Biosecurity Queensland staff to deliver a well-received invasive ant surveillance training program to 6 Indigenous Ranger groups in the Far North region.



## Strategy 1: Undertake broadscale treatment to reduce yellow crazy ants to very low numbers

### 1.1 Use broadscale aerial and on-ground treatment with *AntOff* as required on existing and new infestations

#### Actions:

- *Delimit and treat any newly found infestations*
- *Continue to implement a strategic, effective and adaptive treatment regime, based on three AntOff treatments per year using aerial delivery and on-ground teams as required*
- *Adhere to the requirements of the Authority's APVMA-issued permits, including keeping detailed records of all treatment occurrences using AntOff or other baits and monitoring of non-target impacts and ecosystem recovery*

#### Measuring success:

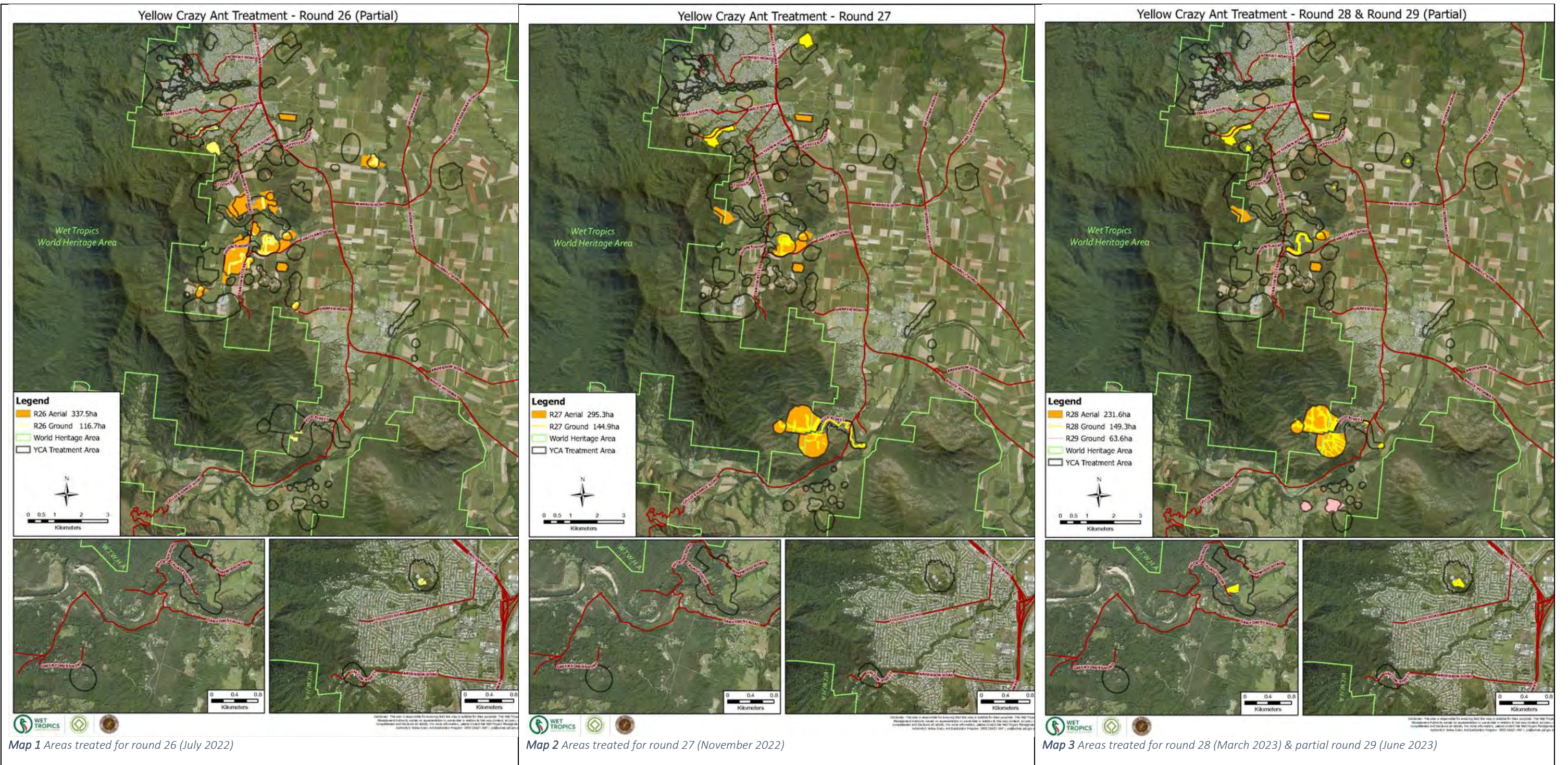
- *Number of broadscale treatments and treatment areas and hectares treated*
- *Number of new infestations delimited and treated*
- *Evidence of effective treatments using maps, spatial analyses, graphs and figures based on comprehensive GIS data*
- *Records of all treatments based on comprehensive GIS data*

The Authority conducted three treatment rounds using *AntOff* during 2022-2023. Round 26 was conducted in July 2022 and covered 439.1ha, Round 27 in November 2022 covered 424.1ha, and Round 28 in March 2023 covered 358ha. It is important to note that Round 26 commenced during the previous reporting period, in June 2022, and the part of the Round conducted during that reporting period covered 67ha. See **Map 1**, **Map 2** and **Map 3** below for areas covered in treatment rounds this year.

The treatment tracks in the maps below depict aerial and ground treatment per round. In the *Detection to Eradication (D2E)* phases, these areas targeted for management are referred to as the broadscale Treatment Areas. They are areas that require broad bait coverage because they are either progressing through the initial five treatment rounds, or yellow crazy ants have been detected after the initial five rounds of treatment and are active, or the area adjoins an infestation and is identified in the traffic light system to have likely experienced spread due to movements of harvesting machinery.

One adjustment adopted in FY22 – to align the Treatment Area boundary in sugar cane with the boundary of the cane paddock and the direction of harvesting of the cane rows – was applied to three Treatment Areas during this reporting period. This adjustment was applied at *TA4/5 Vero's Cane (Vero's Spot)*, *TA41 Collinson's Cane* and *TA42 Ferrando's*. Extending the treatment boundary in these cane areas captures the area of potential spread of yellow crazy ants based on harvester movement on the farm.







Three new Treatment Areas were detected during this reporting period, bringing the total number of individual Treatment Areas to 46. It is important to note that of the 46 Treatment Areas, 6 have been eradicated.

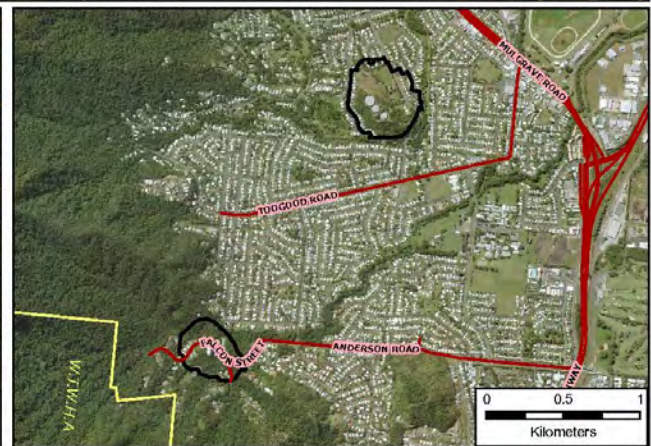
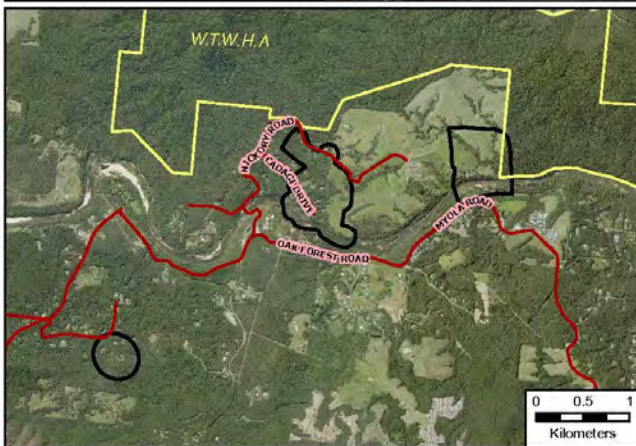
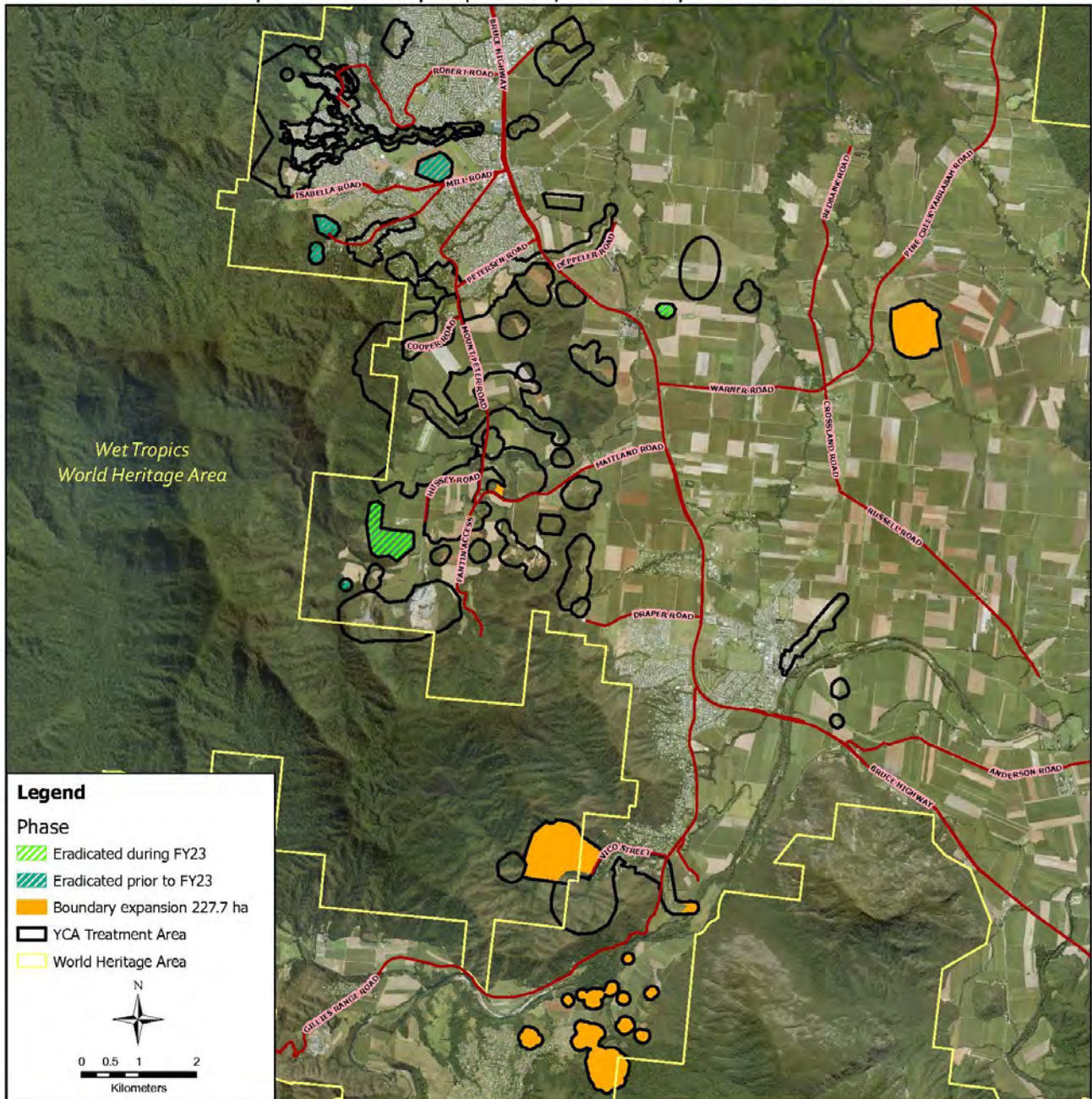
1. 27 July 2022 – TA44 Blackwells 2 – 101ha  
Detected through extended surveys beyond currently known infestation areas.
2. 09 May 2023 – TA45 Green Hill – 63.9ha  
Detected through a public report. The occupier of the property had attended a YCA toolbox one year earlier and recognised the ants, after which she reported them to the Authority.
3. 01 June 2023 – TA46 Goldsborough – 116.9ha  
Detected by National Electric Ant Eradication Program field staff, who were conducting a routine yard check for electric ants.

All new detections made during this reporting period were prioritised for delimitation. TA44 Blackwells 2 was fully delimited and treated twice during this reporting period (treatments took place in November 2022 and March 2023). Delimitation at TA45 Green Hill commenced in May 2023 and continued into the next reporting period, with the first of five treatments planned as part of Round 29 in July 2023. Delimitation at TA46 Goldsborough commenced in June 2023 and continued into the next reporting period. Within TA46 Goldsborough, an initial round of treatment was conducted at 3 discrete, isolated sites. These treatments took place on 23 June, 30 June and 20 July and covered a total of 63.6ha. These treatments were conducted based upon a risk management approach, to control the increased risk of further spread of yellow crazy ants by people. The remainder of TA46 will be treated after 30 June 2023 as part of the next treatment round (which will fall within the FY24 reporting period).

With both Goldsborough and Green Hill in the detection and delimitation phase, a temporary boundary has been applied as of 30 June 2023. This boundary may still be subject to change pending further surveys and final delimitation.

Refer **Map 4** for new detections during this reporting period. Map 4 also includes sites eradicated this reporting period as well as the sites eradicated prior to FY23.

# Yellow crazy ant boundary expansion, 1st of July 2022 to 30th June 2023

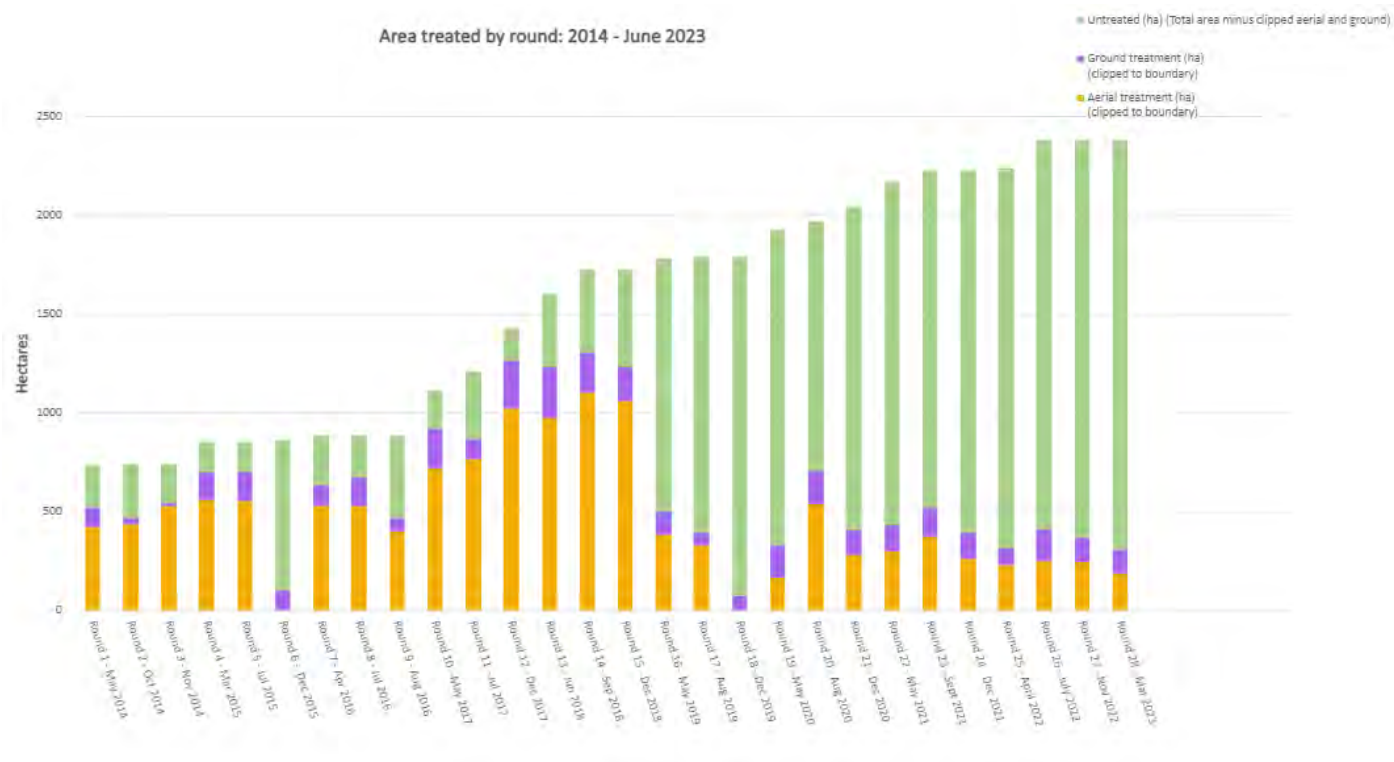


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Map 4 Yellow crazy ant boundary changes 2022-2023, including boundary expansion during FY23 and eradications prior to and during 2022-2023



**Figure 1**, below, illustrates the general trend of reduced area under treatment since the Eradication Program was established due to large portions of the infestation area having moved from the broadscale treatment phase to the intensive surveys and spot treatments phase. These areas, in addition to areas under post-treatment monitoring and eradicated areas, are collectively referred to as ‘untreated’.



**Figure 1** Hectares aerial and on-ground Treatment Areas and untreated areas for each treatment round (2014-2023)

#### APVMA permits

In July 2022, the Authority applied a second time for a three-year extension to existing permit PER #87543. The three-year extension to PER #87543 was approved in November 2022 and is valid until 30 November 2025.

For context, the Authority originally applied for a three-year extension to PER #87543 during the FY21-22 reporting period. The initial application was submitted in July 2021, 10 months prior to the expiry of PER #87543. Due to extensive delays with APVMA permit processing in 2021-2022, the Authority’s application to extend PER #87543 was not completed within the nominated timeframes, and the three-year extension was not issued. Instead, the APVMA issued a temporary bridging permit to continue the use *AntOff* for one year to 30 June 2023. As a result of these processing delays with the APVMA, the Authority wrote to the Federal Minister for Agriculture, Fisheries and Forestry in October 2022 alerting him to the deficiencies in the Agency’s process.

The Authority also applied for an Emergency Use Permit in May 2023 for the use of the registered chemical *Pyganic*. The application was made in response to the new infestation at TA45 Green Hill, which partly covers an organic live stocking paddock (refer 2.3, below). This meant the Authority needed to appraise alternative options for managing yellow crazy ants in an organic situation. The application for the use of *Pyganic* was approved in July 2023 (PER #93602). The Authority has not used *Pyganic* under this permit, as negotiations with the landholder resulted in allowing the use of *AntOff* on a small section of the organic paddock.

As an ongoing requirement of PER #87543, and as detailed in the previous reporting period, the Authority surveyed all creeks in Treatment Areas prior to each treatment round and mapped the wet and dry creeks. The Authority also continued consultation with the sugar industry to ensure compliance with the withholding period for treatment during the cane harvest season and continued to work with James Cook University to assess impacts and measure the recovery of areas which have been subject to yellow crazy ant invasion and treatment. Refer 5.1, below, for research outcomes.



## 1.2 Measure the progress and effectiveness of the treatment regime to reduce yellow crazy ants to very low numbers

### Actions:

- *Survey all Treatment Areas at least once a year to monitor yellow crazy ant numbers and distribution, with priority made to surveying in and adjacent to the World Heritage Area*
- *Transition Treatment Areas from broadscale treatment to surveys and spot treatment when monitoring shows yellow crazy ant numbers are in very low numbers and patchy*

### Measuring success:

- *Number of Treatment Areas and hectares transitioned to surveys and spot treatments*
- *Evidence of eradication progress over time for individual Treatment Areas and the overall treatment area based on comprehensive GIS data*

The Authority aimed to survey each Treatment Area at least once a year for the sites that had received five treatments, to ascertain the absence or presence of any yellow crazy ants. This was largely achieved during 2022-2023 and remaining surveys will be completed by September, pending the weather. Comprehensive survey data is covered below under section **2.1**.

Seven (7) Treatment Areas, totalling 107.3ha, transitioned from broadscale treatment to surveys and spot treatment. This has increased the area under transition to 1,719.3ha, or 70% of the total area under management.

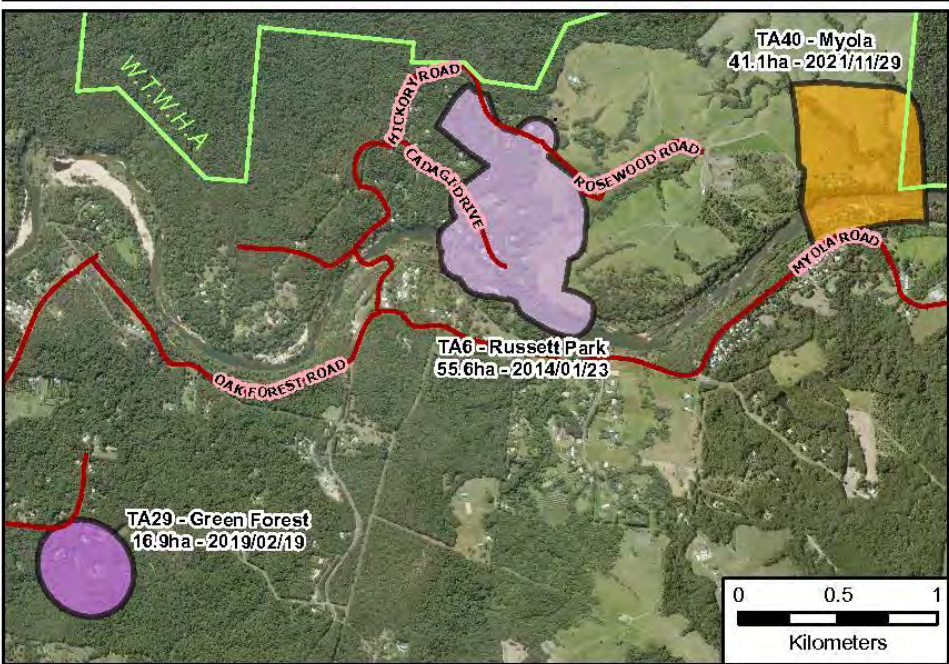
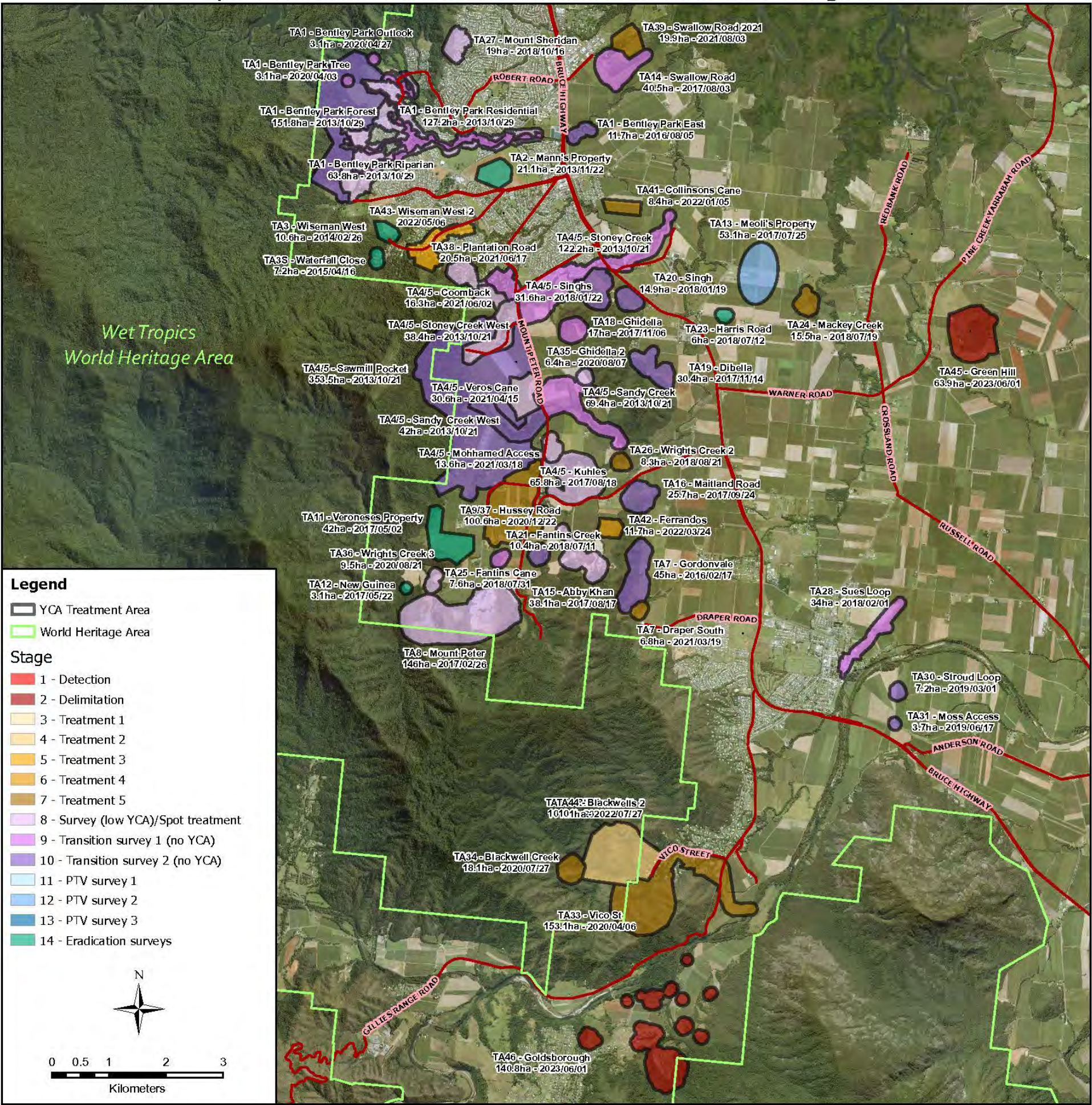
This included:

- TA25 Fantin's Cane (7.6ha)
- TA27 Mount Sheridan (19ha)
- TA35 Ghidella 2 (6.4ha)
- TA36 Wrights Creek 3 (9.5ha)
- TA38 Plantation Road (20.5ha)
- TA4/5 Mohammed Access (13.6ha)
- TA4/5 Vero's Cane (30.6)

**Map 5** below shows the overall progress of Treatment Areas towards eradication as of 30 June 2023 and the stage of each Treatment Area in the *Detection to Eradication* process. Of the area shown in the map below, 519.7ha is under broadscale treatment, 1,719.3ha has transitioned to intensive surveillance and spot treatment of any remaining ants, 53.1ha is in post-treatment validation, and 90ha has been declared eradicated. There are now 46 Treatment Areas, of which 6 have been declared eradicated.



Yellow Crazy Ant Treatment Areas - Detection to Eradication Stages - June 2023



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Map 5 Map of infestation area, depicting Treatment Areas coloured by their stages in the eradication process

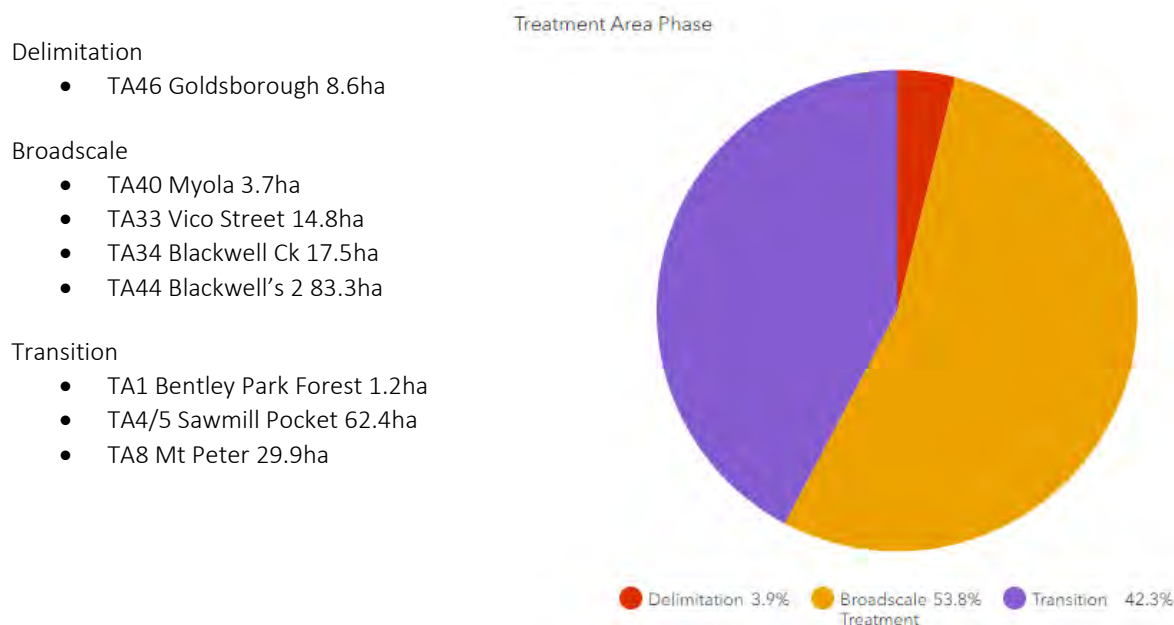


## Wet Tropics World Heritage Area

The area of infestation within the Wet Tropics World Heritage Area increased by 91.9ha to a total of 221.4ha due to the TA44 Blackwells 2 and TA46 Goldsborough infestations (which extend 83.3ha and 8.6ha into the World Heritage Area, respectively).

Of the eight (8) Treatment Areas extending into the World Heritage Area, 93.6ha (42.28%) of their total area is in the transition phase (see **Figure 2**, below). This total includes areas that will soon transition to the post-treatment validation and eradication phases. One Treatment Area, TA46 Goldsborough, accounts for the entire 8.6ha (3.89%) that is in the delimitation phase. The remaining area (119.2ha, or 53.84% of the total infestation area within the World Heritage Area) is under broadscale treatment.

The Treatment Areas extending into the World Heritage Area are listed below by their Detection to Eradication phases, along with the total hectares within the World Heritage Area boundary:



*Figure 2 D2E stages for sites within the World Heritage Area*

## Survey frequency

Based on observations made during this reporting period, the Authority is reviewing annual surveys to determine whether reducing survey frequency (i.e., less than annually) in certain Treatment Areas may improve survey effectiveness. This follows a preliminary review of historic survey data, particularly the time observed since last YCA detection. It also follows preliminary work by the Authority's research partners at JCU to build a probability of detection model that accounts for time since last survey.

Furthermore, the Authority's partners at JCU investigated the influence of 'time since most recent survey' on probability of detection calculations. Following treatment and assuming yellow crazy ants persist, it is anticipated that over time, ant populations will build, causing their detectability to increase. If sufficient time is allowed between surveys, the probability of detection for each additional survey will therefore increase. For example, preliminary calculations show that a lured survey conducted in the dry season may have a probability of detection of 14% - but the probability of detection could increase to 22% if the Treatment Area was "rested" and then surveyed two years later.

This finding aligns with the concept of 'resting' sites, which the Authority already implements. Resting a site allows remaining ant populations (if present) to rebound, increasing detection probability for the next survey. This means that 'resting' sites increases the confidence in absence if no ants are detected in surveys following a 'resting' period. For example, the Authority 'rested' hillslopes in and adjacent to the Wet Tropics World Heritage Area in FY21 and surveyed them in FY22. No yellow crazy ants were detected in the FY22 surveys. If the probability of detection increases with time, the FY22 surveys had a greater probability of detecting ants – and therefore the negative results of the FY22 surveys yield an increased confidence in true absence, compared to the previous year's survey results. Surveys in the same hillslope areas this year (2023) also did not detect any yellow crazy ants. Again, based on the assumption that probability of detection increases with time, the Authority's confidence in YCA absence increases further for these areas.



Combining these two factors – time since last positive yellow crazy ant detection, and increased probability of detection over time – the Authority may increase its confidence in absence of yellow crazy ants earlier in the Detection to Eradication process than anticipated for certain Treatment Areas. For example, TA4/5 Sawmill Pocket currently sits in the Transition stage (Stage 10). That is the last transition stage before the post-treatment validation stages begin (refer Figure 18 in **Appendix 1 - Detection to Eradication: Phases and Stages**). If using *only* the D2E as a guide, the Authority would require another two years of surveys to progress this Treatment Area to eradication. But considering the two time-based factors discussed above, by strategically ‘resting’ parts of the Treatment Area and applying a robust, science-based model of increasing probability of detection over time, the Authority may be able to streamline the Detection to Eradication process for this Treatment Area, reducing the time and cost required to declare eradication.

The benefits of applying these changes to the Authority’s *Detection to Eradication* process to other Treatment Areas are significant. Not only will they significantly reduce total operational costs, but also, they will improve the Authority’s relationships with landholders by reducing the total years of access negotiations and movement restrictions imposed upon residents of infestation areas. Furthermore, the cost savings will allow the Authority to allocate more resources to new detections and other priorities while maintaining momentum in sites closer to eradication. For these reasons, the Authority deems understanding and quantifying the changes in probability of detection over time, and how to use probability of detection to predict cumulative probability of absence, to be key research priorities. During the reporting period, the Authority’s GIS staff and research partners at James Cook University collaborated to investigate these topics and develop useful decision support tools, which have been integrated into operational decision-making (refer 2.1, below). This research partnership will continue into future reporting periods.

The Eradication Program has reached a significant turning point. With numerous other sites soon to be declared eradicated and 70% of the overall infestation area now in transition and close to eradication, the Authority must now consider how to optimise progressing Treatment Areas through the final stages of the Detection to Eradication process. Continuing to develop and refine these decision tools will allow the Authority to streamline and improve the site-specific detection to eradication process and will further the ultimate goal of eradication of yellow crazy ants from the region. This work also leaves a legacy through contributions to the global body of knowledge around yellow crazy ant management.

## Strategy 2: Detect and eradicate very low numbers of yellow crazy ants

### 2.1 Survey to determine absence and to detect and spot treat any remaining yellow crazy ants

#### Actions:

- *Survey and spot treat all areas that have transitioned from broadscale treatment to progress them to post-treatment validation*
- *Spot treat any areas of yellow crazy ants as soon as possible so that the entire Treatment Area can move to post-treatment validation at once*
- *Conduct post-treatment validation surveys at least six months apart*
- *Deploy odour detection dog teams into the field to seek yellow crazy ants (including to sites previously declared eradicated)*
- *Maintain captive colonies to provide yellow crazy ant scent for dog training and maintenance*

#### Measuring success:

- *Evidence of effective surveys and spot treatments using maps, spatial analyses, graphs and figures based on comprehensive GIS data.*
- *Number of survey days, extent of area surveyed, and number of survey points collected*
- *Record of progress to eradication for each Treatment Area and hectares progressed or regressed*
- *Trends over time of points surveyed and presence and absence of yellow crazy ants*
- *Number of captive colonies maintained, and odour materials produced*

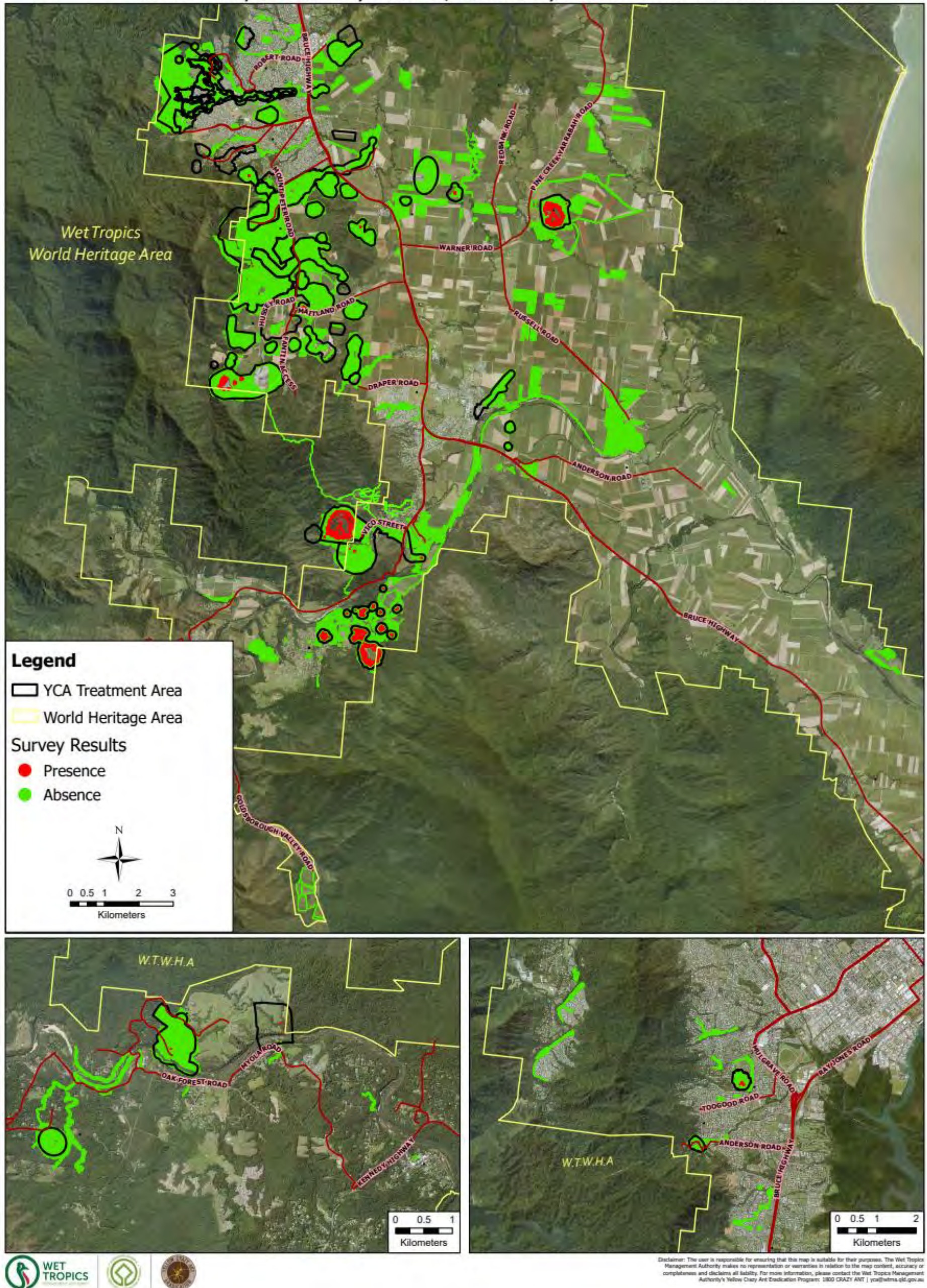
During 2022-2023, survey teams completed surveys across nearly all the Treatment Areas. See **Map 6** for details of the areas surveyed in and around Treatment Areas.

233 days of survey activity were completed, covering 3,385.2ha (1,955.3ha inside Treatment Area boundaries and 1,429.9ha outside), comprising a total of 1.04 million survey points.

**Map 7**, below, shows the progress over time from surveys undertaken in 2016-2017 compared to recent surveys to 30 June 2023, for the Kuranda and Cairns area. Red areas on the map depict yellow crazy ant presence and green areas indicate yellow crazy ant absence points. These maps are referred to as *the “before and after maps”* and illustrate the significant decline in yellow crazy ant populations in the Kuranda and Cairns areas over several years of the Program’s operations, as well as the new detections over time.

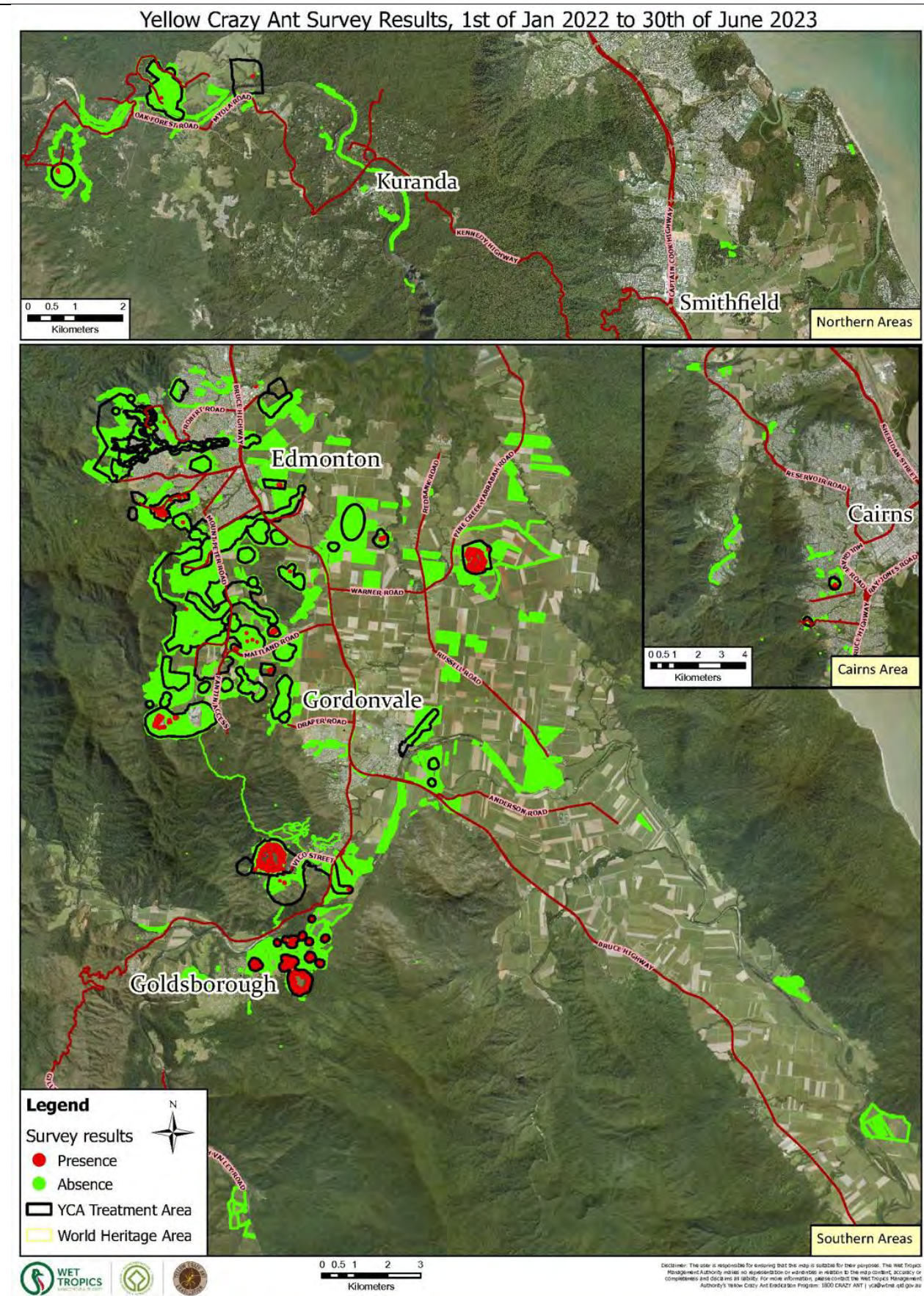
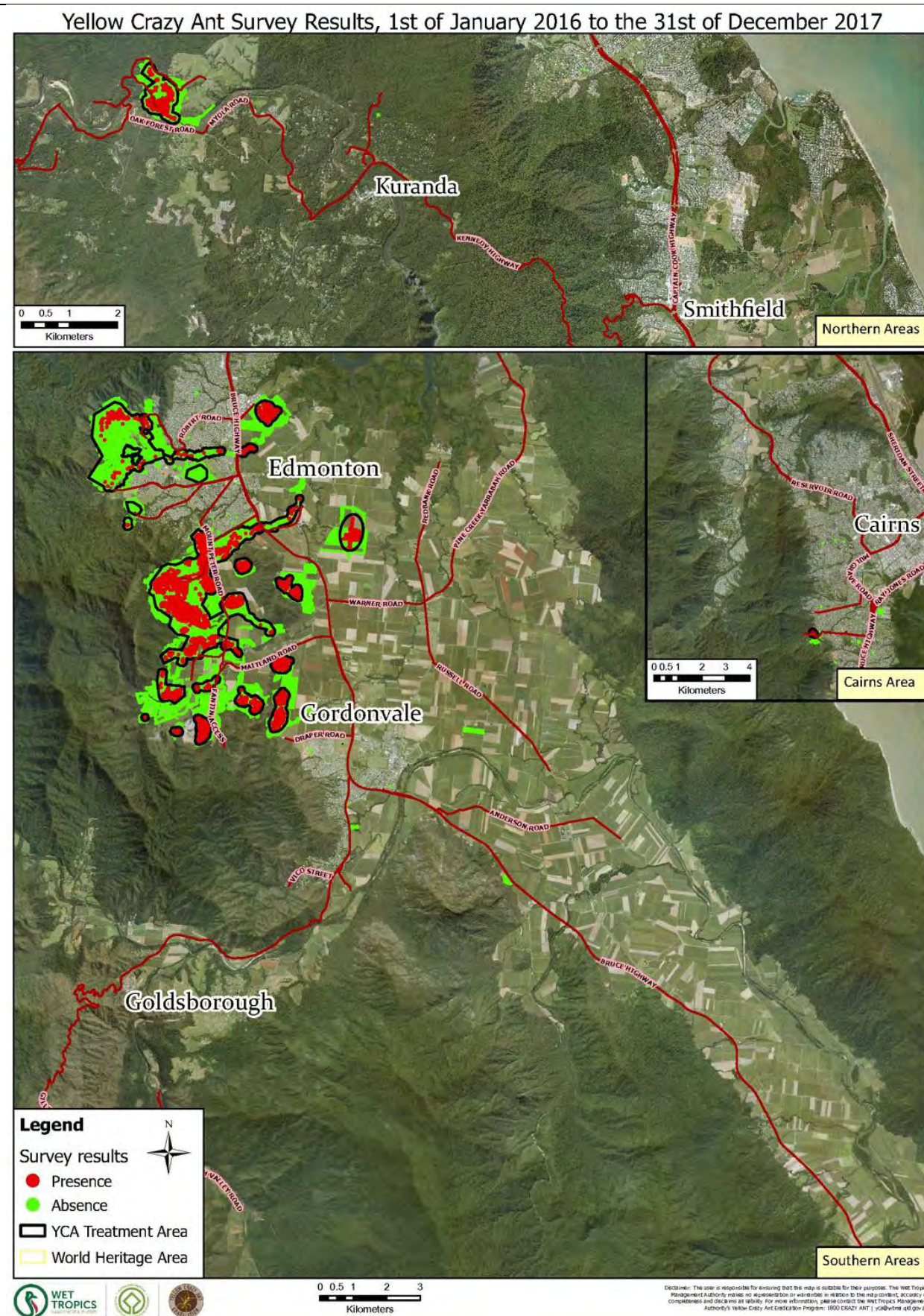


# Yellow Crazy Ant Survey Results, 1st of July 2022 to 30th June 2023



Map 6 Surveys conducted within and around Treatment Areas between 1 July 2022 and 30 June 2023





**Map 7** Comparison of survey results between 2016-17 and 2022-23 – Kuranda and Cairns areas



## Odour detection dogs

At the beginning of the reporting period, the Authority had three odour detection dogs (Fury, Luna, and Pretzel). A fourth odour detection dog (Brodie) passed validation and commenced active surveillance in March 2023. Brodie was assigned to a new dog handler who commenced with the Eradication Program in October 2022.

Following her return to the Authority's contracted expert dog trainer in June 2022, the Authority's first odour detection dog (Fury) spent 3.5 months re-training to eliminate the stress response associated with car transport that she had developed. Fury was re-deployed to the Program in October 2022, and allowed time to bond with her handler and to re-acclimatise to the Cairns environment. Over the following weeks, Fury's handler maintained a structured rehabilitation program as set out by the expert dog trainer. Fury returned to active duty in mid-November 2022.

During the reporting period, the odour detection dog teams completed the following tasks:

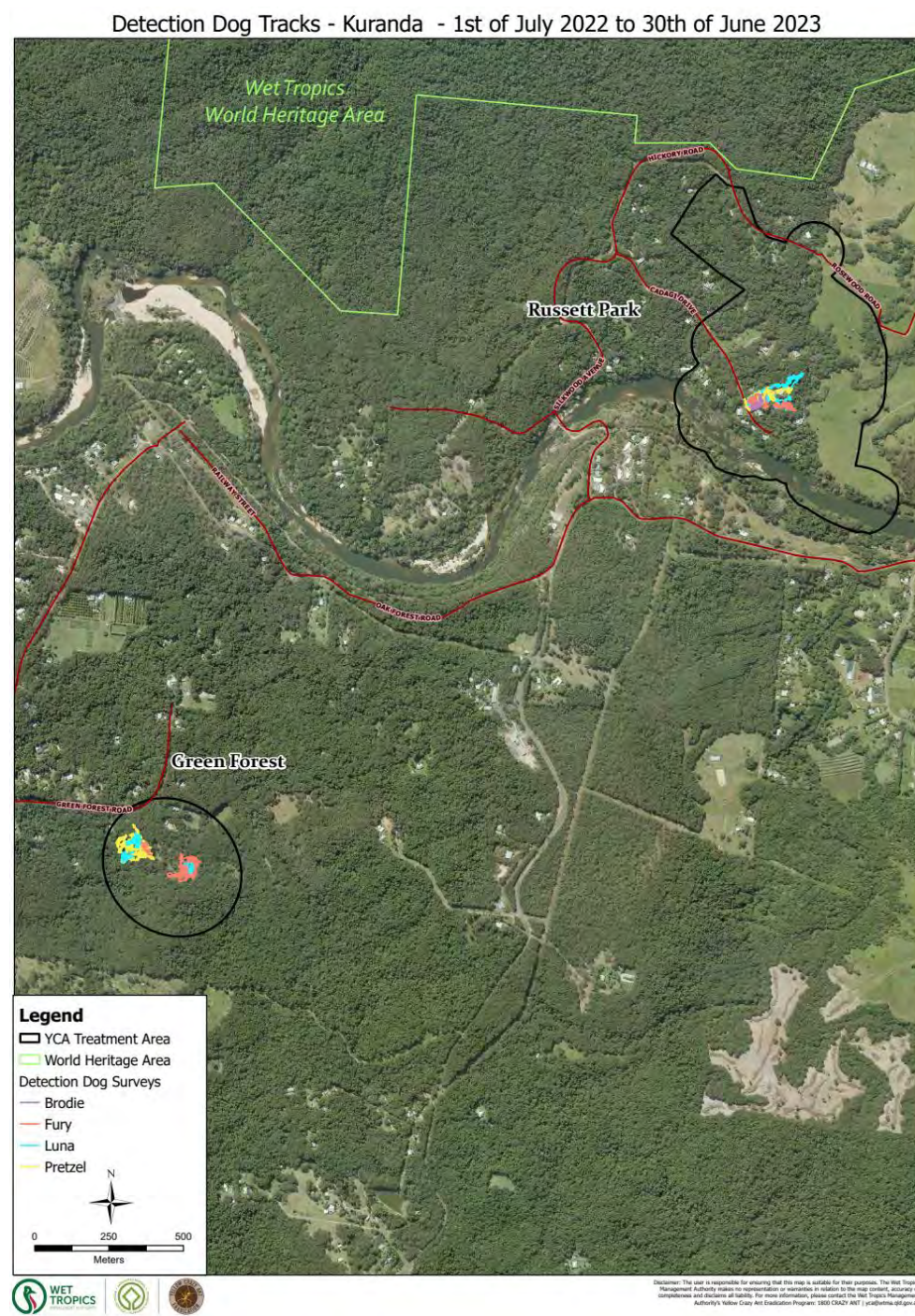
- surveyed 113ha, including 163 residential properties, as well as surveys in riparian areas, sugar cane headlands, railway sidings, and suburban environments, as well as high-risk material (such as mulch piles) sites, roadwork stockpiles, residential development works and construction areas. The teams also completed numerous specific detection tasks. (see **Map 8**, **Map 9**, and **Map 10**, below).
- surveyed 4 high-risk businesses, including a transport company, raw material and timber supply company, a shipping container yard and plant nursery
- detected yellow crazy ants after field team surveys in *TA6 Russett Park*, *TA32 Henley Hill* and *TA38 Plantation Road*. Note: detection dog teams are deployed 'blind' to areas where field teams have detected yellow crazy ants. This means the detection dog teams are not aware ants have been detected. This is a useful exercise to support the probability of detection work and to maintain detection dogs on live ants, as well as detecting ants in areas the field teams might have not detected them.
- participated in school presentations to highlight the work done by the odour detection dog teams and importance of the Program
- contributed to and participated in the canine probability of detection work (refer **5.1**, below).

To support the ongoing training and maintenance of the odour detection dog teams, the Authority's science and monitoring team maintained 27 captive colonies of yellow crazy ants. These colonies were used to produce 411 fabric dollies, 902 botanicals (275 scented sticks and 627 paperbark pieces) and 2,451 makeup pads for ongoing scent training (refer **5.1** below).

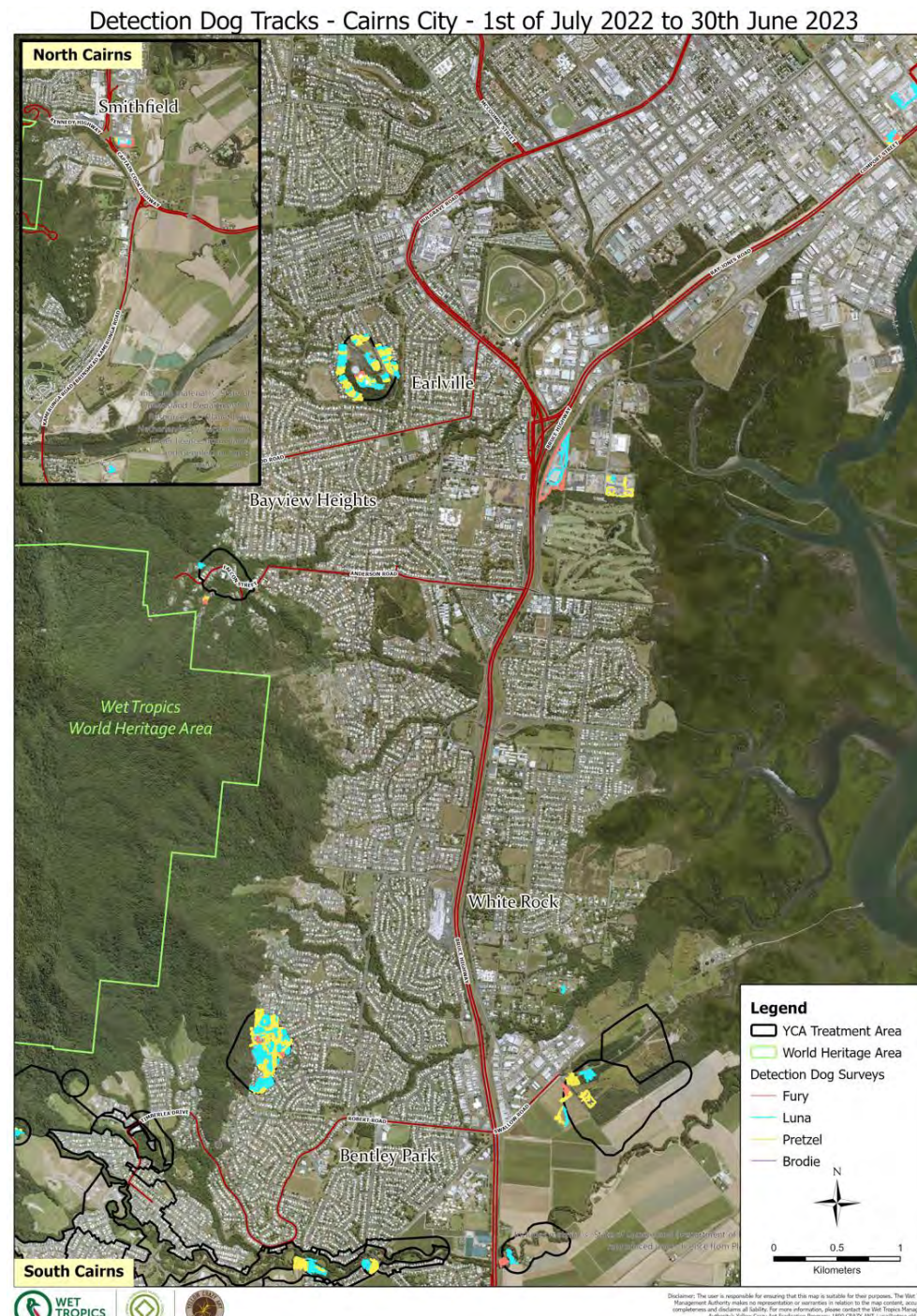


*Figure 3 Yellow Crazy Ant Eradication Program odour detection dog teams*

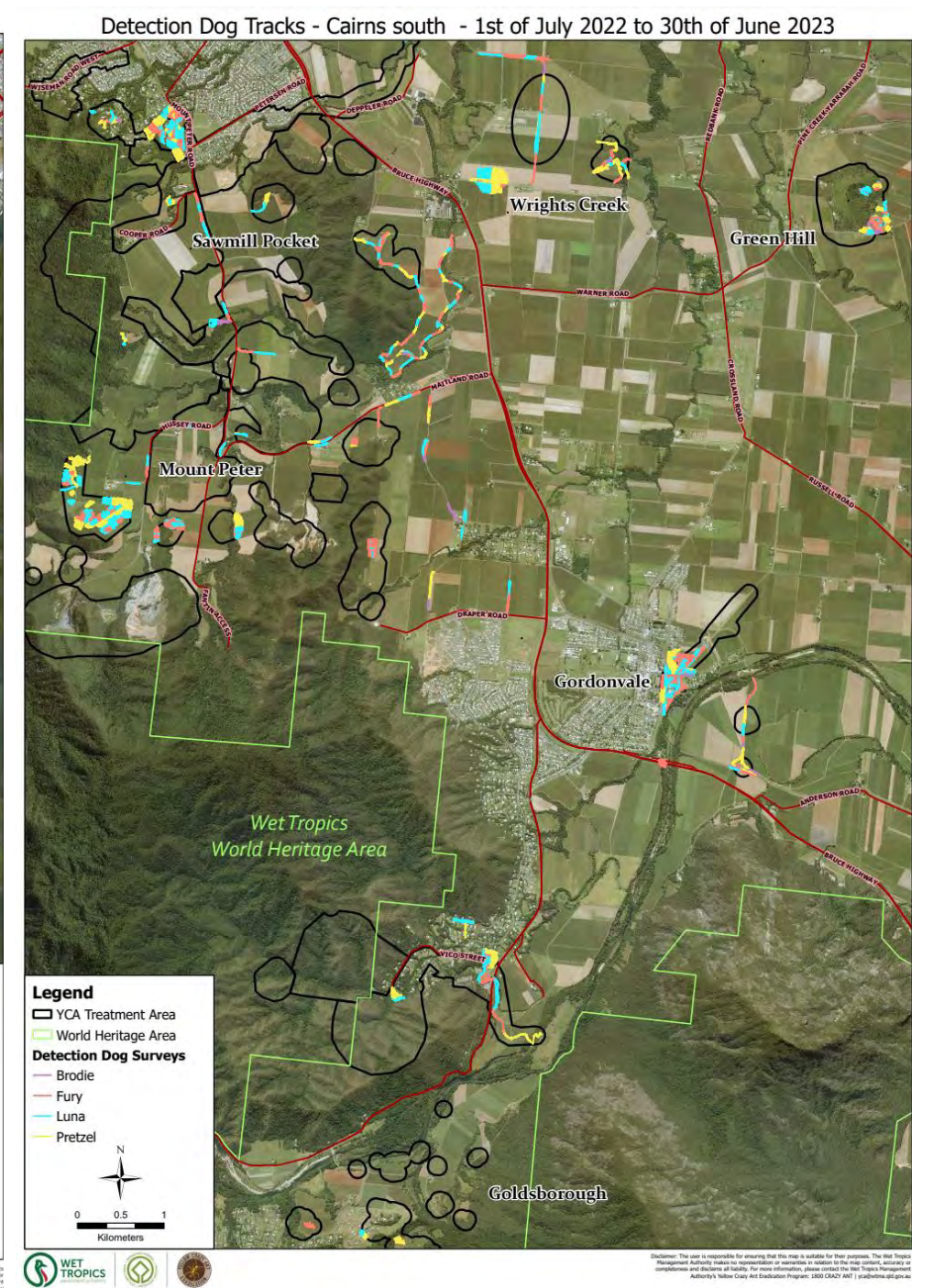




Map 8 Odour detection dog surveys 2022-2023, Kuranda area



Map 9 Odour detection dog surveys 2022-2023, Cairns area



Map 10 Odour detection dog surveys 2022-2023, Cairns south area



## Post-treatment Validation

According to the Detection to Eradication protocol, the post-treatment validation stages constitute the final stages a Treatment Area passes through before eradication can be declared. Post-treatment validation (PTV) of a Treatment Area requires that the area undergo four intensive 5m x 5m lured surveys, conducted no less than six months apart, and that these surveys do not detect any yellow crazy ants with no further treatments applied. Post-treatment validation provides greater confidence that yellow crazy ants have been eradicated and will not re-emerge once management of the area has ceased. This rigorous validation process is considered world-leading best practice in establishing certainty that an area is free of invasive ants. Confidence in post-treatment surveys is especially strong because they are preceded by transition surveys, which are described in section 1.2 above. If yellow crazy ants are detected during post-treatment validation, the Treatment Area will revert to the transition phase and undergo spot treatment and intensive surveys.

**Figure 4:** below, lists all 46 Treatment Areas by date of their initial detection, along with their size in hectares and their stage in the Detection to Eradication process. Note that TA46 Goldsborough is listed at Stage 1 (Detection) and TA45 Green Hill is listed at Stage 2 (Delimitation) as of June 2023.

One site, *TA13 Meoli's* (53.1ha), remains in the post-treatment validation phase. During this reporting period, TA13 moved from PTV stage 11 to PTV stage 12, closer to eradication. TA13 will be seventh site eradication for the Program and is scheduled for eradication in the later part of 2023. However, it should be noted that TA13 may not be eradicated in its entirety at the same time, due to access issues with a section of the Treatment Area.

TA13 Meoli's is located on the eastern side of the Bruce Highway. The area within the Treatment Area boundary consists of cane paddocks, a turf farm, and a cattle paddock. Some residential buildings are also present, as well as a cane rail siding that runs through the middle in a north-south direction. Aside from some flooding and working around business needs for the cane farmers and turf farm operators, there have been no major impediments to Program activities in this general area. Treatment and surveillance activities have been regular, as per Program standard procedures.

However, there is one section within TA13 that has had challenging access from 2018 onwards. This section is located in the north-east section of TA13 and is about 12ha in size, and it is referred to as 'the cattle paddock'. As the name suggests, this section is a cattle grazing paddock, and the vegetation consists of grasses and weeds. Although this habitat is not ideal for yellow crazy ants, the area sits within the buffer zone of the original infestation, and therefore it must be treated and surveyed adequately before TA13 can be progressed to eradication.

Since 2018, the owners of the property have been reluctant to allow Authority staff access for survey and treatment activities. The working relationships with the landholders deteriorated further in 2019, when the landholders had internal family disputes due to ownership. The landholders subsequently revoked all access for Authority staff. In 2020, 2021 and 2022, 'the cattle paddock' received full surveys due to the in-kind assistance of Cairns Regional Council (CRC) officers, who provided access for the Authority via their legislative authority under the *Biosecurity Act 2014*. However, CRC staff have been unwilling to continue this role, and the 2022 survey only occurred after a meeting between CRC, Biosecurity Queensland and the Authority to convince CRC to provide short-term access assistance to survey the cattle paddock. The Authority is seeking clarification from Biosecurity Queensland on the matter to facilitate CRC involvement on this matter.

The Authority is currently not satisfied with the number and quality of surveys conducted on 'the cattle paddock' in TA13. Therefore, it is recommended that this property is separated from the remainder of TA13 when the rest of TA13 is progressed towards eradication.

## WTMA YCA Eradication Program: Detection to Eradication

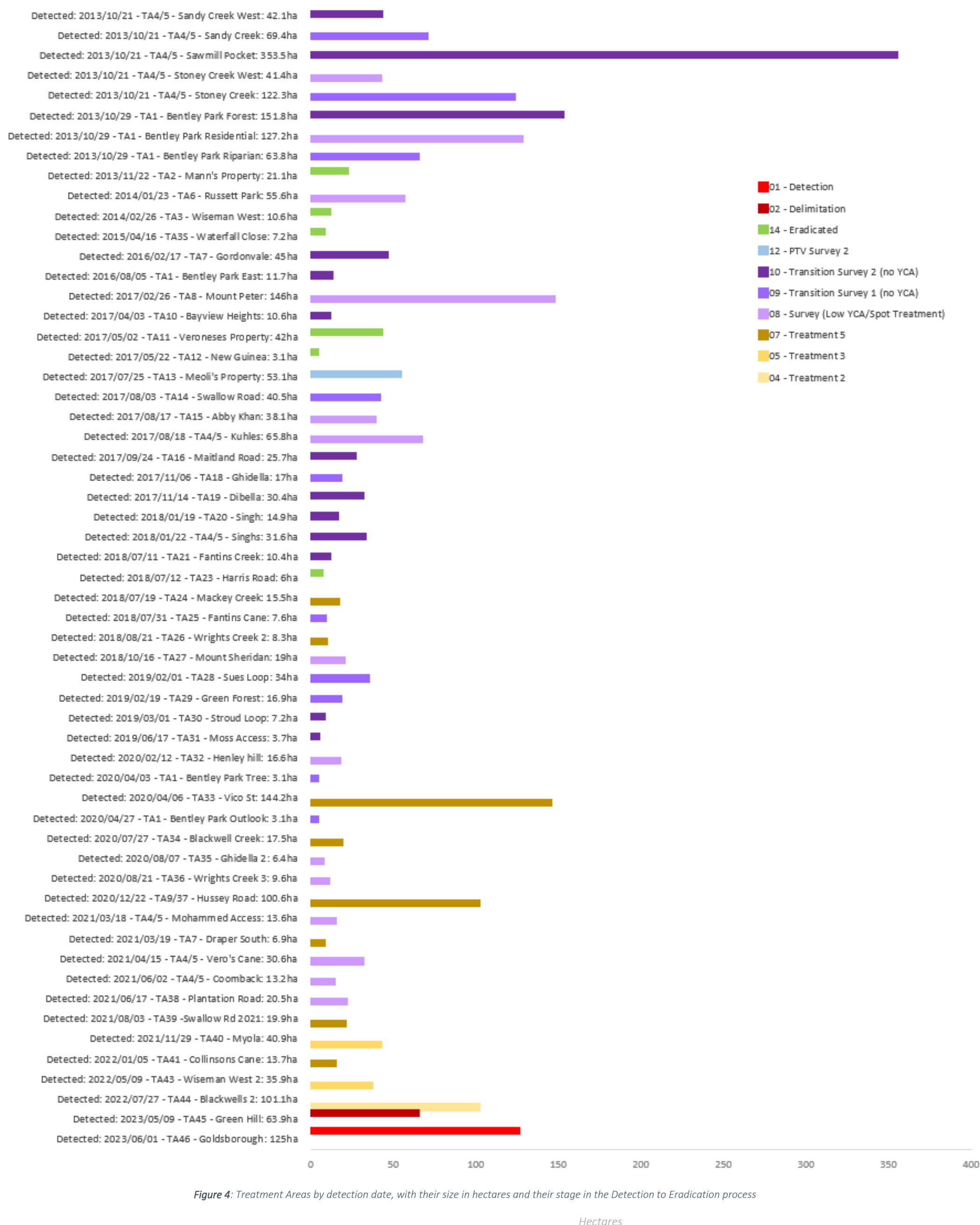
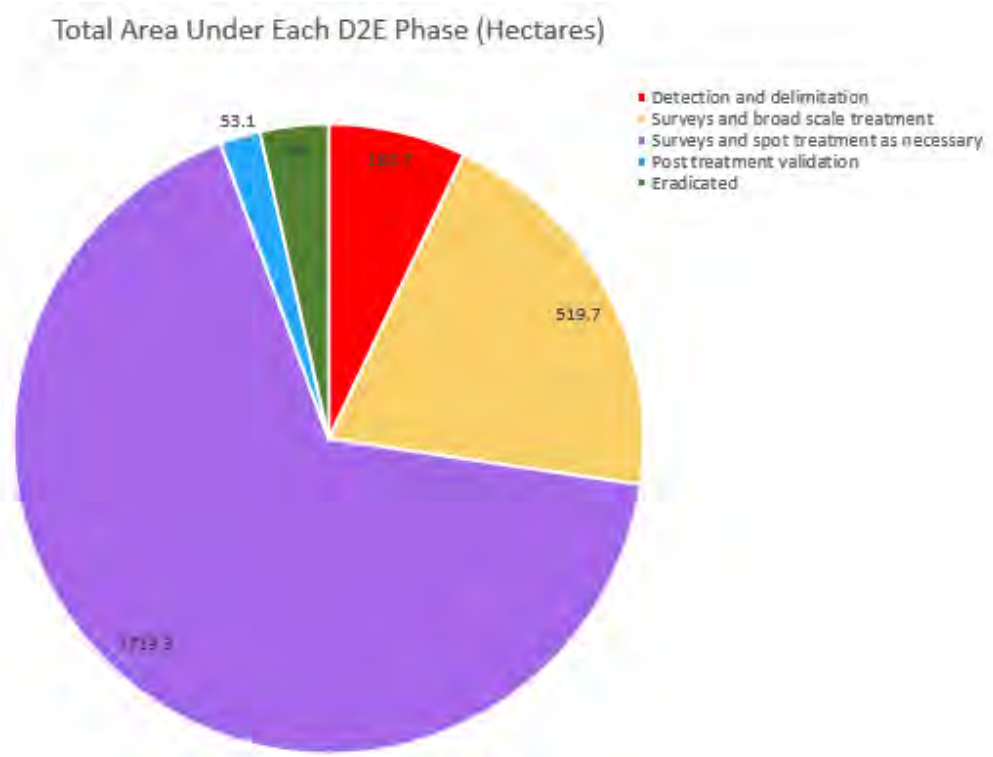


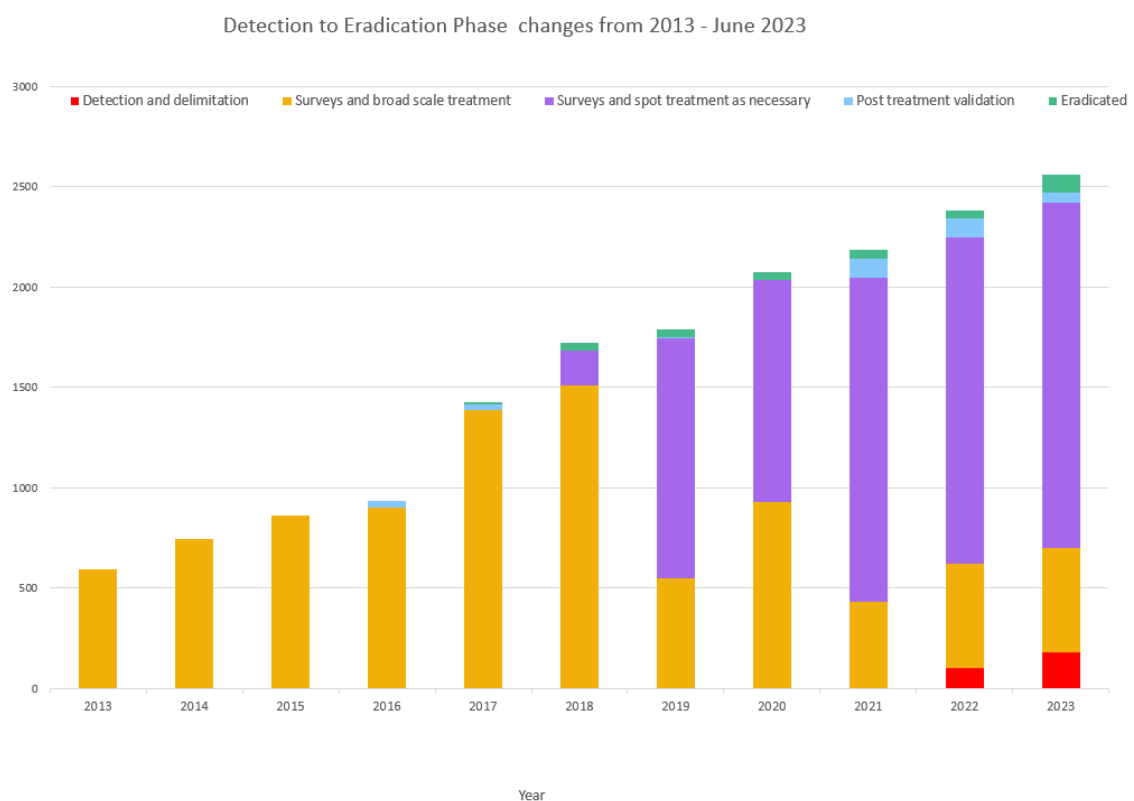
Figure 4: Treatment Areas by detection date, with their size in hectares and their stage in the Detection to Eradication process

Hectares



*Figure 5: Total hectares in each Detection to Eradication phase as of 30 June 2023*

**Figure 6** below illustrates how much of the total treatment area over time has moved from broadscale treatment to spot treatments and surveillance (transition), then to post-treatment validation, and then to eradication. As of June 30, 2023, an area of 519.7ha is under broadscale treatment, while 1,719.3ha has transitioned to surveillance and spot treatment of any remaining ants, 53.1ha is in post-treatment validation, and 90ha has been declared eradicated. There are now 46 Treatment Areas, and 6 have been eradicated.



*Figure 6 Transition stages over time*



## 2.2 Investigate persistent infestations and areas that are difficult to access

### Actions:

- Identify areas where yellow crazy ant infestations persist
- Undertake intensive surveys and treatment of persistent infestations
- Monitor the edges of infestation areas that are difficult to access for surveys
- Develop techniques to survey or deliver bait to difficult-to-access areas and persistent infestations
- Research potential reasons why infestations may persist

### Measuring success:

- Number of persistent infestations treated
- Survey data and treatment data for spot treatments of persistent areas
- Evidence of use of other bait delivery mechanisms, if required

*Persistent sites* are defined as sites where yellow crazy ants have been detected after the site has received more than eight rounds of treatment since 2017. During the FY23 reporting period, the criteria for declaring a site to be persistent were reviewed and further developed. See **Table 1**.

**Table 1** Criteria used to define persistence

	Not persistent	Potentially persistent	Persistent
Criteria	Number of treatment rounds <=4	Number of treatment rounds 5-7	Number of treatment rounds >=8

Because many persistent and potentially persistent sites have now experienced long periods of non-detection, the Authority is now considering criteria to remove sites' persistent status. As with the larger sites, persistent sites will be assessed by taking into consideration the time elapsed since the last yellow crazy ant detection, the complexity of habitat at the site, and the effort and quality of historic surveillance effort and quality. Sites identified as potentially no longer persistent are identified under various rulesets in **Table 2**.

**Table 2** Persistent sites and time since detection of yellow crazy ants

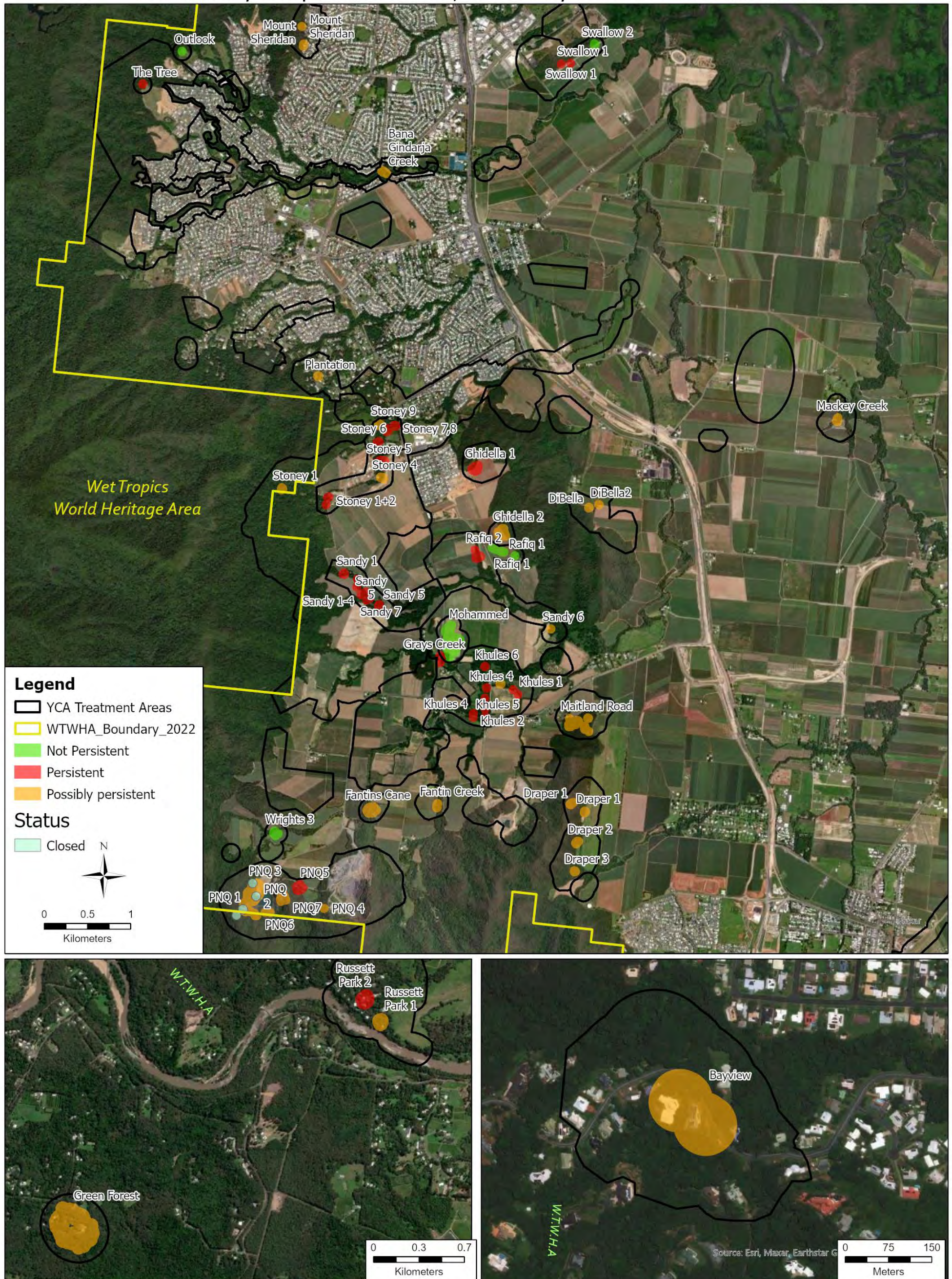
Risk (Ruleset)	Level 1 – Very low risk Surveys since last detection => 4 Days since last detection => 1460 (4 years)	Level 2 – Low risk Surveys since last detection => 4 Days since last detection => 1095 (3 years)	Level 3 – Moderate risk Surveys since last detection => 3 Days since last detection => 1095 (3 years)
Sites considered to be no longer persistent under these rulesets	Sandy 2 Sandy 3 Sandy 4	Bana Gindarja Creek* Sandy 1 Sandy 5 Stoney 5 Stoney 6 The Tree	Gray's Creek Stoney 2 Stoney 3 Swallow 1 Stoney 7 Stoney 8

\* Formerly Blackfellow Creek. See discussion below.

Twenty-seven (27) sites are currently classified as persistent, with a further 29 considered to be possibly persistent (see **Map 11**). It is important to recognise that while a site may have a persistent status, it does not mean that yellow crazy ants continue to be present. For thirty-nine (39) of these persistent or possibly persistent sites, at least two years have elapsed since yellow crazy ants were last detected (see **Figure 7**).

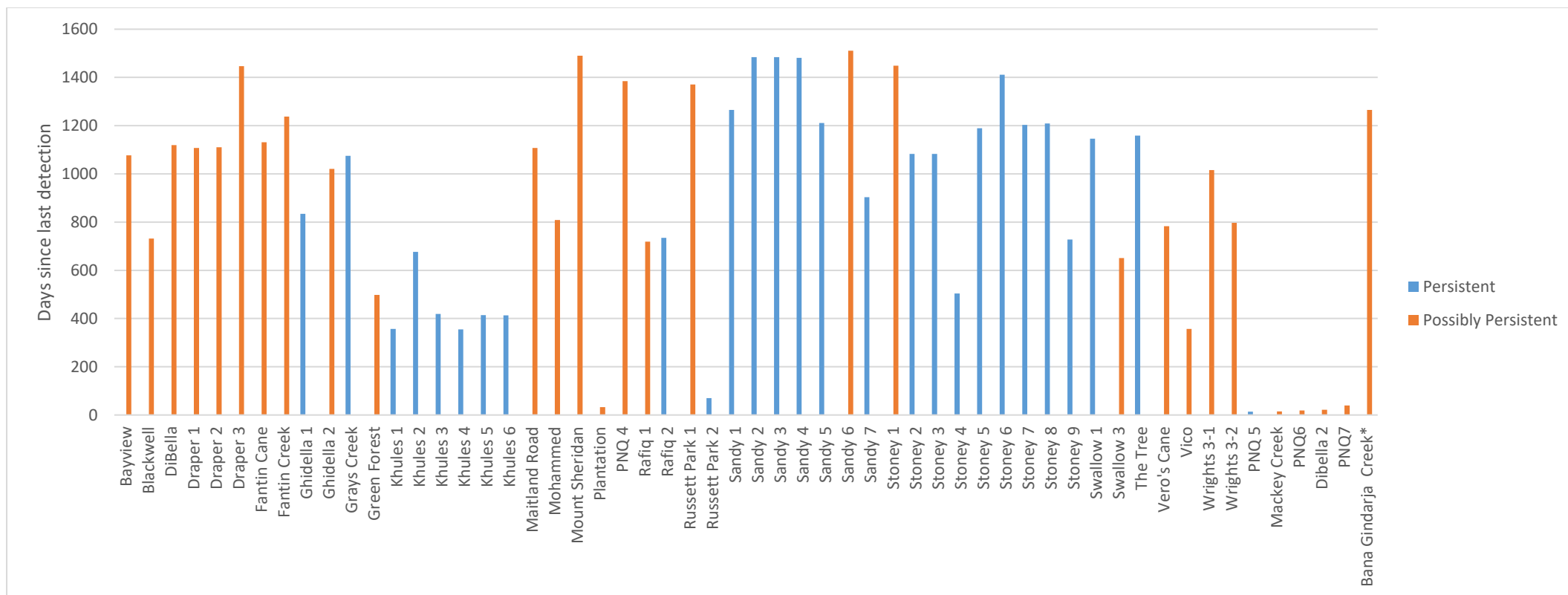


# Yellow crazy ant persistent sites, 1st of July 2023 to 30th June 2023



Map 11 Persistent, possibly persistent, and no longer persistent sites, as of the conclusion of FY23





**Figure 7** Persistent and possibly persistent sites by name, with the time since most recent detection of yellow crazy ants (days). Note that Bana Gindarja Creek was previously known as Blackfellows Creek.

## Notable sites for 2022-2023

### *Bana Gindarja Creek (formerly Blackfellows Creek)*

In February 2021, Cairns Regional Council voted unanimously to rename Blackfellows Creek to Bana Gindarja Creek in recognition of the Gimuy Walubara Yidinji people and their culture. The creek was officially renamed in 2023.

Canine surveys were undertaken upstream of the potential persistent site at Bana Gindarja Creek in July and August of 2022. During the July surveys, the dogs displayed physical reactions twice near the sugar cane rail bridge, but no complete indications were made. During the August surveys, the dogs indicated at three further points, but no yellow crazy ant specimens were found. See **Map 12** for locations of the indication points. Two follow-up surveys were conducted, using sticky traps placed in a 20 metre buffer around each indication point in a 2x2 metre grid. Additional follow-up fine-scale lured surveys were conducted. None of the follow-up surveys detected yellow crazy ants. See **Map 13**, below, for location and extent of follow-up surveys.

In September 2022, water samples that had been collected by James Cook University at the possibly persistent site in Bana Gindarja Creek in May 2022 returned a positive yellow crazy ant eDNA result (see **Map 13**). Environmental DNA (eDNA) technology for the detection of yellow crazy ants is considered experimental, and the sample in question was collected as part of ongoing research into the viability of eDNA sampling as a surveillance technique. Follow-up fine-scale lured surveys were conducted (covering areas including the area where the odour detection dog teams had previously reported indications). No follow-up surveys detected yellow crazy ants (see **Map 13**).

Bana Gindarja Creek presents challenging conditions for surveillance. There are extensive areas of dense weeds such as Guinea grass (*Megathyrsus maximus*) and elephant grass (*Cenchrus purpureus*) present throughout the site, limiting accessibility for survey activities (see **Figure 8**). These stands of weeds may also provide refugia for ants from treatment activities.

While the site meets the proposed criteria for progression to non-persistence (see **Table 2**), the number of potential detections recorded indicate that a precautionary approach is appropriate. Given the potential for yellow crazy ants to persist at this site, it will not be progressed until further evidence of absence is collected.

Actions for future management of this site:

- the Authority will continue to work with local stakeholders to manage weeds to improve access to the site
- no further treatment will be undertaken, to allow any ant populations that may be present build to detectable levels
- follow up eDNA sampling will be undertaken
- ongoing surveillance using multiple survey techniques (lured surveys, canine, sticky traps) will be undertaken

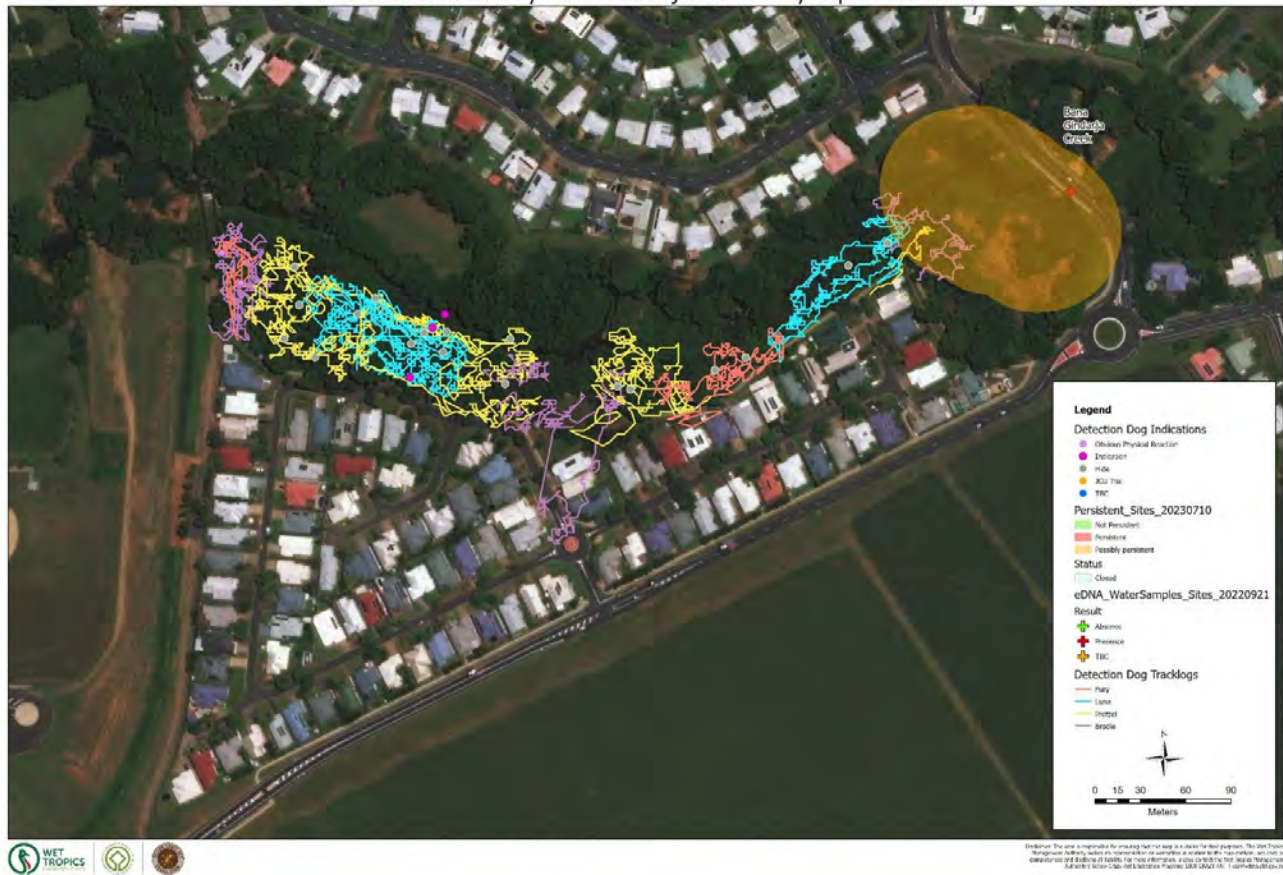




*Figure 8 Bana Gindarja Creek (formerly Blackfellows Creek). The terrain in the creek is challenging for surveillance.*

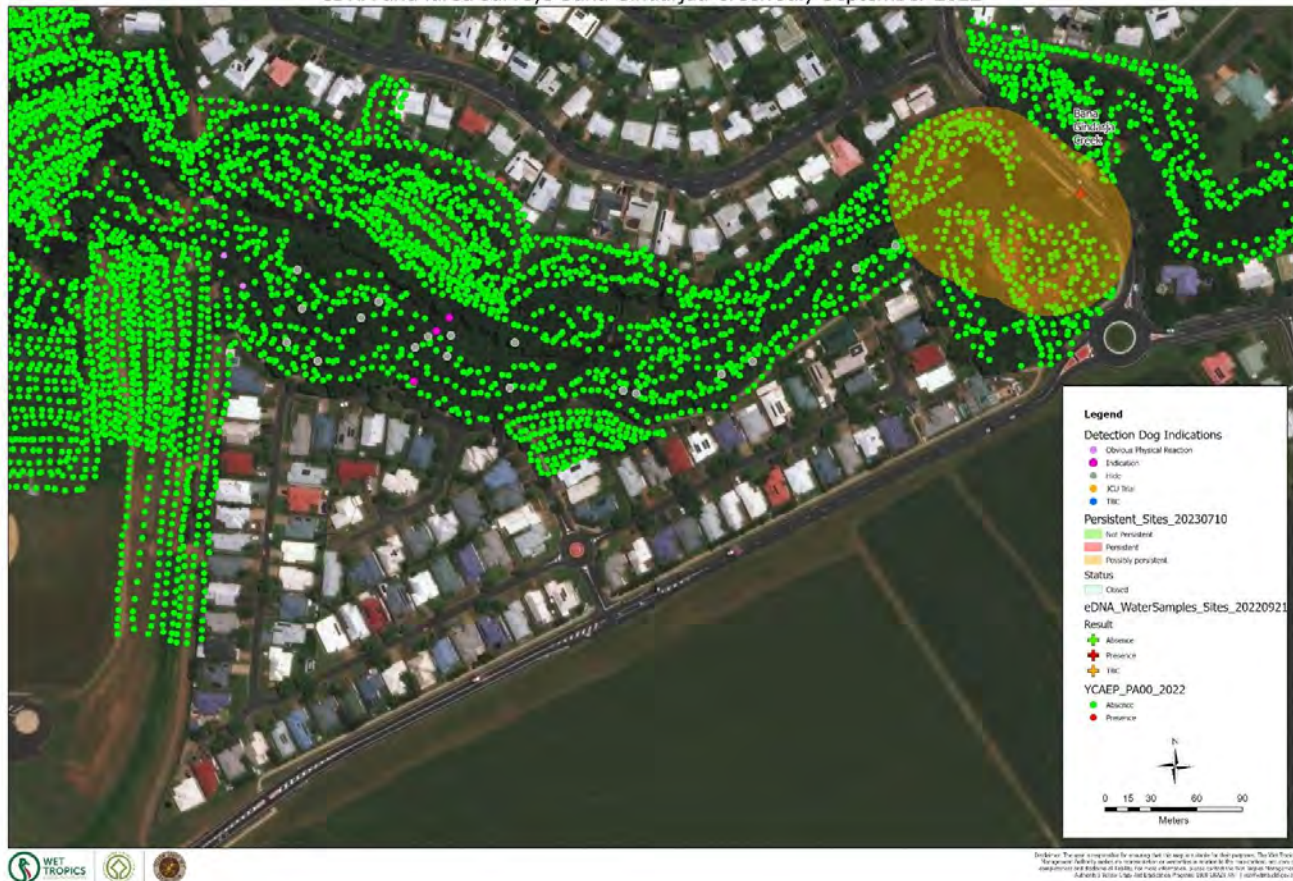


# eDNA and lured surveys Bana Gindarjda Creek July-September 2022



Map 12 Bana Gindarjda Creek canine surveys, July-September 2022

# eDNA and lured surveys Bana Gindarjda Creek July-September 2022

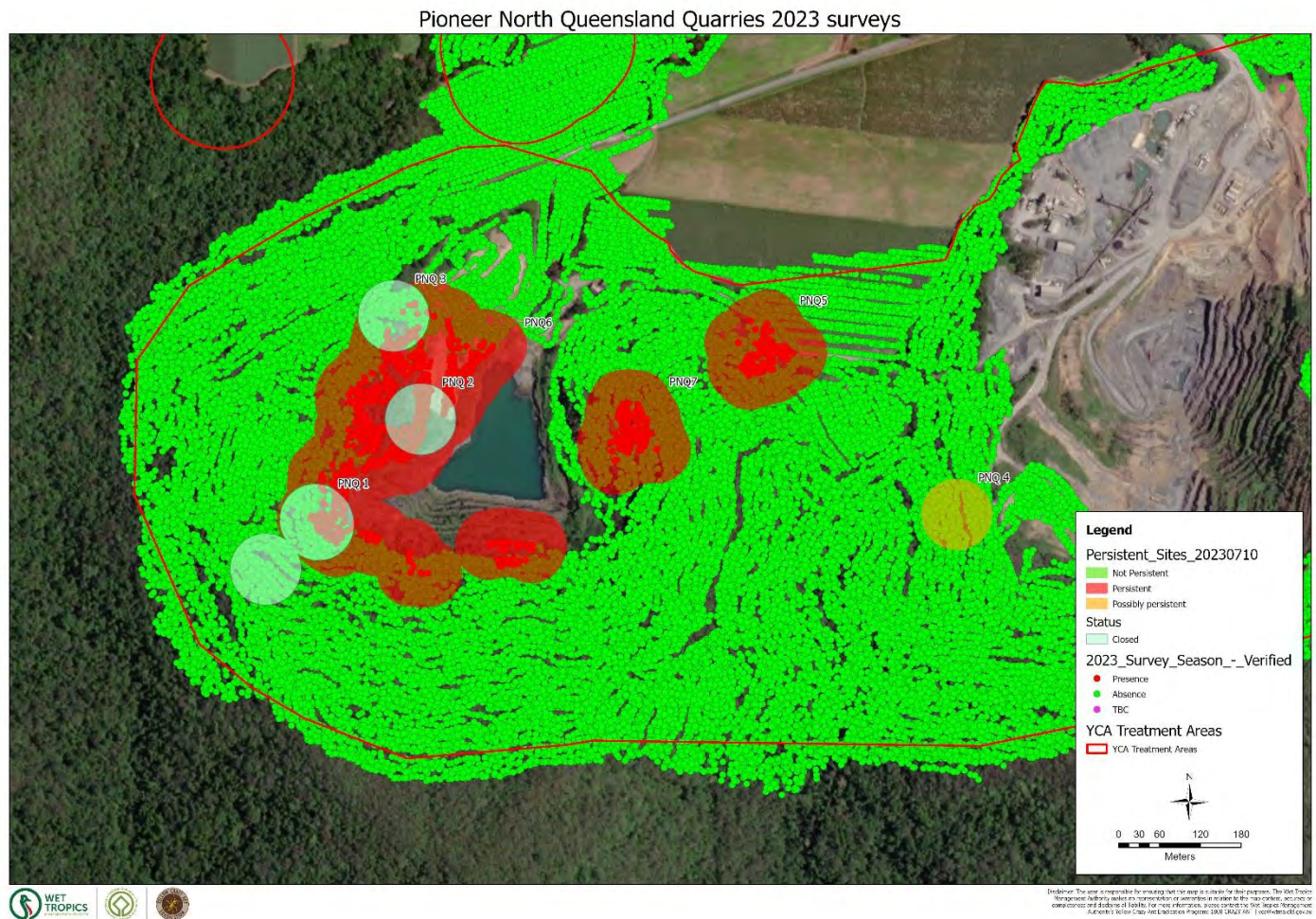


Map 13 Bana Gindarjda Creek fine-scale luring surveys, July-September 2022



## Pioneer North Queensland Quarries

In March 2023, yellow crazy ants were detected at Pioneer North Queensland (PNQ) Quarries across several points around the Hussey pit (in the western area of the quarry). The extent of these detections resulted in three of the previously identified potentially persistent sites (PNQ 1, PNQ 2 and PNQ 3) being absorbed into a new potentially persistent site (PNQ 6). Additionally, a new area of infestation was detected on the eastern side of the Hussey pit (PNQ 7), and an additional area that had previously been infested (PNQ 5) was found to have yellow crazy ants present again. See **Map 14** for locations of PNQ sites. Of the PNQ sites, only one location (PNQ 5) is considered to be persistent by the current ruleset (8 or more treatments since 2017, with ants continuing to be present). The other sites are considered to be possibly persistent (having received 5-7 rounds of treatment since 2017, with ants still present). Surveys across PNQ Quarries in 2019 and 2020 detected a small number of yellow crazy ants, and no ants were detected in 2021. In 2022, the site was not surveyed, allowing it to 'rest' so that any persistent populations had the opportunity to recover to detectable levels.



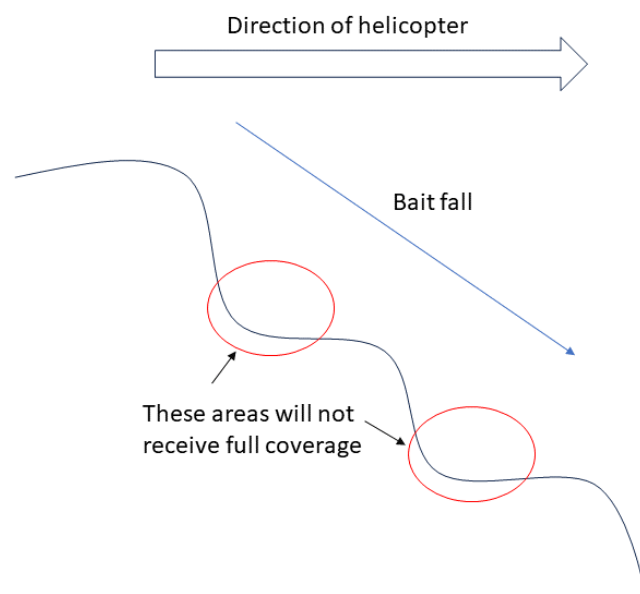
**Map 14** Pioneer North Queensland 2023 detections

The Pioneer North Queensland Quarries site presents unique operational challenges. The site is a working quarry, and access to multiple areas is restricted or prohibited due to safety concerns. The accessible terrain is rugged and steep. Due to the risks, surveillance and treatment at this site require very experienced field staff to ensure field operations are conducted safely. Quarry benches are often unstable and are unsafe to traverse for surveillance activities (see **Figure 9**).

While multiple factors have been identified as potential contributors to persistence at this site, the terrain is likely to be the most important factor. Quarry benches are likely to offer refugia for ants. During aerial treatment via helicopter, the direction of the falling bait and shape of the land surface may cause bait 'shadows' (see **Figure 10**). In this way, the direction of the helicopter as it crosses the quarry benches may contribute to inconsistencies in bait distribution. It is therefore likely that yellow crazy ants have persisted on the quarry benches and that due to the inaccessibility of these areas, surveys have been unable to detect the ants until populations have increased to the point where ants are beginning to expand their territory.



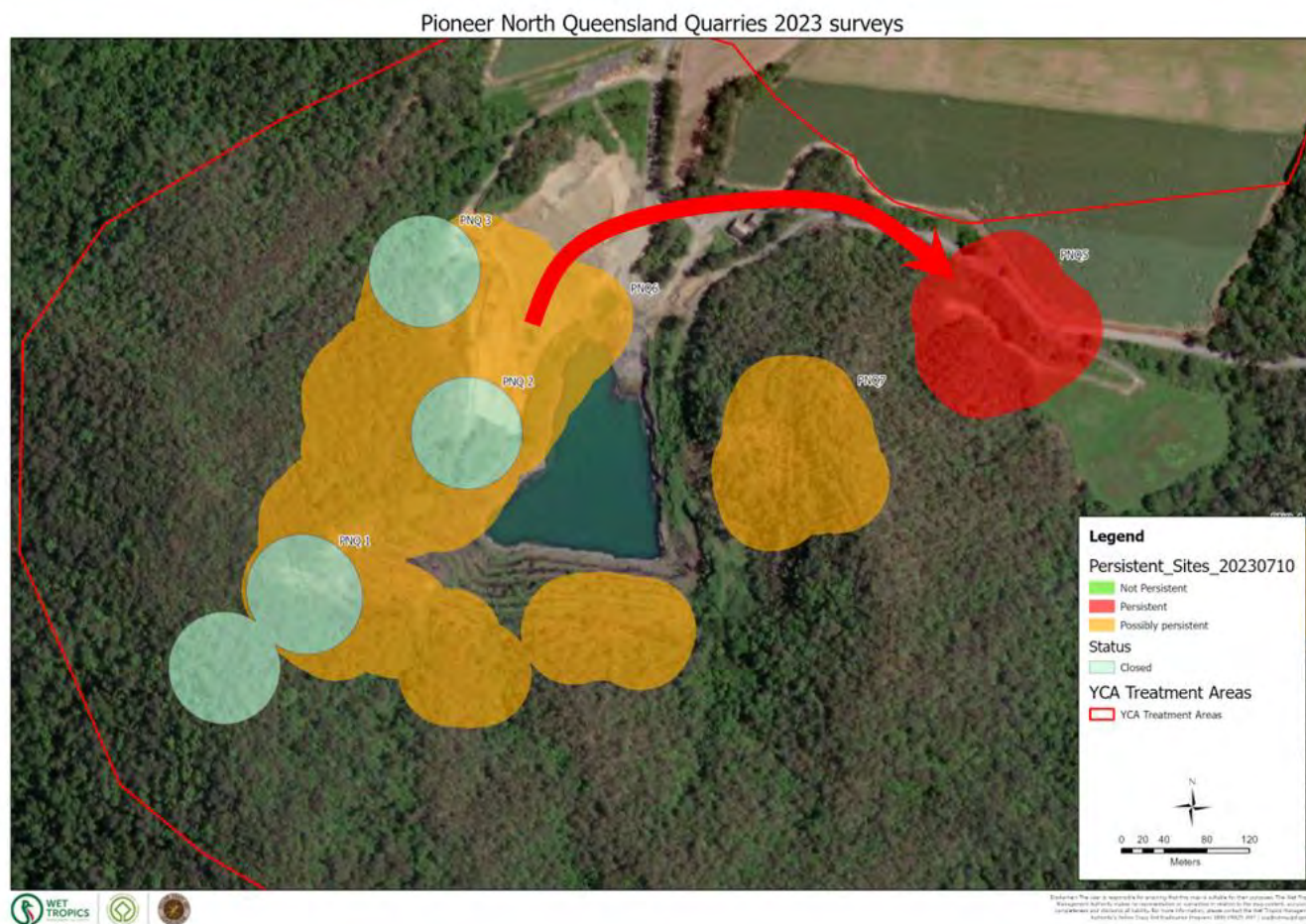
**Figure 9** The Hussey pit at Pioneer North Queensland Quarries. The steep, narrow benches are unsafe to traverse and are likely to provide refugia from treatment



**Figure 10** When helicopter treatment crosses the quarry, the direction of travel impacts the spread of bait.



PNQ 5 is one of the more easily accessed sites within the greater PNQ Treatment Area. No yellow crazy ants have been detected at PNQ 5 since the initial delimitation surveys of the PNQ Treatment Area in 2017. Recent road-building in the PNQ 5 area is therefore considered the most likely source of reinfestation, due to the influx of material relocated from the infested PNQ 6 site (see **Map 15**).



*Map 15 Movement of materials from PNQ 6 is the likely source of reinfestation in PNQ 5*

The detection of yellow crazy ants at PNQ7 highlights the difficulties of the terrain. The area is very steep, with previous quarrying operations leaving behind bench areas that have now become overgrown (refer **Figure 11**). Survey activities in this area have historically been difficult due to safety concerns, and the 2023 surveys have been the most comprehensive yet conducted. It is possible that previous surveys have missed ants present in low numbers.





*Figure 11 PNQ 7 (circled in red) The steep terrain has prevented effective surveillance for several survey rounds.*

Actions for future management of this site include:

- utilising a drone to deliver bait along the contours will ensure consistent bait application (refer 2.3)
- continuing to work with PNQ management to reduce the risk of spreading yellow crazy ants via potential movement pathways

#### *Russett Park 2*

Yellow crazy ants were detected in March 2023 at a property in Russett Park during regular surveys. This property was also the point of origin for the original Russett Park infestation. The area was delimited and found to be a very small patch of persistence (3 yellow crazy ant detections within a 5-metre radius). The property is challenging to survey, with numerous car bodies and large amounts of overgrown vegetation proving excellent ant habitat and making hand treatment difficult. The Authority is working with the landholder to improve access to the property, with contactors undertaking vegetation management. Treatment of the entire property was undertaken in May 2023.



## 2.3 Maintain and improve techniques and practices for survey and treatment, and data collection, processing and analysis

### Actions:

- *Continue to develop the Konect system (or alternative system) and train staff in its use and maintenance*
- *Ensure survey data is collected under appropriate conditions for yellow crazy ant foraging*
- *Continue to develop data processing and spatial analyses to provide confidence in absence*
- *As required, test the use of alternative baits and alternative treatment methods*

### Measuring success:

- *Evidence of effective data collection by well-trained staff*
- *Analysis of survey data and confidence in absence of yellow crazy ants*
- *Evidence of the successful use of spatial analysis*
- *Results of trials of alternative baits and alternative treatment methods*

The maps and survey data supplied in this report demonstrate that the Authority is keeping comprehensive and detailed records of all its treatment and survey activities. The Authority also continues to develop new ways to analyse and present this data for management, reporting, and community engagement purposes.

A key part of this process is to ensure technical aspects of data collection and analysis function effectively. To this end, the Authority has devoted significant effort to improving technical systems, protocols and staff training, which helps to ensure that surveys and treatment are effective, and that data capture, processing and analysis is performed optimally within our resource constraints. In 2022-2023 these improvements have included the application of innovative technical and GIS initiatives as well as trialling of alternative baits and alternative treatment methods.

### Technical and GIS initiatives

#### *Automation of GPS processing*

The Authority has made major advances in the way it processes GPS data, resulting in better-quality data and a quicker turnaround on map production and data visualisation. Previously, GPS data was processed in a semi-automated way by the GIS team on a weekly basis. Over the reporting period, new tools have been developed to allow field teams to process their own data as soon as they return to the office, giving Operational staff the ability to identify any errors or gaps in data on the day, and making their survey and treatment data immediately available in all web and mobile map products. Data is now up-to-date daily, and teams can use the data immediately to plan their follow-up survey and treatment activities.

#### *GIS dashboard*

An ArcGIS Reporting Dashboard was created to provide figures required for the Annual Report. The dashboard provides a platform for users to manipulate data through relevant filters to gather specific statistics required for reporting purposes. The filtered data can also be visualised in the dashboard map, with additional information available in map pop-ups. Automated processing scripts are being created so that each year the figures are created and stored in the same way, ensuring consistency in processing and documentation.

#### *Transition from Konect*

At the time of the FY21-22 report, the Konect system was expected to be decommissioned by October 2022, with the QLD Government's ArcGIS Enterprise Portal (QPortal) planned to replace it. These plans were abandoned when upgrades to QPortal took much longer than expected, resulting in the portal being unavailable for six months. Due to the mission-critical nature of the Program's field data collection, it was therefore determined that QPortal was not an appropriate option (despite the upgrades bringing much-needed improvements to the Portal's functionality). It was decided that the solution best designed to replace the functionality of Konect would be QSpatial Live, the QLD Government's ArcGIS Online portal. ArcGIS Online is continuously upgraded without disruption to users, and it offers the latest in ESRI's web and mobile GIS features.

The Authority has now replaced the main functions of Konect with equivalent solutions in QSpatial Live. This migration has included adding, editing, and retrieving contact details of residents, recording residential surveys, and recording residential treatment activities. Workshops were conducted with staff to gather user feedback and look for ways to improve the user



experience while still collecting all the necessary information for reporting and analysis. This new mobile and web GIS solution provides greater flexibility with configuration of maps and forms, as well as improved access to data. The Authority predicts that the adoption of QSpatial Live will result in better-quality reports and maps, as well as the agility to adapt to changes in our operational activities or reporting requirements. As of 30 June 2023, user acceptance testing is underway, and it is expected that Konect will be replaced well ahead of the Authority's current licence expiration in October 2023.

#### *Field Maps on smartphones*

Operational staff are increasingly using web and mobile mapping products to gain access to information and to collect data in the field. ESRI Field Maps is currently being utilised to visualise survey and treatment data, Treatment Area boundaries, hazards, and other relevant spatial features. This product was selected because it allows users to immediately visualise, add, and edit spatial data, improving efficiency of information-sharing across the workforce.

The ability of field staff to carry an easy-to-use, accurate mobile map means that staff can be tasked with location-specific survey and treatment activities by team leaders without confusion around exact locations. Residential and farm contact phone numbers are now simple for staff to access from any mobile phone or tablet, improving communication with stakeholders and therefore Program reputation. Staff can also record hazards immediately upon encountering them in the field, and attach photos, videos or other files. Using Web Maps, teams can also create team- or initiative-specific maps with only the relevant features and layers for their own work, eliminating the need to navigate dozens of irrelevant layers and the risk of accidentally making changes to those layers.

Additionally, locations of signs and banners are now tracked in Field Maps. Dog handlers are recording all weather observations and dog indications in Field Maps, making that data instantly available to the Program management and partners. Mobile-friendly Web Maps has been adopted as the tool of choice to communicate to vegetation management contractors the locations they need to slash or spray to improve the Authority's access.

Across the Yellow Crazy Ant Eradication Program, various web maps are being used by team leaders, field team supervisors, Program management and our partners to view, query, extract, and report on data. This has made access to data more efficient, ensuring everyone has good access to current information.

#### *Probability of Absence mapping*

Over the FY22-23 reporting period, James Cook University developed and refined the Probability of Absence mapping methods with the GIS team (refer **Appendix 2 – Progress towards eradication: Transition to Post-treatment Validation and Eradication**, section 1.2, and section 2.1).

#### *Sugar Industry*

Utilising methodology developed in previous years, the Authority continued to use data supplied by MSF Sugar to develop trace maps to identify when harvesters move through areas of infestation and the harvesters' subsequent destinations. Targeted surveys are then conducted at these destinations to ensure yellow crazy ants have not been translocated.

#### *Other Technical Initiatives*

Staff have been supported to transition from the network drive system to Microsoft Teams and SharePoint, improving efficiencies in document control and collaboration, task management, work program planning, and reporting.

### **Alternative baits and alternative treatment methods**

Between 1 July 2022 and 30 June 2023, the Authority continued to monitor the market for emerging bait alternatives via bait suppliers and invasive ant networks across the world. To date, the Authority has not found any other products more effective and suitable for Program use than *AntOff*.

#### *Organic products*

With the detection of TA45 Green Hill, the Authority faced a challenge unprecedented in Program history: a Treatment Area that contains an organic farm. (In this instance, the property in question is a beef cattle farm pursuing certified organic status through Australian Certified Organic and the United States Department of Agriculture.) The primary and secondary treatment products used by the Authority, granular bait *AntOff* and paste bait *Vanquish Pro*, are not approved for use on organic properties. Because TA45 Green Hill contains properties and businesses with a considerable risk of spreading yellow crazy ants, treatment of the

property was urgent, but best-practice contiguous treatment of the entire Treatment Area could not proceed until an organic alternative to the Authority's established treatment methods was agreed upon.

To progress this, the Authority thoroughly researched the Australian National Organic and Biodynamic Standard, the Australian Certified Organic certification standards, and all relevant pest insect treatment methods and products listed therein. The Authority conducted a detailed comparative analysis of over 30 organic standard-compliant chemical and mechanical treatment methods and assessed each method's logistical suitability for the Treatment Area, likelihood of eradicating yellow crazy ants, and cost to implement, with input from expert Program partners. Furthermore, the Authority liaised with experts from the National Fire Ant Eradication Program to seek information on how that program has navigated organic restrictions.

The Authority selected a primary treatment strategy of slashing the infested areas, disturbing the soil via grader or discing, and burning the remaining vegetation to remove potential yellow crazy ant refugia. The Authority also selected a secondary strategy of treating any remaining yellow crazy ant populations with the pyrethrin-containing insecticide *Pyganic* (APVMA No. 59684). In May 2023, the Authority applied for a permit to use *Pyganic* in this Treatment Area only. Permit #93602 for the use of *Pyganic* was issued in July 2023.

After further considering the options and implications of using organic treatment versus *AntOff* treatment, the landholder decided to fence off the section of the organic paddock affected by yellow crazy ants and agreed to permit treatment of the infested area as per standard Program procedures with *AntOff*. This situation served as a useful exercise which improved the Authority's capacity to efficiently manage similar challenging treatment situations in the future.

#### *Drone trials*

As the Authority progresses eradication of yellow crazy ants in the region, the total area subjected to broadscale treatment continues to decrease, and the areas actively being treated will become smaller. This progress necessitates change in treatment strategy in order to maintain optimal cost efficiency and improve precision of bait delivery. During the FY22-23 reporting period, the Authority continued to investigate and trial the use of Unmanned Aerial Vehicles (UAV) for the distribution of its primary treatment product, the granular bait *AntOff*. Due to recent advancements in the agricultural technology space, UAVs are now able to carry operationally significant payloads. Furthermore, the operating cost efficiency per hectare of UAVs continues to improve. Finally, UAVs have the advantage of being deployable on short notice compared to a field team or helicopter, and they can deliver treatment to areas that are difficult to access on foot.

To assess whether use of a UAV would realistically confer these benefits to the Program, the Authority conducted a pilot trial during the FY21-22 reporting period (refer *Detailed Report on Deliverables – Annual Implementation Plan – July 2020 to June 2021*). The results suggested that use of a UAV for this purpose was viable, but the small-scale trial yielded little further data due to methodology issues. To investigate the question more thoroughly, the Authority conducted a follow-up trial on 14 September 2022, using an improved experimental design. The main objectives of this second trial were to assess the spatial variability of *AntOff* distribution when dispersed by the drone, both in an open paddock and in a sloped, tree-covered area (representing field-realistic conditions), as well as the speed and efficiency of drone treatment. This was accomplished via flying the UAV over a carefully selected test area while dispensing a blank bait several times and measuring the output (see **Figure 12**). Crucially, these sampling events were then repeated with an experienced field team performing the treatment rather than the UAV, allowing a direct comparison of the UAV and hand treatment across key target metrics.

The results show that the average *coefficient of variation* (an industry standard metric describing the uniformity of spread of a granular substance across a Treatment Area) was significantly lower in drone-treatment events than in hand-treatment events, indicating that drone treatment surpasses hand treatment in evenness of spread. Additionally, the variability of spread was higher under tree cover than in the open field – as expected, based upon past research and staff accounts of the difficulty of treating evenly in difficult terrain. Finally, projections based upon the experimental data suggest that UAV treatment would eclipse hand treatment in speed and cost-efficiency, even when accounting for battery changes, lead time required by the UAV operator, and mechanical and software issues. Based upon these results, the UAV has been recommended for immediate deployment, pending resolution of procurement delays external to the Program.





*Figure 12 Drone flying above the experimental paddock during the second drone trial*

## Strategy 3: Seek any additional yellow crazy ant infestations

### 3.1 Strategically trace potential sources from known yellow crazy ant infestations

#### Actions:

- *Work with industry to track potential vectors for movement*
- *Trace potential sources and predict locations of translocated ants*
- *Strategically survey areas of potential spread through targeted surveys*

#### Measuring success:

- *Comprehensive GIS data on areas and vectors searched for yellow crazy ants, including mapping*
- *Number and area of any new infestations detected*
- *Evidence of surveys conducted in areas where future infestations are predicted to be likely due to human-assisted movement of yellow crazy ants*

Tracing the potential spread of yellow crazy ants formed a significant part of the work in the later part of FY 22-23 due to the detection of TA45 Green Hill and the detection and ongoing delimitation of TA46 Goldsborough.

#### **Green Hill**

TA45 Green Hill is a small site, with few (6) landholders affected by the infestation. However, various activities currently conducted at the Green Hill site pose a risk of potentially spreading ants. This made management of spread risk a top priority at this site, in addition to the customary tracing investigation conducted at all newly discovered infestations.

First, several sugar cane farms are situated adjacent to the infestation area, and yellow crazy ants were detected in one of the sugar cane paddocks during delimitation surveys, presenting a risk of spread through sugar cane harvesting machinery. Operations teams traced the relevant harvester used in this paddock and subsequently performed targeted surveys in all paddocks that this harvester had been in previously and subsequently. Fortunately, no further spread was detected. Furthermore, there was no sign of ants in the areas the harvester had previously occupied, indicating that other paddocks were not the infestation's source.

Another factor complicating tracing this infestation was the presence of communications towers on top of the hill. These towers are serviced by several contractors and used by multiple companies. After enquiring with operators Australia-wide, the Operations team determined which company was responsible for maintenance of the towers. Following successful conversations with the local area manager, the company has now added strict instructions on their contractor database. The instructions mandate that contractors contact the Authority prior to entering the site and receive the latest spread prevention protocols.

One of the six landholders in the TA45 Green Hill infestation area operates a revegetation business, responsible for supplying and planting trees and shrubs to the Edmonton to Gordonvale Road Project (E2G). The business owner informed the Operations team that this business has been using plants from a holding nursery that is located inside the infestation area. Yellow crazy ants were detected in the nursery during delimitation surveys. The business owner also informed the Operations team that this nursery had only been in operation for six months at the time of delimitation. The Operations team obtained detailed planting records from the company and surveyed all the planted areas in the E2G project. No yellow crazy ants were detected. To manage spread risk, the business owner informed E2G management of the potential risk of spread so E2G management could add this information to their existing suite of biosecurity measures at the site. Additionally, to allow the business to continue operations, the Authority provided advice on treatment of the existing plant stock in the nursery prior to it being planted out. The Authority's staff and the business' staff worked together to treat the plant stock, using *Biosecurity Queensland*-approved protocols for treatment of a similar pest species, fire ants, in plant stock.

The revegetation company at TA45 Green Hill also has links with the Townsville region, where the company owns a property that propagates the plants used in the Cairns region. To ensure that yellow crazy ants had not been spread to and from this property, the Authority sent its odour detection dog teams to Townsville to inspect the property. During this surveillance, no yellow crazy ants were detected.

Finally, during delimitation surveys, field crews reported that the roadside at Green Hill, in which yellow crazy ants were active, had recently been slashed. Authority staff contacted Council and were informed that they use a local contractor to manage the



roadsides at that location. Operational staff contacted the relevant contractor, provided infestation information, and obtained slashing records to ascertain where the operator had worked after slashing the roadside at TA45. Fortunately, this operator adheres to strict equipment washdown processes as per their Council contract, and no further spread has been detected due to the slashing activities.

### ***Goldsborough***

Since the discovery of TA46 Goldsborough, the Authority has conducted significant tracing activities in this area. A complex land-use history contributes to the difficulty of tracing yellow crazy ant spread in the Goldsborough Valley.

After the initial report of yellow crazy ants at a newly built suburb in Goldsborough, the Authority discovered a further 13 infestation areas, some of which adjoin each other after the Treatment Area buffer is applied. Due to the extensive distribution of infestation areas through residential properties and properties under development, spread from these infestation areas presented a significant risk. Operational staff moved quickly to contact landholders in the area and gather information. All the currently known infestation areas in the Goldsborough cluster are located either in sugar cane farms or in areas that were sugar cane farms previously.

During investigations into the source of the infestations, Authority staff discovered that machinery movement had occurred between the infestation areas. Machinery movement was thus identified as the main mode of spread. Every relevant farmer in the Goldsborough area was then informed of the presence and significance of yellow crazy ants, and the Authority provided information regarding machinery washdown and spread prevention protocols. (Furthermore, a storage shed where a local slasher was stored received a spray insecticide application, reducing the risk of further spread.) Once this baseline level of community awareness was established, the Authority began tracing other potential high-risk sites in the area, based on information obtained from machinery operators.

As investigations and targeted surveys in high-risk areas continued, it was discovered that yellow crazy ants were present at some of the local residential development sites. In response, Authority staff met with the developers in the area, who indicated that they used local slasher operators to maintain their sites in Goldsborough. During this meeting, Authority staff expressed their concern about ants found in an on-site storage area. The developers requested information and best practice in how to deal with the ants, as they were in the process of moving this on-site storage to another development in the Redlynch Valley area. Authority staff instructed the developer to burn any old, disused timber from pallets and crates on site. The developer was further instructed to place all other equipment, machinery, and material that was to be moved offsite onto a firm pad. Authority staff then treated this material with an insecticide spray prior to transport. In the weeks following transfer of the storage to the Redlynch Valley development, the development site in Redlynch Valley was surveyed by the odour detection dog teams. No further spread of yellow crazy ants was detected due to this activity.

Two of the sites in Goldsborough are in a residential development area where new houses were being built. This link led to three construction companies who are also active in other parts of Cairns. Staff obtained details of all relevant related properties from the construction companies, and these properties are currently scheduled for surveillance by the odour detection dog teams.

After meeting with the Mulgrave Mill Cane Supply Field Officer, Authority staff identified other farms in the region that were linked with the infested farms in the Goldsborough Valley. These consisted of other farms in the Cairns area either owned by the same farmers or otherwise connected to the Goldsborough cluster via harvester movements or other machinery movements. Targeted surveys were accordingly conducted in cane near the mouth of the Mulgrave/Russell River, upstream along the Mulgrave River, and along Pine Creek Road (towards Yarrabah). Fortunately, no further yellow crazy ants were discovered during these targeted surveys.

Authority staff then contacted various smaller earthmoving businesses and lawn mowing companies operating in the Goldsborough area and obtained information about their activities. Authority staff provided business owners with an overview of the situation along with machinery washdown and spread prevention information.

The situation in Goldsborough continues to develop as surveys continue and more data become available. Additional areas that are currently listed to be surveyed as part of ongoing tracing activities include Orchid Valley, which is located west of Goldsborough Valley. Further tracing will be required to ensure that all potential vectors of spread have been investigated and followed up.

## Strategy 4: Prevent further spread of yellow crazy ants

### 4.1 Work with industry to prevent yellow crazy ant movement

#### Actions:

- *Work with the sugar industry to implement machinery movement and harvesting protocols*
- *Promote collaboration with industries such as housing developers, quarries, agriculture, and turf farms to prevent yellow crazy ant spread from infested sites*

#### Measuring success:

- *Documentation of cane machinery movement protocols and evidence that protocols have been adhered to (harvester movement records and mapping)*
- *Evidence of partnerships and collaboration and evidence of training activities*

### *The sugar industry*

*Refer 3.1 above for work completed with the sugar industry to trace potential spread.*

Monitoring of cane harvester movement this year was interrupted following the resignation of our Sugar Industry Engagement Officer. This position remained vacant for the remainder of the year due to the difficulty in finding a suitably skilled replacement with relevant experience. A new Sugar Industry Engagement Officer commenced in August 2023.

Before leaving, the Authority's former Sugar Industry Engagement Officer led numerous consultations and meetings with harvester operators and farmers to discuss the agreed risk mitigation protocols. The existing machinery movement protocols stipulate that operators harvest 'clean' areas before harvesting areas within a yellow crazy ant infestation, and that after harvesting within an infestation area, it is mandatory to clean down machinery before moving on. In collaboration with MSF Sugar, the Authority's updated data is combined with MSF farm harvest mapping data and provides the results to all harvesters and farmers prior to commencement of the harvest season in June. These easy-to-follow protocols and maps are known as the 'traffic light system', and green, amber and red zones are clearly marked to simplify compliance.

The 'traffic light system' map visually classifies cane farms within proximity to yellow crazy ant Treatment Areas based upon their risk of yellow crazy ant infestation and spread. The red zone indicates areas where yellow crazy ants have been detected in the last two survey rounds. The amber zone displays the areas of potential spread of yellow crazy ants from the areas of known infestation, based on the direction of harvester movement on and off the farm. The green zone indicates areas where no yellow crazy ants have been detected.

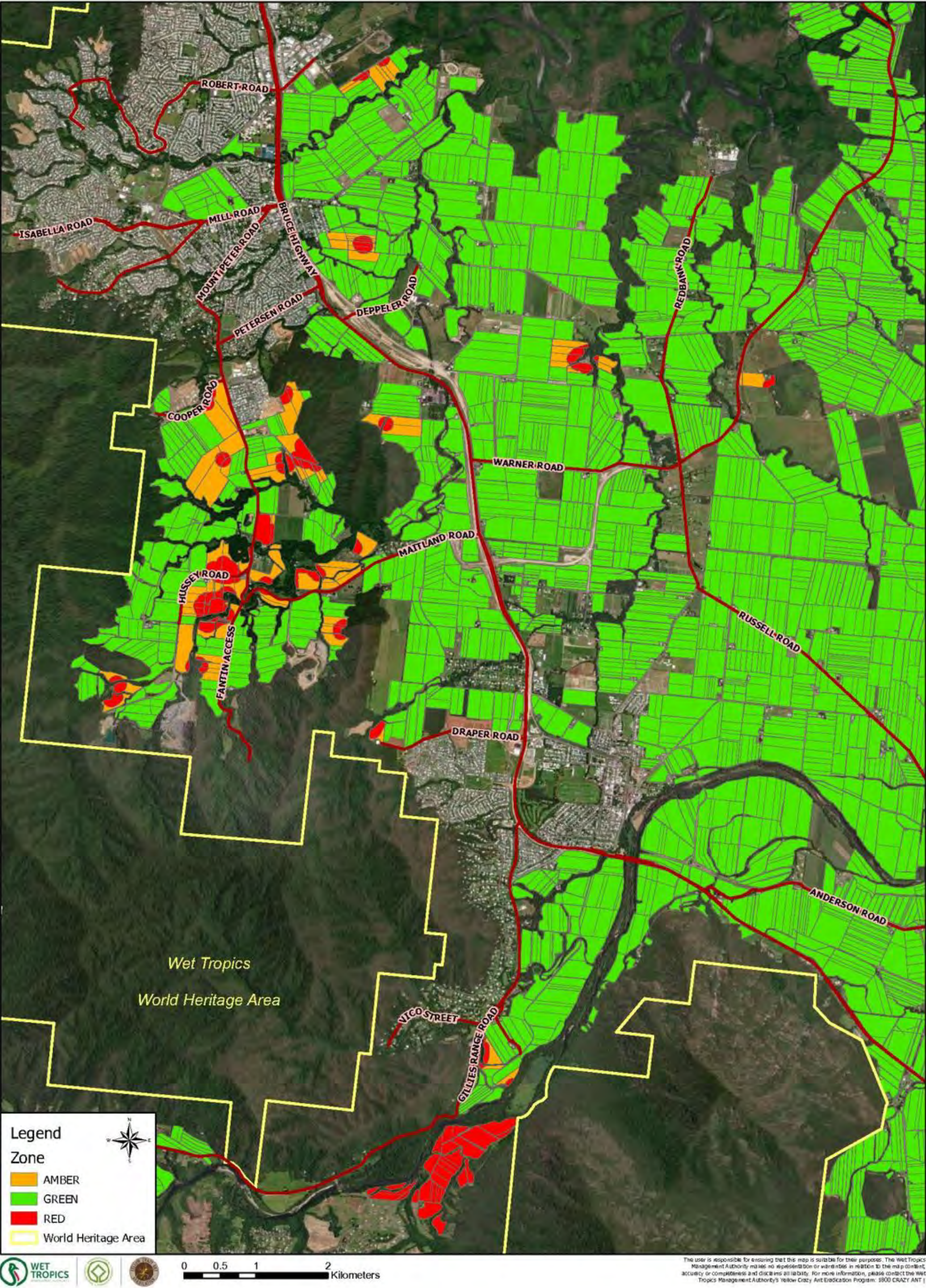
The 'traffic light system' mapping for the 2022 harvest season was completed by the beginning of this reporting period. Maps were circulated to harvester contractors in May 2022 and implemented for the duration of the harvest, between June and December 2022. The Authority's GIS team led the process this year. It is important to note that TA46 Goldsborough was still being delimited at the conclusion of the reporting period in June 2023. In light of the substantial unknowns, the Authority took a risk-based approach on advice from MSF Sugar and classed all sugarcane farms in the area 'red' to indicate their high risk of infestation. This decision has mitigated the risk of spread during this year's harvest (refer **Map 16** below). The final delimitation data at Goldsborough will inform future traffic light system and enable the Authority to present a more accurate map in the FY24 report).

The Authority conducted a Toolbox Talk on yellow crazy ant identification at Sugar Research Australia in July 2022.

**Map 17** shows the area of sugar cane within yellow crazy ant Treatment Areas as of June 30, 2023. Sugar cane represents 751ha (30%) of the total area under management.



Yellow crazy ant Traffic Light System for cane harvester movement, 2023



Map 16 Traffic Light System map with FY23 survey data for the 2023 harvest season



This map displays the Wet Tropics World Heritage Area, outlined in green. The area is characterized by a mix of forested land and agricultural fields. Numerous roads are shown, including Robert Road, Mill Road, Mount Peter Road, Petersen Road, Bruce Highway, Warner Road, Mattland Road, Draper Road, Anderson Road, and Bruce Highway. The map highlights areas of sugarcane (yellow) and eradicated areas (green). The YCA Treatment Area Boundary is indicated by a black outline. A legend in the top right corner defines the symbols: yellow for Sugarcane, green for Eradicated, green outline for World Heritage Area, and black outline for YCA Treatment Area Boundary. A scale bar at the bottom indicates distances from 0 to 2.5 Kilometers. A north arrow is located in the top right corner.



### *Collaboration with other industries*

Industry engagement (separate to the cane industry) increased further between 1 July 2022 and 30 June 2023. Many new industry connections were established, including those listed below.

#### Housing development and associated industries:

- consultation and surveys with housing developers, including Ashlee Homes, to progress tracing potential yellow crazy ant spread from infestations in TA46 Goldsborough (refer **3.1**, above). This work included canine team surveys at other construction sites connected with Ashlee Homes in areas around Cairns.
- Industry engagement regarding best practices to reduce risk of yellow crazy ant spread from construction activities in Goldsborough was conducted with housing construction company HPS Contractors
- provided advice to Placid Pools regarding soil movement from TA10 Bayview Heights (this engagement followed the Authority's Toolbox Talk presented to Placid Pools staff in FY22)
- provided detailed information on biosecurity measures and protocols for reducing the risk of yellow crazy ant spread through soil movement at a Gordonvale building project to infrastructure consulting firm AECOM Australia
- provided information to, and performed survey and treatment work at, Holcim Concrete in Gordonvale

#### Other infrastructure projects:

- continued collaboration with the Edmonton to Gordonvale (E2G) southern access corridor project. This major infrastructure project has required earthworks within and near infestation areas. Ongoing collaboration has involved representatives of E2G attending Reference Group meetings, toolbox presentations by the Authority to E2G staff, and a material movement agreement that sees high-risk soil being stored on-site to reduce the risk of yellow crazy ant spread.

#### Nurseries and other raw material suppliers:

- in addition to staffing community engagement booths at Bunnings events, the Authority continued periodic collaborative events with Biosecurity Queensland's National Electric Ant Eradication Program staff at two Bunnings locations in Cairns
- the Authority continued regular canine surveys at Limberlost Nursery
- the Authority provided advice and assistance to Revegetation Contractors, working with the business's staff to treat nursery plant stock before delivery of these plants to the E2G project
- the Authority surveyed turf farms Harden Park Lawns and Tropical Lawns, which are adjacent to infestation areas
- field staff were inducted at Pioneer North Queensland (PNQ) and Zappala Quarries prior to undertaking surveillance operations in these areas. This resulted in the detection of two persistent sites that were treated promptly and brought to the attention of quarry staff so that biosecurity protocols could be adhered to
- the Authority surveyed Northside Raw Materials & Timber Supplies/Northside Landscape Supplies and provided information to staff regarding yellow crazy ant spread risk controls

#### Service providers:

- North Queensland Land Management Services were used to clear and maintain vegetation on persistent sites in Kuranda
- the Authority engaged the services of North Queensland Vegetation Management to complete slashing in inaccessible areas, enabling lured survey work to be completed
- delivered an Industry Toolbox Talk to staff of Wilkins Family Services slashing company
- worked with Telstra to implement risk reduction protocols for contractors servicing the towers within TA45 Green Hill
- worked with Queensland Rail to organise access for odour detection dog team surveys along Rail network in Gordonvale

#### Waste management and disposal:

- the Authority removed yellow crazy ant habitat that harboured persistent sites at TA3 Plantation Road and TA38 Wiseman West. This vegetation was treated and disposed of at the appropriate disposal site (Cairns transfer station)
- the Authority provided information and conducted surveys on the premises of Enviroland Waste Management Services

#### Transportation and storage:

- The Authority used the odour detection dogs to survey the Toll and PNQ Pioneer North Queensland depot facilities

#### Other industry:

- a complete lured survey of an operating chicken farm was completed in Edmonton



## 4.2 Raise community awareness of yellow crazy ants to assist in finding new infestations and to support community to prevent further spread

### Actions

- *Raise community awareness of how to identify, report, and prevent spread of yellow crazy ants through events, brochures, media, presentations, and other activities*
- *Work with partners to promote behaviour change regarding illegal dumping and movement of high-risk material (soil, vegetation, pot plants, green waste, etc.)*
- *Support community groups and other volunteers to work with local landholders to raise awareness and promote property management plans*
- *Ask landholders, particularly in more recent infestation areas, to request inspections before moving materials such as garden waste, soil, or pot plants*
- *Raise community awareness of World Heritage values and the impacts of yellow crazy ants to promote behaviour change and prevent the risk of further infestation movement into the World Heritage Area*
- *Train and liaise with partner agencies to identify any additional infestations and undertake surveys*

### Measuring success:

- *Number of community awareness raising events, volunteers and people participating*
- *Evidence of awareness raising materials*
- *Number of social media posts and people reached*
- *Number of community reports and requests for yellow crazy ant ID and inspection*

### Community awareness raising

In 2022-2023 the Authority organised or attended numerous community awareness raising activities. The main events (and attendance) are summarised below:

- NAIDOC (160 engagements)
- Carnival on Collins (160 engagements)
- Cairns Botanic Gardens Christmas plant sale (140 engagements)
- Cairns Botanic Gardens Easter plant sale (27 engagements)
- Rotary FNQ Field Days – Mareeba (300 engagements)
- Cairns Canine Carnival (50 engagements)
- RSPCA Million Paws Walk (30 engagements)
- Festival of the Knob – Yorkeys Knob (185 engagements)
- Tinaroo Falls Dam Open Day – Tinaroo (32 engagements)
- Cairns Ecofiesta (~700 engagements)
- Cairns Canine Carnival (50 engagements)

As part of the Cairns Ecofiesta community event in June, the Authority repeated its popular tree giveaway, distributing 500 native plants with custom tags to local residents. The plant tags conveyed that the plants had been inspected and declared free of yellow crazy ants, highlighting the Authority's message that all residents need to be vigilant in preventing spread of ants via the plant trade. The tags prominently displayed the Authority's contact information along with a request to report any suspect ants. During the Cairns Botanical Gardens plant sales at Christmas and Easter, all plants for sale were inspected by the odour detection dog teams and again, these plants were identified as "Inspected and Passed by the Yellow Crazy Ant Eradication Program" via custom tags.

### Engagement (infestation areas)

The Authority directly communicated with stakeholders via a range of methods, including:

- 1 roadside stall at Goldsborough (52 engagements)
- 7 shopping centre displays (360 engagements)
- 9 industry toolbox talks



- letterbox drops to:
  - TA46 Goldsborough residents (new infestation, aerial treatment, and general treatment notices – June)
  - TA45 Green Hill residents (new infestation, survey notice and treatment notices – May)
  - TA33 Vico Street residents (aerial treatment notice – March, April)
  - TA1 Bentley Park residents (survey notice)
  - TA43 Wiseman Rd West 2 (treatment notice – April)
  - Mount Peter Estate (outside of Treatment Area) (survey notice – April)
  - TA41 Edmonton (aerial treatment notice – March)

## **Media**

During the 2022-2023 reporting period, the Authority's Eradication Program featured in numerous media stories, e-newsletters, news and interest articles, radio advertising, and interviews. Major stories and newsletters included:

- a media release advising of the TA33 Vico street infestation was picked up by local TV, radio and social media
- March media release advising of the Goldsborough infestation was picked up by multiple print publications (including national)
- radio interviews:
  - August 2022 – interview regarding the TA33 Vico street infestation (ABC Far North)
  - August 2022 – interview discussing General yellow crazy ant issues, the TA33 Vico street infestation, and Aboriginal team members working on country (Black Star Radio network)
  - April 2023 – (4KZ)
  - June 2023 – interview discussing the TA46 Goldsborough infestation (ABC Far North)
- odour detection dog teams featured in many community engagement events and presentations including:
  - a funding announcement with ALP Senator Nita Green
  - a media event with Federal Minister for the Environment and Water, the Hon. Tanya Plibersek MP
- 2 articles the Australian Canegrower magazine
- 2 articles in the Pyramid views community magazines

## **Social Media**

The Authority continued to engage with the community through social media, making 155 posts which were viewed by 55,400 people. This is an increase in reach of 157.8% compared to the FY2021-22 reporting period. The Program's Facebook page follower count grew by 25.6% to 957 followers. During the reporting period, there were 4,448 visits to the Program's Facebook page, an increase of 59.5% from the 2021-22 total.

Paid Facebook advertisements were used strategically to alert the public about surveillance activities in Bentley Park. Paid advertisements were also used to inform Goldsborough residents of the new detections in the Goldsborough area, and to invite residents to visit the Authority's pop-up roadside stall which was set up to provide information about the infestation and the Yellow Crazy Ant Eradication Program.

## **Advertising**

The Authority continued to utilise roadside banners, which are regularly moved around 30 sites in the greater Cairns region. The dust banners are highly recognisable, with 47% of people that call in to report suspicious ants citing "dust banners" as the way they became made aware of the Yellow Crazy Ant Eradication Program. The banners are placed in prominent areas with the cooperation of local government, businesses, and private residents.

The Authority continued its bus advertising, changing the existing advertisement placement from the rear of the busses to a full side in December 2023 (see **Figure 13**, below). The bus pictured travels across the greater Cairns area, providing high-visibility reinforcement of other messaging tools.



*Figure 13 Bus advertising*

The Authority continued its advertising targeting the sugar industry through monthly advertisements in *Australian Canegrower* magazine and a full-page advertisement in the Canegrowers pocket diary.

Advertisements targeting the Gordonvale and Goldsborough area were continued in the monthly community magazine *Pyramid views*

#### *Community reporting*

Public reporting of suspicious ants is made available through the Wet Tropics Management Authority (for yellow crazy ants) and Biosecurity Queensland (for electric ants). Both programs will forward or respond to reports as appropriate. During the reporting period, 2 positive yellow crazy ant detections were made due to reports submitted by individuals outside the Program. The TA45 Green Hill infestation was reported to the Authority by a landholder who, in the previous year, had hosted one of the Authority's toolbox talks at their business. The initial detection at TA46 Goldsborough was made by Biosecurity Queensland staff responding to a yard check request from a landholder for suspected electric ants.

During the FY22-23 reporting period, the Authority modified its public reporting database to collect more detailed data about reports and enquiries. Modifications included the ability to attach photographs of suspect ants for rapid identification, expanding the Authority's capacity to assess high numbers of suspect ant reports. During the reporting period, the Eradication Program received 274 total reports, with 106 photographs submitted. Four reports were forwarded to Townsville City Council and 5 to Biosecurity Queensland. In the Cairns region, the Authority inspected 114 properties after receiving reports of suspicious ants.

#### *Schools*

The Authority continued to engage with local schools providing presentations and activities for student to raise awareness of yellow crazy ants and for high school students, awareness of potential career paths. The Authority continued to support the 'Gifted Global Green Program', providing information packs for 56 students and 16 teachers in the Cairns district.

Schools that the Authority engaged with during the reporting period included:

- St Mary's Catholic College (180 engagements)
- Whitfield State School – Science on the Oval ('SOTO') (500 engagements)
- Edge Hill State School – Science Week presentation (170 engagements)
- Kuranda District State College (73 engagements)
- Hambeldon State School (66 engagements)

#### *Products*

This year, the Authority developed a set of 11 display panels to be displayed at events. The panels are printed on solid polypropylene, providing a durable, well-presented and professional product that attaches directly to our portable display boards (see **Figure 14**).





## Research and monitoring

The Wet Tropics Management Authority works with James Cook University on a range of research projects supporting the eradication program. Projects include undertaking biodiversity assessments of terrestrial invertebrates after areas have been treated for yellow crazy ants, measuring foraging activity and foraging distances of yellow crazy ants, and calculating probability of detection for a range of survey methods.




### Facts

- New projects include developing improved surveillance methods, such as detection of yellow crazy ant eDNA (environmental DNA) in juice samples from the MSF Sugar Mulgrave Mill site and water samples from creeks and rivers.
- Captive yellow crazy ant colonies are kept for production of scent material used in ongoing training of odour-detection dogs.
- Ecological function assessments are conducted to assess the impact of yellow crazy ants and the Authority's treatment regime on invertebrate communities.

WET TROPICS  
Queensland Government  
Australian Government



## What are yellow crazy ants?

Yellow crazy ants (*Anoplolepis gracilipes*) are an introduced invasive species. Believed to originate in Southeast Asia, they are now found throughout the world and are notorious for their negative impacts on ecosystems. The 'crazy' moniker comes from their frenetic movements when disturbed.





### Facts

- They do not bite or sting, but spray formic acid from their abdomen.
- They are one of the world's worst invasive species, posing a threat to the Wet Tropics environment, local agriculture, and our tropical lifestyle.
- They communicate by smell, using pheromones and other chemicals which are detected by their sensitive antennae.

WET TROPICS  
Queensland Government  
Australian Government



## How you can help eradicate yellow crazy ants

Yellow crazy ants are easily spread by human-assisted movement. Ants can be transported through the removal of soil, mulch, plants, green waste, or other materials from infestation areas. Other common movement pathways include pot plant trading, movement of machinery, vehicles and trailers, and illegal dumping.

For information on identifying yellow crazy ants, visit [wettropics.gov.au/yellow-crazy-ants](http://wettropics.gov.au/yellow-crazy-ants)



If you suspect you have seen yellow crazy ants, please contact the Wet Tropics Management Authority for a free inspection.

Phone: (07) 4241 0525  
Email: [yca@wtma.qld.gov.au](mailto:yca@wtma.qld.gov.au)

Look  
Identify  
Report

WET TROPICS  
Queensland Government  
Australian Government



## A targeted approach

To eradicate yellow crazy ants, the Wet Tropics Management Authority conducts carefully scheduled and targeted treatment rounds, during which insecticide bait is dispersed over areas with yellow crazy ant infestations. Treatment is conducted over a total of 5 or 6 rounds. A maximum of 3 rounds of treatment are applied per year, no less than 3 months apart. All treatment activities follow strict conditions set out by the Australian Pesticides and Veterinary Medicines Authority.





### Facts

- The insecticide bait used has a very low dose of active ingredient and is non-toxic to household pets.
- The bait is designed to attract yellow crazy ant workers so it is taken back to the nest to kill the queens.
- The active ingredient in the bait is the same active ingredient featured in many topical tick and flea treatments used on cats and dogs.

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Australian Government

Figure 14 Examples of display panels



### **Activities by the Yellow Crazy Ant Community Taskforce**

The Kuranda Yellow Crazy Ant Community Taskforce (the Community Taskforce) is a volunteer group of environmentally concerned residents who initially joined together to combat the threat of yellow crazy ants in an infestation area in Kuranda. Under the not-for-profit community group Kuranda Envirocare, the Taskforce has assisted with surveys, monitoring and treatment activities in the past, as well as raising community awareness. Now, the Taskforce contributes to the Wet Tropics Management Authority's Yellow Crazy Ant Eradication Program by raising awareness at events and schools and by carrying out surveillance activities in endangered species habitat. The Taskforce operates under a shared Coordinator role through a Grant arrangement with the Authority. The Coordinators (refer **Figure 15**) facilitate activities and manage volunteer participation.

During the FY22-23 reporting period, the Community Taskforce worked with the Authority to improve overall awareness of, and recognition of, yellow crazy ants in the Kuranda and wider community.

In March 2022, the Community Taskforce delivered an Invasive Ant Identification Workshop at the Kuranda Recreation Centre to build capacity among the local community. Attendees learned how to recognise and report yellow crazy ants and electric ants, why these invasive ants are significant, and how to mitigate the risk of spreading invasive ants. The Authority's staff and staff from Biosecurity Queensland's National Electric Ant Eradication Program collaborated with the Community Taskforce to deliver this workshop. The workshop was attended by 16 members of the public, and a media release was produced for the event.

In November 2022, the Community Taskforce renewed the existing Department of Transport and Main Roads permit for placement of the Authority's yellow crazy ant awareness banners on two road corridors in the Kuranda region (Black Mountain Road and Myola Road).

The Community Taskforce shared displays with the Authority at three events: Cairns Ecofiesta, the Rotary FNQ Field Days, and Carnival on Collins. The Taskforce recorded approximately 1,140 total engagements over these three events.

The endemic and critically endangered Kuranda tree frog (*Litoria myola*) is found in (in addition to other habitat) 3 creeks which intersect with known yellow crazy ant infestations. Furthermore, 3 more creeks with documented *L. myola* presence intersect with electric ant infestation areas. Therefore, surveying for both yellow crazy ants and electric ants in partnership supports the protection of this frog species. During the reporting period, the Community Taskforce facilitated 9 luring surveys in Kuranda Tree Frog (*Litoria myola*) habitat. These Kuranda Tree Frog habitat surveys, or 'KTF surveys', involved luring for electric ants and yellow crazy ants.

31 volunteers, of which 17 were new volunteers, participated in the KTF surveys, and five Biosecurity Queensland staff and 3 Authority staff also assisted with these activities (refer **Figure 16**). No invasive ants were detected during these surveys. The Community Taskforce engaged with 31 residents outside of known infestation areas to gain property access permissions to conduct the KTF surveys, in addition to engaging with 73 residents inside the Kuranda infestation areas to support the Authority in survey and treatment activities.

The Djabugay Bulmba Rangers invited the Community Taskforce to engage with Kuranda District State College students studying their Certificate II in Conservation & Ecosystem Management. The Community Taskforce collaborated with Biosecurity Queensland and the Authority to deliver an Invasive Ant Workshop in the classroom, followed by a survey activity in Speewah. The Community Taskforce continues its valued partnership with the Kuranda region's Traditional Owners through a creek naming project that is still ongoing and will be reported on in the coming reporting period.

Biosecurity Queensland staff joined the Community Taskforce at events, such as the Kuranda Spring Fair and Cairns & Hinterland Steiner School Spring Fair. Biosecurity Queensland supported four Taskforce KTF surveys through the attendance of five staff. The Taskforce displayed live electric ants, along with live yellow crazy ants, at the Cairns Volunteer Expo (VEXPO), the Cairns & Hinterland Steiner School Spring Fair, a toolbox talk at Speewah Gardens nursery, and a display at the Kuranda IGA.

The Taskforce Coordinators drafted and published monthly e-bulletins on the Taskforce Facebook page and monthly newspaper columns in the Kuranda Paper, and 158 social media articles were posted on Facebook and viewed by 24,615 people. More details are provided in the Tabled Report.





*Figure 15 Taskforce Coordinator Sylvia Conway, volunteer Tim Brown and Coordinator Ciara Bridgland*



*Figure 16 Taskforce Coordinator Sylvia Conway, Authority staff Lukasz Podgorski and Adam Mason-Smith, and Taskforce volunteers Paul Devine and Ellin Christie during the Owen Creek KTF survey in September 2022.*

## Strategy 5: Enhance program capability and expertise

### 5.1 Research, innovate and monitor to promote adaptive management and measure progress

#### Actions

- Calculate the probability of detection for survey techniques using analysis of existing and ongoing Eradication Program survey data
- Undertake biodiversity assessments of terrestrial invertebrates in treatment areas following yellow crazy ant infestation and subsequent treatment
- Investigate variation in ecological processes in historical treatment areas following yellow crazy ant infestation and subsequent treatment
- Calculate the probability of yellow crazy ant detection associated with detector dog searches
- Determine the feasibility and reliability of using eDNA for yellow crazy ant detection in cane

#### Measuring success:

- Monitoring and research report on analysis of survey technique effectiveness
- Research report of results of ecological recovery monitoring
- Design experiments to measure variation in ecological processes
- Results of tests and monitoring of odour detection dog's effectiveness and efficiency
- Research report on results of eDNA experiments on sugar cane juice samples
- Research publications

Prior to June 2022, the Wet Tropics Management Authority negotiated a *Deed of Extension and Variation* of its contract with James Cook University to continue research between 1 July 2023 and 30 June 2025, with work under the updated contract commencing 1/07/2023. The work during the FY22-23 reporting period included ongoing biodiversity assessments to evaluate ecological recovery of terrestrial invertebrate communities after invasion and treatment of yellow crazy ants, continuing to refine probability of detection and probability of true absence of yellow crazy ants at some Treatment Areas, sampling eDNA from sugarcane juice, and maintaining captive colonies of yellow crazy ants for study, and associated support activities.

The new contract also included an additional task: investigation of potential variation in ecological processes between yellow crazy ant-invaded (and subsequently treated) sites and historically uninvaded sites over the duration of the Detection to Eradication process. The research question is being addressed through three related experiments, which will measure rates of leaf litter decomposition, timber decomposition, and invertebrate carrion scavenging. The work will be conducted mainly at the established terrestrial invertebrate study sites.

#### *James Cook University*

Up to June 30, 2023, James Cook University's research contract focused on undertaking a variety of research projects. The main outcomes of the University's June 2023 report on contract deliverables were:

- James Cook University collaborated with the Authority's GIS staff to continue refining the procedures to generate *cumulative probability of absence* maps (refer 2.1 above). Initial probability of absence mapping at TA11 Veronese's was based upon the Program's minimum documented probability of detection values alone (14%, doubled to 28% in the wet season), and yielded a site-wide confidence in absence of less than 95% even after seven lured surveys. The probability of absence map for TA11 Veronese's was then updated with 2023 survey data and refinements to the probability of detection value for odour detection dog surveys. An additional parameter for probability of absence models, *probability of persistence*, which is based upon variations in habitat suitability within Treatment Areas, was also incorporated. The current model has yielded a confidence in absence between 90% and 95% for most of the Treatment Area. This outcome supported the Authority's decision to declare eradication at TA11 Veronese's in June 2023.
- at most dry forest and rainforest sites, ant communities at sites previously infested by yellow crazy ants have a similar total species richness to that of control sites and buffer sites. The result indicates that some measure of ecological community recovery is occurring at sites after yellow crazy ants are removed through treatment.
- at the end of the contract period, James Cook University was maintaining 23 yellow crazy ant colonies. One colony was maintained as a reserve for canine training aid production, and the other 22 were maintained for experimental purposes and to support probability of detection and environmental DNA (eDNA) work. James Cook University also reviewed the



Authority's emergency procedures and renewed its commitment to house the Authority's captive colonies in the event of a natural disaster compromising the Authority's secure facility.

- work to calculate the probability of detection associated with canine searches continued during the reporting period. Experimental methodology reflected the research question of whether dogs can detect very low numbers (between 5 and 10 individuals) of stationary, non-foraging ants, which would not be detectable by other survey methods. Further work will be required over the next reporting period to refine the experimental design and elucidate the influence of environmental factors, such as habitat or weather conditions, on canine probability of detection before canine probability of detection values can be conclusively determined.
- James Cook University revisited past (FY21) experimental work around detection of yellow crazy ant environmental DNA (eDNA) in samples of sugarcane juice sediment post-processing. Past samples from yellow crazy ant-infested paddocks still did not test positive for yellow crazy ant eDNA despite dilution and repeated testing. Review and modification of the sugar cane sampling protocol is underway.
- in response to failures to detect yellow crazy ant eDNA in samples from experimentally spiked (deliberately contaminated with yellow crazy ant DNA) paddocks during FY21, James Cook University has updated the protocol for cane spiking and is preparing supplies to conduct another round of experimental spiking as per the procedures.
- James Cook University continued a DAFF-funded project investigating detection of yellow crazy ant eDNA from waterways after rain events. This work has resulted in the publication of the first ever scientific study demonstrating the detection of a terrestrial invertebrate through eDNA collected from waterways. The article is available at <https://neobiota.pensoft.net/article/98898/>.
- James Cook University continued to collaborate with and advise the Authority via program meetings (six-weekly Work Programming meetings, six-monthly Reference Group meetings, occasional additional meetings, and incidental communications) and deliver periodic reports and advice on the outcomes of the research and monitoring components of the Eradication Program.

The James Cook University Reports are available upon request.

### **Monitoring Team**

The Authority's monitoring team continued its field research and monitoring tasks, including ongoing collaboration with James Cook University on research contract deliverables. Activities during the 2022-2023 reporting period included:

- captive colony maintenance for detector dog training aid production. During the reporting period, 411 fabric, 627 paperbark, 275 wooden (sticks), and 2451 makeup pad training aids were produced using the colonies contained at this facility. The Monitoring Team researched and developed protocol to collect, process and use a new botanical product (sticks), and this product is so successful it has been adopted as the training aid of choice. (Refer **2.1** above).
- yellow crazy ant colony collection. At the end of the financial year, the monitoring team was maintaining 26 colonies for odour production and one additional reserve colony.
- the Field Coordinator – Scientific, applied for a renewal of the Authority's permit PRID000618 to keep live yellow crazy ants in July 2023.
- 3 rounds of terrestrial invertebrate surveys with James Cook University, including pitfall trap setup and collection, leaf litter collection, and direct sampling of terrestrial invertebrates.
- established 9 new monitoring sites at TA44 Blackwells 2, allowing for the collection of pre-treatment baseline data. These sites are now incorporated into the dry forest terrestrial invertebrate survey site list after removal of three other sites at TA7 Draper Road. This brings the total number of dry forest sites to 18.
- established 8 new ecological processes monitoring sites in and around TA4/5 Sawmill Pocket boulder fields in response to loss of 9 rainforest terrestrial invertebrate survey sites after spot treatment in November 2022. Initiated the ecological processes experiments and performed the first 2 rounds of data collection and sample processing for the leaf litter decomposition and scavenging experiments.
- assisted with eDNA trials by spiking (contaminating with a standard quantity of yellow crazy ant DNA) cane paddocks and sampling sediment from the MSF Sugar Mill for eDNA trials.
- assisted James Cook University with sample collection to progress DAFF-funded project investigating detection of yellow crazy ant eDNA from waterways after rain events.
- collaborated with James Cook University on a project using genetics and bioinformatics to test relatedness of yellow crazy ant infestations. This developing project utilises the Authority's collection of yellow crazy ant DNA samples and takes advantage of improvements in high-throughput genetic sequencing technology.
- sticky trap deployment at odour detection dog indication sites.

- site assessments at newly discovered infestations (refer **1.1** above) to describe and document habitat and investigate the likely source or sources of infestation.
- second trial to evaluate the performance of a UAV for *AntOff* bait dispersal (refer **2.3** above).
- researched Australian organic certification standards; researched and compiled a list of organic treatment options to eliminate yellow crazy ants, their context and use cases, their cost, and their likelihood of success.
- researched and wrote a response to the Fipronil reconsideration – residues and trade, Gazette No. APVMA 20, 4 October 2022, regarding the Authority’s use of fipronil-containing products to control yellow crazy ants.
- new staff inductions: teaching staff about field survey procedures and about the identification, habitat and ecological significance of yellow crazy ants.
- responding to enquiries from the public regarding suspected yellow crazy ants (refer **4.2** above).
- community engagement events, including Cairns Ecofiesta, Carnival on Collins, and the Mareeba Rotary FNQ Field Days (refer **4.2** above).
- community engagement presentations and field days at schools, including Whitfield State School’s *Science on the Oval*, a lecture and field day at St Mary’s Catholic College, and lectures to Environmental Management students from the University of Queensland.
- processing of 929 samples from surveys and call outs (782 samples collected from field teams’ regular survey work and callouts, plus 147 photo enquiries).
- continued to monitor emerging science and curate the Authority’s extensive reference library of over 800 resources to inform decision-making and contribute to staff training.



## 5.2 Build partnerships and share knowledge and information

### Actions:

- Promote participation and contributions from the six-monthly Reference Group meetings (as allowed under COVID-19 restrictions)
- Collaborate with partners to improve community engagement and participation
- Share knowledge and information with Traditional Owner groups
- Enhance partnerships with decision-makers, stakeholders, media, and the broader community
- Share research results with other ant eradication and control programs through formal meetings and informal communications
- Report annually to the Australian and State governments
- Keep stakeholders informed about the Program's progress and activities
- Provide support and advice to nearby yellow crazy ant control programs, such as those in Townsville and Shute Harbour, to minimise the risk of further spread from those areas

### Measuring success:

- Evidence of Reference Group meetings or other communications with the Reference Group
- Evidence of information sharing and collaboration, including:
  - Presentations at industry seminars, conferences
  - Joint projects with other eradication and control programs
  - List of partnership benefits and outcomes
- Information and knowledge shared with Traditional Owner groups
- E-newsletters produced and distributed
- Annual report card produced and distributed

See **Strategy 4** above for a summary of all community awareness-raising events and products and industry partnerships.

### ***Communications and Engagement Plan***

The Authority implemented the *Communications and Engagement Plan* and trained staff in key messaging specific to target audiences prior to each community event.

### ***Reference Group***

A YCA Reference Group meeting was held in February 2023 and was attended by 22 people. The meeting was also broadcast online, enabling participation by other organisations managing yellow crazy ant infestations, such as the Whitsunday Regional Council and Townsville City Council.

### ***Information and knowledge shared with Traditional Owner groups***

The Authority maintained connections and engagement with Traditional Owner groups associated with lands in the infestation areas. Activities during the 2022-2023 reporting period included an extension of the existing contract with AbriCulture (*Gimuy Walubara Yidinji*) to engage field staff throughout the year. Indigenous Rangers also participated with the Authority at community events, including Cairns Ecofiesta and NAIDOC Day in the Park display stalls.

Between August and December 2022, the Authority collaborated with Biosecurity Queensland's National Electric Ant Eradication Program (NEAEP) to develop an outreach project delivering training to Indigenous Ranger groups in the North and Far North region whose Country sits adjacent to or within the Wet Tropics World Heritage Area. The training focused on understanding invasive ant ecology and spread risk, identifying high-risk activities and areas, and conducting invasive ant surveillance in areas of high risk. The project built capacity among target Indigenous Ranger groups to support ongoing protection across extended surveillance networks and to establish a legacy of biosecurity knowledge being imparted to successive traditional custodians and environmental managers in the region. The project was successfully delivered to 6 groups, including the Gunggandji-Mandingalbay Yidinji People Prescribed Body Corporate Rangers, Mamu Rangers, Mandubarra Rangers, Jabalbina Rangers, Giringun Rangers, and Yirriganji Rangers. Yellow crazy ant-specific training was also delivered to Queensland Parks and Wildlife & Partnerships staff and the Gudjuda Rangers in Townsville (refer **Figure 17**).

Feedback from the workshops was overwhelmingly positive.

### ***Enhance partnerships with decision-makers, stakeholders, media, and the broader community***

See 4.2, above, for a summary of the Program's media and broader community engagement.

### ***Share research information with other ant eradication and control programs through formal meetings and informal communication***

The Authority continued to contribute to the International Yellow Crazy Ant Forum (also referred to as the YCA Information Sharing Group), which is hosted by the Invasive Species Council. The Forum currently has 47 members representing six countries (the Republic of Seychelles, French Polynesia, Papua New Guinea, Aotearoa New Zealand, the United States, and Australia). The Forum is designed to facilitate sharing of knowledge and research information, so that participants may assist each other in their respective work and learn from each other's successes and failures.

### ***Inter-agency cooperation***

The Authority continued to collaborate with Biosecurity Queensland's National Electric Ant Eradication Program (NEAEP).

NEAEP staff are invited to the Authority's monthly Community Engagement Team meetings to ensure that both programs continue to deliver appropriate messaging through communication products and to coordinate attendance at events. This collaboration is critical in reducing confusion among the general public regarding the identity and purpose of the two ant eradication programs in the Cairns region. At the Mareeba Rotary Field Days event, open communication between both programs' community engagement teams ensured that on the day, the programs occupied adjacent stalls and were able to produce a shared advertisement in the field day guide (which had a distribution of 10,000 copies).

The partnership between Biosecurity Queensland and the Authority has diverse benefits for both teams. Biosecurity Queensland staff provided validation services for the most recent yellow crazy ant odour detection dog's validation and have also provided staff for recruitment panels. The initial detection of the Goldsborough infestation was made by NEAEP staff who were responding to a request for a routine electric ant yard check. Biosecurity Queensland field staff identified yellow crazy ants at the site, and promptly informed the Authority and forwarded contact details of the relevant landholder. Furthermore, the Authority's technical/GIS team have collaborated with the National Electric Ant Eradication Program to develop automated processing of GPS data and are currently working to develop electronic checklists for use in daily briefings, similar to those introduced to the Authority's Program in 2021.

The collaboration between the two ant programs also provides benefits for organisations further afield. Many staff members and contractors have worked for both programs, and contractors also often have experience with Biosecurity Queensland's National Tropical Weeds Eradication Program. Through participation in multiple programs, these individuals develop extensive field skills and experience. This results in a high-quality pool of applicants in the region, improving recruitment outcomes for field staff position not only within the eradication programs, but also within other agencies, such as the Queensland Parks and Wildlife Service and the Department of Environment and Science.

### ***E-Newsletters***

The Authority prepared and published two Yellow Crazy Ant Eradication Program e-Newsletters: one in September 2022 and a second in May 2023. These e-Newsletters received 748 views and 228 views, respectively.

### ***Annual Report and Annual Report Card***

The Authority's 'Annual Report' for FY21-FY22 to the Australian and Queensland governments was submitted and accepted. The Annual Report Card, a brief summary of the previous reporting period's key achievements and outcomes, was produced and distributed in December 2022 to 168 stakeholders.

### ***Provide support and advice to nearby yellow crazy ant infestations, such as Townsville and Shute Harbour, to minimise the risk of further spread from these infestations***

The Authority continues to support, advise, and share information with agencies working to control invasive species and yellow crazy ant infestations, both within Queensland and across other areas of the country. During the reporting period, the Authority continued to provide assistance to:

- Gold Coast City Council – advice regarding treatment and permits
- Whitsunday Regional Council – advice and assistance with treatment and surveillance
- New South Wales Department of Primary Industries (Lismore) – images for community engagement



- Townsville City Council – provided all the Authority’s current Standard Operating Procedures (SOPs) and Safe Work Practices (SWPs), all previous Annual Reports and planning documents, communications templates, and informal advice to the staff of the Townsville Yellow Crazy Ant Program. Note: outside of the reporting period, the Authority also shared a curated research library of relevant literature and other resources (in July 2023).



**Figure 17** Jared Barlow-Gray demonstrates an invasive ant survey technique to Townsville Queensland Parks and Wildlife staff and the Gudjuda Rangers at Cape Pallarenda Conservation Park in Townsville.

### 5.3 Promote staff learning and development and workplace health, safety, and wellbeing

#### Actions:

- *Promote staff learning and development and workplace health, safety, and wellbeing*
- *Ensure high standards of workplace health and safety and well-being are met*
- *Conduct cultural training for staff with Traditional Owners*

#### Measuring success:

- *Number and type of professional development and skills opportunities provided to staff*
- *Annual WHS audit detailing incidents and responses, WHS processes, documents, communications and WHS culture*
- *Number and type of cultural training opportunities provided to staff*

On the initiative of a staff member during this reporting period, the Authority developed and implemented a revised contractor engagement framework to improve both the quality of contractor staff and staff retention rates. Recognising the importance of the seasonal contractors to the Authority's Program outcomes, and the benefits of broadening the skills, knowledge and enthusiasm of these staff, the Authority reached out to environmental organisations, training centres and other environment networks to advertise Field Officer roles. This resulted in environmentally minded people applying to the Authority's service delivery provider (labour hire agency) for the available temporary Field Officer roles. When selecting the most suitable candidates from the service delivery provider, the Authority paid particular attention to diversity and inclusion within the candidate pool to ensure that its workforce continues to reflect the community that it serves.

Under this new process, approximately 40 potential applicants attended orientation sessions, at which prospective field staff learned about the Program, field officer duties, and realities of the job, between December 2022 and March 2023. This resulted in the engagement of 27 seasonal contractors before the end of March 2023. Once new staff were onboarded with the labour hire agency, the Authority provided training in all aspects of the role, including health and safety, Standard Operating Procedures, field operations, communications within the Program, and Code of Conduct training. Since the engagement of contract staff under the new process, the Authority has closely monitored staff performance. In recognition of high performance, several contractors have progressed within the ranks to become Field Supervisors, and the prospect of promotion continues to motivate staff and drive great performance.

The new engagement strategy not only provided motivated, skilled staff, but also ensured that staff with the right skills progressed within the labour hire agency. The new engagement strategy also resulted in the Authority's most productive start to a survey season on record, more than doubling the previous year's 1 December to 20 February survey point total. This unprecedented progress meant that all cane surveys inside Treatment Areas were completed by March 2023. The new engagement strategy has ensured consistently quality of work and will provide continuity of skills and knowledge into the next survey season in FY24.

#### ***Professional development and training***

Staff working on the Authority's Yellow Crazy Ant Eradication Program, including both Authority staff and contract (labour hire) staff, participated in numerous training and professional development opportunities during the year. The highlights included:

- 27 new seasonal contractors attended field staff inductions that included an overview of the Wet Tropics Management Authority and the Yellow Crazy Ant Eradication Program, vehicle inductions, procedures for communication with the public and media, Safe Work Practices, Standard Operating Procedures, Emergency Response, and PPE donning procedures
- 42 staff and contractors attended MSF sugar mill and cane rail safety inductions
- approximately 46 staff and contractors attended face-to-face Code of Conduct training
- throughout the year, staff attended first aid courses, as well as in-house WHS presentations on topics such as heat stress and machete safety
- the Authority's first odour detection dog, Fury, returned to the expert dog trainer for behaviour rehabilitation training for 3.5 months (between June and September 2022). Prior to Fury's return, Fury and her handler attended behaviour rehabilitation training in Brisbane.
- the new odour detection dog handler attended a new handler training course with odour detection dog Pretzel in November 2022
- the new odour detection dog handler attended training and skill development in Brisbane prior to taking charge of the new odour detection dog, Brodie, in March 2023



- all 4 odour detection dogs and both dog handlers attended a maintenance training week in March 2023 with the expert dog trainer in Cairns
- both dog handlers attended a canine training webinar in August 2022
- over 30 staff and contractors attended ArcGIS Field Maps and basic ArcGIS Pro training workshops presented by the Authority's GIS staff
- Authority staff completed mandatory online training as required, including Emergency Safety Training, Fraud & Corruption Awareness, Code of Conduct, Information Security, and Information Privacy Awareness
- 9 staff acted in higher duties, including in the A07 Project Manager, A06 Team Leader Operations, and A06 Team Leader Technical positions
- 10 staff were converted from temporary to permanent employment with the Department of Environment and Science
- 3 staff were converted permanently to a higher classification level
- numerous staff attended training on Wet Tropics Management Authority messaging prior to community engagement events throughout the year
- managerial and coordinator staff attended Performance Conversations training, as well as new *Public Sector Act* training focused on the Act's implications for the recruitment process
- 30 staff and contractors participated in diversity and inclusion training(s), which improved staff awareness of diversity and inclusion issues and initiatives and provided practical strategies for all staff to play a role in continuing to improve workplace culture
- staff continued to be involved in the Department of Environment and Science Diversity & Inclusion Employee Resource Group (ERG), and activities included contributing to strategic documents (such as the DES Equity & Diversity Plan and the DES Reasonable Adjustment Policy), publication of DES Communique and Intranet articles, chairing meetings, conducting interviews, providing informal feedback on ERG members' published materials, and an ongoing project to establish a department-wide LGBTQ+ employee resource network

Staff working on the Eradication Program also participated in delivering training to other organisations during the year. The highlights included:

- 8 staff from the Edmonton to Gordonvale (E2G) road infrastructure project attended training on yellow crazy ant survey methodology following the detection of TA45 Green Hill (the plant nursery located within TA45 supplies plants to the E2G project)
- 9 workshops were delivered to Indigenous Ranger groups as part of a pilot program to train indigenous rangers in invasive ant identification and survey techniques (refer 5.2, above)
- Key Performance Indicators (KPIs) were developed to support delivery and build capacity with Service Providers to deliver quality outcomes and value for money for services under contract

### ***High standards of workplace health and safety***

This year, the Authority initiated a process to audit the Eradication Program's Workplace Health and Safety practices and procedures to ensure compliance with relevant laws. The audit is primarily desktop-based that identifies shortfalls in Workplace Health and Safety practices and procedures. Overall, the Program performed well, and out of the 120 audit questions, only 7 minor questions' responses did not meet the standard as required. These points were flagged for immediate action, and by the end of June 2023 all issues have been resolved.

During this reporting period, there were 22 total incidents reported. One of these was a notifiable workplace health and safety incident (serious injury), one was a close call, and one was a hazard. Other incidents included wasp stings, tick bites, slips, trips and falls, and stings from stinging trees.

High standards of workplace health and safety were demonstrated by:

- all staff, including contractors, possess a valid First Aid Certificate, and some selected staff have completed Remote First Aid Training
- in October 2022, a thorough annual review was conducted of all Health and Safety procedures, including Standard Operating Procedures (SOP) and Safe Work Practices (SWP)
- all relevant equipment that did not have a SWP was isolated, and SWPs were developed prior to this equipment being used again in the workplace
- all staff and contractors attended workshops on equipment relevant to their duties and how to safely operate it

- all staff and contractors signed off digitally on each SWP and SOP relevant to their duties, acknowledging the content and that they understood how to use equipment safely and how to follow the correct process
- all staff and contractor training was recorded and stored on SharePoint
- several practical demonstrations were conducted throughout the year for staff and contractors, demonstrating the safe use and maintenance of machetes and of the electric drop saw
- incidents were promptly reviewed with all field staff during toolbox meetings, which raised awareness of risks and improved safety
- testing and tagging of all electrical equipment was completed as per the Australian Standard
- electrical load testing and Residual Current Device testing was completed, and all results were compliant with the Australian Standard
- WHS staff implemented improved the Authority's "Tag Out" procedure
- WHS staff implemented and reviewed the Safety Data Sheets (SDS) hard copy library, alongside a digital version
- WHS staff trialled and implemented new and improved safety gloves, in consultation with field staff and contractors, to address dexterity issues
- WHS staff trialled and implemented lighter work uniforms, in consultation with staff and contractors, to address overheating in the field
- WHS staff are currently trialling safer and more comfortable footwear options for field staff
- WHS staff continued investigating improved eye protection options, in consultation with staff, contractors, and suppliers
- contractor Workplace Health and Safety Management Systems were reviewed for compliance, and in particular, Emergency Response Procedures were assessed
- all incidents that occurred during the reporting period were dealt with using planned, responsive, and systematic management

### ***Cultural training opportunities***

Staff and contractors attended several meetings with representatives of Gimuy Walubara Yidinji throughout the reporting period, and cultural training (among other matters) was discussed. On request of the representatives, the Authority will await availability for training to be presented.

The Authority invited Gimuy Walubara Yidinji colleagues to collaborate at this year's Ecofiesta to share cultural artifacts and information about working on Country, as part of the larger display about the Yellow Crazy Ant Eradication Program and the Wet Tropics Management Authority.

Staff supported the Authority's National Reconciliation Week activities in May-June 2023. Program staff supported a lunch event with presentations by special guests and joined staff from Queensland Parks and Wildlife Service and Partnerships, Tourism and Events Queensland, Tourism Tropical North Queensland, Advance Cairns, the State Development Office and Ports North joined in on a Walk for Reconciliation.



## 5.4 Engage appropriate governance arrangements to inform and seek advice from experts, and ensure oversight to the Program

### Actions:

- *Regular meetings with WTMA Executive Director, YCA Leadership Team and Management Forum*
- *Regular briefings to the WTMA Board as required on Eradication Program*
- *Circulate Program Planning and Annual Reporting documents to DAF, and provide a brief as required.*

### Measuring success:

- *Number of Board meetings attended, and Board papers prepared*
- *Records and outcomes from YCA Leadership Team and Management Forum meetings*

To ensure appropriate governance arrangements for the Eradication Program were maintained and to facilitate appropriate oversight and advice, activities undertaken during this reporting period included:

- six-weekly Work Programming meetings, which were attended by the Yellow Crazy Ant Eradication Program Leadership Team and Operations Management Team, and by representatives of James Cook University and Credible Canines
- an Internal Governance Group meeting in November 2022, attended by the Yellow Crazy Ant Eradication Program Leadership Team and the Authority's Executive Director
- fortnightly updates to the Authority's Management Forum
- weekly meetings between the Authority's Executive Director and Yellow Crazy Ant Eradication Program's Project Manager
- quarterly presentations to the Wet Tropics Management Authority Board (details below)

The Wet Tropics Management Authority's Board of Directors met 4 times during the reporting period, and at each meeting received an update on the Yellow Crazy Ant Eradication Program. The Authority prepared a Board Paper for noting and a presentation for Board Meeting #120 in August 2022, and for Board Meeting #121 in October 2022. Following an informal review, the Authority decided that 'business as usual' updates could be included in the Executive Director report. In the absence of a Board Paper for noting, the Executive Director provided updates to Board #122 in March 2023 and Board #123 at the June 2023 meeting.

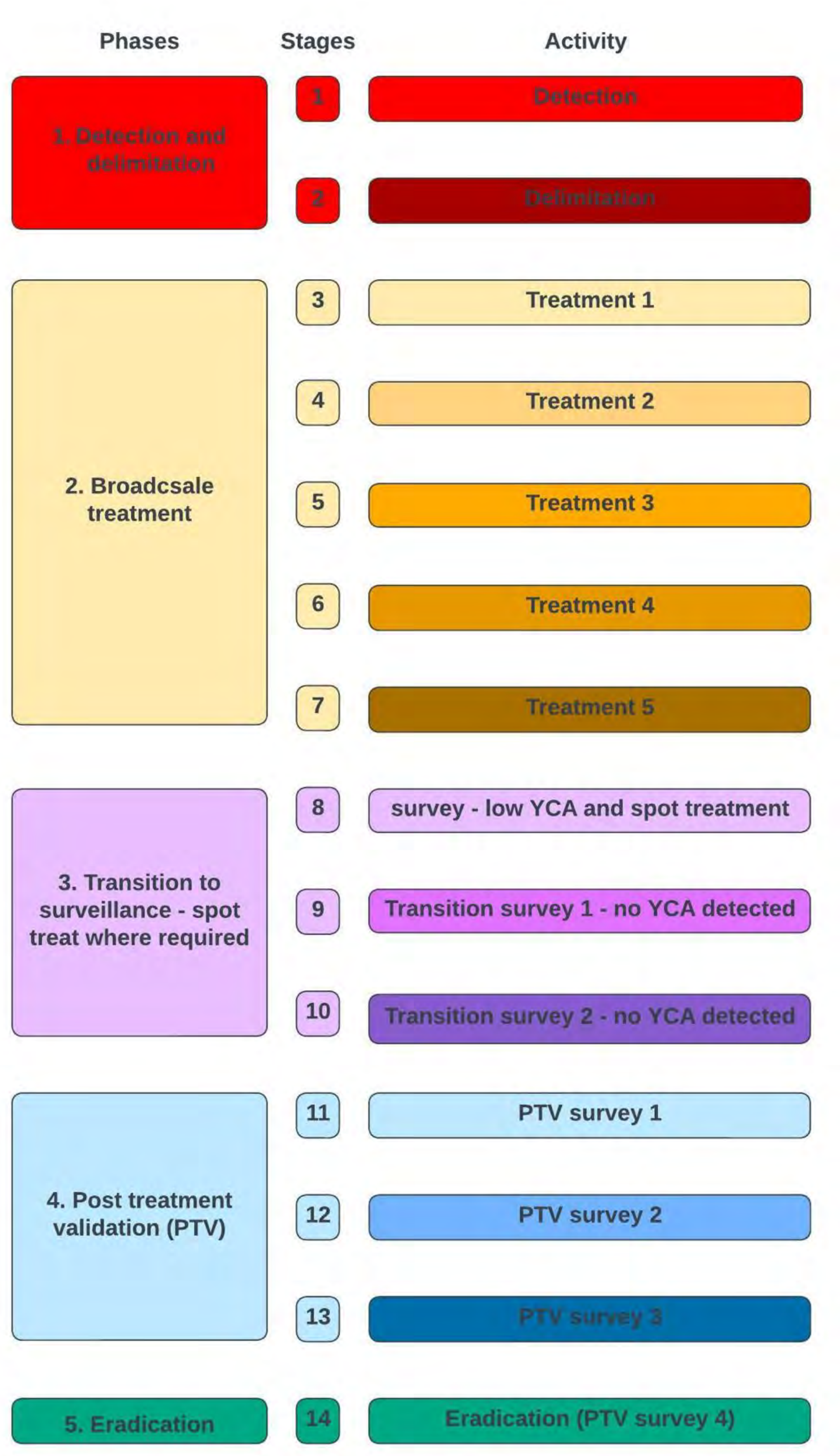
### ***Funding Agreement***

The Authority contributed to numerous ministerial correspondence during this reporting period surrounding the negotiations and drafting of the Federation Funding Agreement (Environment) for the Authority's Yellow Crazy Ant Eradication Program. As part of its commitment to funding the Authority's Eradication Program, State approval stipulated that the Department of Agriculture and Fisheries (DAF) endorse the Authority's project plan. Formal acknowledgement of DAF's endorsement was received from the DAF Director General by the DES Director General in December 2022. The documents submitted to DAF by the Authority included the *Eradication Program Four-Year Project Plan*, *FY23 Implementation Plan*, *YCA Communications and Engagement Strategy* and the high-level design plan *Detection to Eradication*.

### ***Audit***

In July 2022, the Queensland Audit Office commenced an audit to examine how effectively state and local government entities are managing invasive species. The Authority was invited to share information about its role in managing invasive species, particularly key threats such as yellow crazy ants. The Authority participated in an interview and provided past years' Annual Reports, as well as a copy of the Independent Review conducted in 2018.

**Figure 18** depicts the five management phases divided into fourteen stages from Detection to Eradication (D2E). These stages are used to record progress and guide decision-making for individual Treatment Areas over time. This colour coding is also used on maps to represent the stage of each Treatment Area. The fourteen stages are not a one-way process, and at times a Treatment Area can move backwards due to newly detected ants.



**Figure 18** The five phases and fourteen stages from detection to eradication



## Appendix 2 – Progress towards eradication: Transition to Post-treatment Validation and Eradication

### *Eradication*

Two additional site eradications were made during this reporting period at TA11 Veronese's Property (42ha) and TA23 Harris Road (6ha), bringing the area of eradication to 90ha across 6 sites. A combination of new factors was taken into consideration when the Authority declared eradication at these Treatment Areas, and these factors are being considered for addition to the *Detection to Eradication* process. One of these is the refinement of the cumulative probability of absence analysis, and the other is a checklist for eradication.

### *Detection to Eradication (D2E)*

Over the life of the Eradication Program, the Authority has developed and documented a guide for eradicating yellow crazy ants. *Detection to Eradication (D2E)* is a high-level design plan developed by the Authority and is used as a guide to document and manage the progress of each Treatment Area from detection to eradication. The detection to eradication process evolves as new information is gained, and this year's new findings included an 'eradication checklist' and refinements to the probability of absence methodology.

The D2E describes five (5) core phases divided into fourteen (14) stages (refer **Figure 18** in Append 1). Each Treatment Area will move through the stages, from Stage 1 detection to Stage 14 eradication. The D2E is used as a guide to ensure all steps towards eradication are completed for each Treatment Area, and that none are taken prematurely. Progress is reviewed every six weeks and decisions are made to move or not to move a site to its next stage.

The D2E also highlights a wide range of variables that need to be considered during the process from detection to eradication. It acknowledges that informed decisions about detection, treatment and surveys of yellow crazy ants must take into account a range of environmental factors such as terrain, waterways, vegetation type, weather, and the seasonal changes. Other factors that may affect decisions include the size of the infestation, its land use (i.e., agricultural crop and requirements, residential, industrial), bait type and distribution, survey techniques, permit requirements, staff expertise and experience, and more.

The Authority also recognises the importance of having an objective measure for declaring eradication. While stepping a Treatment Area through each stage is a useful tool, confidence in absence could be strengthened through analysis of survey data. As such, the Authority continued to engage JCU to inform the probability of detection for survey methodology (with this reporting period focussing on the dog probability of detection), and further refinements to the probability of absence methodology.

### *Probability of detection*

*Probability of detection*, put simply, is the chance that yellow crazy ants will be detected if yellow crazy ants are present, at the Treatment Area scale. Prior to 2021-2022, JCU determined the probability of detection for lured surveys was 14%, and 21% for sticky trap surveys, based upon field work conducted during the dry season. Because the dry season correlates with lower ant activity and represents a theoretical minimum probability of detection, these probability of detection values were arbitrarily doubled to 28% and 42%, respectively, to estimate probability of detection for wet season surveys. The probability of detection associated with canine surveys for yellow crazy ants is not yet known. Canine probability of detection in other contexts (biosecurity dogs, explosives-detection dogs, etc.) is variable but high, and estimated to be over 80% in some situations. The Authority is currently working with James Cook University to determine the probability of detection of yellow crazy ants by odour detection dog teams in the program's operational context and has currently assigned a placeholder probability of detection value of 33% to canine surveys, pending further data (refer **2.1, 5.1**).

As mentioned above in section **1.2**, the Authority is also working with JCU to quantify the increase in probability of detection of yellow crazy ant populations over time. Time since last survey influences probability of detection because over time, formerly undetectable yellow crazy ant colonies can potentially increase in size and reach detectable level of activity. Delaying surveys to allow yellow crazy ant populations to build to this size, while managing risk, may therefore be a cost-effective way to increase effective probability of detection. Preliminary calculations indicate that in the Program's local context, probability of detection of yellow crazy ant colonies could increase by 0.08 per year after treatments have concluded. However, so little is known about yellow crazy ant colony growth rates, and the effect of colony size on detection probability, that quantifying the increase in probability of detection over time is difficult. In the FY23-24 reporting period, James Cook University will continue to work towards developing a robust metric of how probability of detection may increase with the time between surveys.

## Probability of absence

During the FY21-22 reporting period, the Authority adopted a concept initiated by James Cook University to estimate the *probability of absence* using the Program's survey data. Probability of absence maps represent the cumulative probability of absence spatially across a Treatment Area, based on the probability of detection for each survey type and the number and locations of surveys conducted, when surveys have not detected yellow crazy ants. Probability of absence is an objective, quantitative measure, and in conjunction with existing decision tools such as number of surveys and survey density, it will inform confidence in yellow crazy ant absence prior to declaring eradication.

Due to its potential to substantially inform high-level decision-making, *probability of absence* work was included in the current research contract with James Cook University, which has continued to develop this methodology through the FY22-23 reporting period. Initial probability of absence maps were created for TA11 Veronese's, using the following formula:

$$\text{Probability of absence} = 1 - (1 - \text{probability of detection})^{\text{survey count}}$$

Using the previously determined probability of detection values for the Authority's standard survey techniques and the total number of surveys conducted, a total cumulative probability of absence value was calculated for every survey point within the boundary of TA11 Veronese's and displayed spatially. The initial probability of absence map was based upon five lured surveys. For the purposes of these calculations, lured surveys were assumed to have a consistent probability of detection between microhabitat types and across the Treatment Area, and lures were assumed to have an effective detection range of 5m. Assuming lured surveys yield a probability of detection of 14%, the total probability of absence for this site was less than 50%. Assuming the arbitrary wet season probability of detection values instead, the total probability of absence increased to between 65% and 95% for much of TA11, but no part of this Treatment Area reached a cumulative probability of absence greater than the 95%. Calculations showed that numerous additional lured surveys would be required to reach 95% confidence in absence, which is a potential benchmark criterion to confidently declare eradication.

In light of these findings, the Authority's research partners at James Cook University suggested that the addition of alternative survey methods with higher probability of detection values, such as canine surveys, could reduce the total number of surveys required to reach 95% confidence in absence. Furthermore, additional refinements to the probability of absence modelling parameters and assumptions would provide a different cumulative probability of absence outcome at this site. Note that probability of absence is only as reliable as the assumptions that underlie it – so further research to support robust probability of detection estimates is needed.

Regardless of the outcome of further work, probability of absence is extremely valuable because it contributes an objective, scientifically rigorous, and spatially defined metric of the likelihood of yellow crazy ant detection, persistence, and absence to management. Probability of absence is data-driven, quantitative, and specific to the Authority's local operational context. Because of this, probability of absence mapping results may be more robust than conclusions of the conventional metrics of survey effort (survey density, number of surveys) and treatment effort (number and density of treatments) hitherto used to judge likely absence of yellow crazy ants. Therefore, during the second half of the FY22-23 reporting period, the Authority's GIS staff continued to collaborate with the James Cook University research team to refine the procedures used to generate cumulative probability of absence maps. The team returned to the TA11 Veronese's map, this time with updated data from recent surveys and a new estimate of the canine team probability of detection (canine probability of detection work is ongoing – refer **5.1**).

The updated probability of absence map at TA11 Veronese's incorporated data from additional lured surveys and canine surveys. The calculations integrated all aforementioned assumptions and wet season probability of detection values, along with the additional assumptions that canine surveys have a probability of detection of 33% and that all GPS waypoints recorded by field staff are accurate. Using these figures, the updated probability of absence map at TA11 Veronese's suggests that most of the site has attained a confidence in absence between 80% and 90% (refer **Map 18**).

However, the assumptions underlying this finding did not take into account factors such as time since most recent survey and habitat-specific probability of yellow crazy ant persistence. Habitat influences probability of absence because yellow crazy ants are more likely to survive and persist in favourable and complex habitat, such as riparian forest, than in unfavourable and simple habitat, such as sugar cane paddocks. There is potential for particular habitats to be associated with increased *probability of yellow crazy ant persistence*. This spatial variable has the potential to significantly alter probability of absence across the site, as per the following formula:

$$\text{Probability of absence} = 1 - (\text{probability of persistence} (1 - p)^{\text{count of surveys}})$$



To illustrate the influence of variations in probability of persistence at the Treatment Area scale, probability of persistence values of 100% for forest habitat and 90% for cane paddock habitat were assigned to TA11 Veronese's. These values were based upon a hypothetical 10% decrease in survival of yellow crazy ants in cane as compared to forest habitats. The resulting analyses indicate a probability of absence between 90% and 95% across most of the Treatment Area, with a small portion exceeding 95% confidence in absence of yellow crazy ants (refer **Map 19**). In this example, incorporation of probability of persistence values effectively reduced the number of surveys required to attain a high confidence in absence of yellow crazy ants. These results informed the decision to formally declare eradication at TA11 Veronese's in June 2023.

Ultimately, the goal of probability of absence mapping is to contribute to a rigorous, spatially defined understanding of the likelihood of yellow crazy ant persistence in a Treatment Area, given the number and quality of treatment rounds and (especially) surveys that have taken place. With further work, it will be possible to elucidate the influences of factors such as habitat type, survey type, season of survey, time between surveys, and other factors on the spatially dependent probability of absence. James Cook University's research team has trained the Authority's GIS staff in the methodology to produce probability of absence maps as this work continues. The Authority anticipates utilising probability of absence mapping in future eradication declaration decision-making, as well as in planning targeted surveillance and potentially even in reducing the boundaries of Treatment Areas to contain only high-risk habitat, accelerating the progress towards eradication for the remainder of such Treatment Areas.

### ***Checklist for eradication***

The 'checklist' of eradication criteria is a final step before declaring eradication, and comprises a series of questions the Authority poses, which are addressed before considering a declaration of eradication. The questions identify factors or risks that may decrease (or increase) confidence in absence for a given Treatment Area, and therefore provide further data to support the decision to declare eradication.

Question subjects include days since last detection, habitat complexity, proximity to riparian vegetation, location (is the site downstream from a known infestation), likelihood of reinfestation, original infestation density and extent, what product(s) were used for treatment, how many rounds of treatment were applied, how many surveys were conducted post-treatment, whether surveys and treatments had any gaps, presence of persistent sites, and more. All these factors are considered by the Authority during the consideration process for any Treatment Area eligible for progression to eradication. Due to ongoing research around probability of detection and probability of yellow crazy ant persistence, certain questions remain in development as of the end of this reporting period. Another vital question will surround the decision of what percentage confidence, or probability of absence, the Authority will consider its target for all infestation areas. Further work will help formalise this checklist and cement its role in future eradication decision-making. The Authority anticipates that these developments will be operationally applied within the next financial year, and this work will form part of the updates to the next review of the *Detection to Eradication* document, which will be included in the FY24 milestone report.

### ***What does this mean for eradication?***

In many other ant eradication programs worldwide, a minimum of two years of surveys detecting no ants is the criterion by which eradication is inferred. In contrast, the Authority has employed a more robust process, using the D2E as a guide to progress a Treatment Area through the stages of detection, delimitation, treatment, surveys, and finally a declaration of eradication. Each phase transition requires evidence of operationally sound surveys and/or treatment before a Treatment Area can progress. With the introduction of the probability of absence mapping and establishment of a preliminary 'checklist' of eradication criteria, the Authority piloted new decision support tools which can be incorporated into the existing framework to inform management decisions. Combined, these tools help justify, and increase the Authority's total confidence, in the eventual eradication declaration.

As a case study, the Authority applied these three processes to determine and evaluate the likelihood of eradication at two sites formerly in post-treatment validation: TA11 Veronese's and TA23 Harris Road.

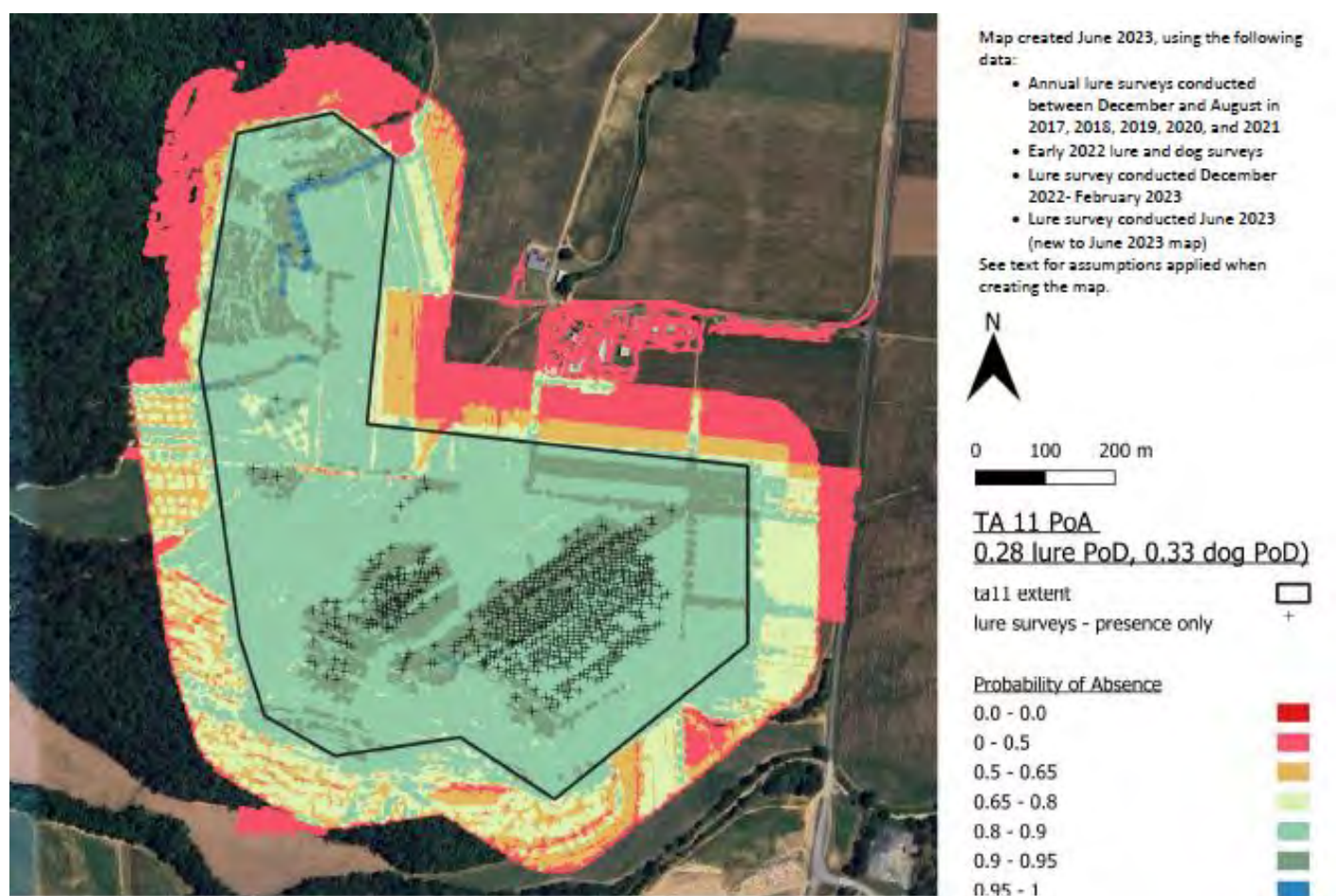
As mentioned above, the probability of absence methodology was used to generate cumulative probability maps of yellow crazy ant absence at TA11 Veronese's and at TA23 Harris Road. The results for TA11 Veronese's showed that in the area in which yellow crazy ants were originally detected, there was 90-95% probability of absence. Furthermore, some areas in the northern part of TA11 attained a probability of absence of over 95%. This outcome, combined with consideration of the time since last detection and the number and quality of surveys conducted, supported the Authority's decision to declare eradication at TA11 Veronese's in June 2023.

For TA23 Harris Road, probability of absence mapping showed an 80-90% probability of absence across the full extent of the Treatment Area, based upon all survey data, including canine surveys across the entire site. When only wet season data were

used, the result dropped to between 65% and 90% confidence in absence for the Treatment Area. As per the *Detection to Eradication* process, TA23 – which was only in stage 11, in post-treatment validation #1 – would have required another two survey rounds to progress to eradication. But, considering the relatively small size of this Treatment Area and the simple habitat (sugar cane paddocks) that characterises it, the probability of yellow crazy ant persistence at TA23 was deemed low. Appraisal of the treatment and post-treatment survey history of this site against the checklist for eradication, along with the results of probability of absence mapping, ultimately supported the Authority’s decision to declare eradication at this site in June 2023.

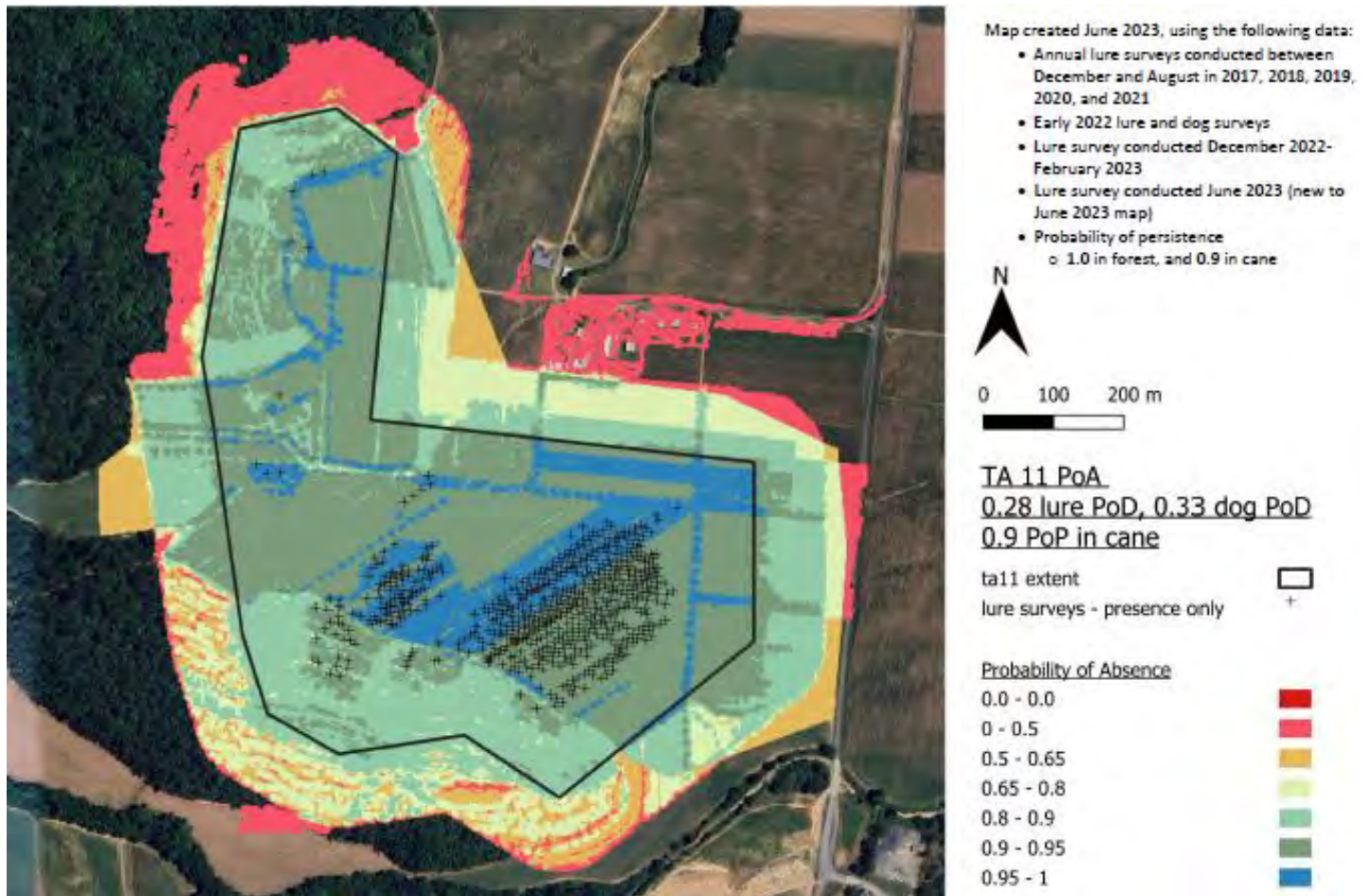
The outcomes at TA11 Veronese’s and TA23 Harris Road show that this innovative, combined approach has positive results. Moving forward, the Authority accepts that while each approach on its own can be used to support a declaration of eradication, together these techniques provide the greatest confidence of yellow crazy ant absence based on the information available to date. For some sites that meet the criteria for eradication and display high probabilities of absence, this could mean rapid progress to eradication, as there is the potential to skip some steps in the *Detection to Eradication* process while maintaining very high confidence in results. As part of its world-leading, best-practice, and scientifically driven approach to operations, the Authority will continue to invest in research, analysis, and field testing to continue delivering an optimized Eradication Program and excellent value for money.

The probability of absence represented in these maps is based on the post-treatment surveys (annual lure surveys conducted between December and August in 2017, 2018, 2019, 2020 and 2021, early 2022 lure survey and dog surveys, and lure survey conducted December 2022 to February 2023, plus lure survey conducted in June 2023), their associated GPS points, and the probability of detection associated with each survey method. Several key assumptions used to arrive at these probabilities (such as wet vs. dry season lure survey probability of detection and odour detection dog team probability of detection) may be refined as further data are gathered.



**Map 18** The cumulative probability of true yellow crazy ant absence at TA11 Veronese’s (without the probability of persistence parameter)





**Map 19** The cumulative probability of true yellow crazy ant absence at TA11 Veronese's (including a probability of persistence parameter)