PREVENTATIVE SURVEILLANCE FOR HIGH-RISK INVASIVE SPECIES – CENTRAL QUEENSLAND CASE STUDY

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ABSTRACT

Preventative surveillance is a pre-emptive and deliberate approach that facilitates the early detection of new incursions of priority invasive plants and animals. This ensures that subsequent responses are more cost-effective and maximises the likelihood of their success. Led by Biosecurity Queensland, this approach has been implemented in Central Queensland where the large land area (571,145 km^2 or 31% of the state) combined with diverse climate, habitat, industries, land use and population demographics enable a myriad of new and emerging high-risk invasive species to be potential threats.

Coordinated preventative surveillance activities commenced in Central Queensland in 2020 with a selection of targets, development of surveillance plans, implementation of surveys, facilitation of capacity building and ongoing monitoring and review. This paper provides an overview of the program with specific reference to activities and outcomes for Siam weed, high-risk cacti, spiked pepper, high-risk invasive ants, Asian black spined toads and exotic turtles.

Extensive surveys have been completed, resulting in the detection and extirpation of multiple prohibited cacti sites, and proof of freedom confidence for other targeted high-risk invasive plants and animals. Through the program, there have also been learnings including target species identification and prioritisation, pathway and entry point determination, and adaptation of survey methodologies to the target and environment.

Keywords: surveillance, prevention, early detection, invasive species.

INTRODUCTION

In August 2019, the highly damaging and invasive yellow crazy ant (*Anoplolepis gracilipes*), was detected at Shute Harbour near Airlie Beach. This detection was the first for a priority invasive ant species in the region and a catalyst for Biosecurity Queensland to evaluate other emerging invasive plant and animal threats to Central Queensland.

The detection highlighted that preventative surveillance for invasive plant and animal threats had historically been in response to detections (Csurhes 2017) with the need for a pre-emptive approach recognised. Thus began a planned, well-researched and systematic program approach to selecting high-risk targets and plan for their surveillance in Central Queensland – a maxim of '*detection by design*' rather than '*detection by chance*'. This initiative occurred concurrently with similar regional approaches in other parts of Australia e.g. North Coast High Risk Weed Species,

Sites and Pathways Inspection Plan 2020-2022 developed by Local Land Services, 2020.

REGIONAL PREVENTATIVE SURVEILLANCE PLANNING

To determine a list of priority regional preventative surveillance targets, a review was undertaken of the 228 emerging weed threats to Queensland identified, assessed and prioritised in 2015 (Csurhes unpublished) supplemented by consideration of national prioritisation documents and internal agency expert knowledge.

Prioritisation of targets considered their preferred climate and habitat, potential impact, likelihood of entry, feasibility of early detection and vulnerability to timely eradication. Surveillance plans were developed for targets deemed as highest risk to Central Queensland but with moderate to high feasibility of detection and eradication – these were Siam weed, high-risk cacti, spiked pepper, high-risk invasive ants, Asian black spined toads and exotic turtles. The biology of the target species, their distribution within or external to Queensland and spread pathway characteristics and controls helped identify where targets are most likely to turn up and/or inform survey methodologies. Sentinel sites (where targets are most likely to be found based on pathway analysis) were identified and prioritised for survey with consideration also given to seasonality, timing and frequency.

REGIONAL SURVEILLANCE IMPLEMENTATION AND OUTCOMES

Siam weed

Siam weed (*Chromolaena odorata*) is considered one of the world's most invasive plants. It has the potential to spread across northern Australia including much of Central Queensland. Siam weed was first identified in Australia in 1994 and has since established between Mossman and Giru along the coast and inland to Charters Towers. In 2013, a small infestation was found north of Rockhampton (since extirpated) and in 2024 plants were found in Brisbane.

The spread of Siam weed into central Queensland is considered highly likely due to its prevalence and near proximity in north Queensland (within 60 km of the Whitsunday Region), and ease of seed spread. Each seed has a tuft of white hairs that allow it to attach to vehicles, machinery, clothing, footwear and animals. Flowering usually occurs from May to July and again in September to October, therefore, high priority areas, including rest areas along the Bruce Highway, camping areas in coastal National Parks and State Forests, caravan parks and 4WD tracks are surveyed annually during these months. Since mid-2020, 92 surveys have been undertaken by Biosecurity Officers, and 11 undertaken by other government agencies in addition to local government efforts.

High-risk cacti

Cacti are recognised as one of the leading invasive plant threats to Queensland. Despite this, cacti remain a popular plant and there is a considerable market for ornamental cacti. To improve the probability of early detection, thus

reducing the likelihood of establishment in central Queensland, town surveys are undertaken either on foot or by vehicle. Town surveys involve travelling along roads scanning for the nine targeted species, which were selected as they are eradication targets or have no known established infestations in Queensland. The species include, jumping cholla (*Cylindropuntia prolifera*), Eve's pin cactus (*Austrocylindropuntia subulata*), bunny ears (*Opuntia microdasys*), wheel cactus (*Opuntia robusta*), blind cactus (*Opuntia rufida*), violet prickly pear (*Opuntia gosseliniana*), Engelmann's cactus (*Opuntia engelmannii*), Aaron's beard cactus (*Opuntia leucotricha*), and *Opuntia puberula*. Since 2023, 95 towns have been surveyed, resulting in compliance action and the seizure of 61 high-risk cacti with half of the plants being bunny ears cactus. Town surveys are complemented by online monitoring and compliance to disrupt attempted illegal sales of regulated cacti and other plants. This has recently resulted in the detection of black spined prickly pear (*Opuntia macrocentra*), the first known record of the plant in Australia.

Spiked pepper

Spiked pepper (*Piper aduncum*) is a quick-growing, small tree native to South and Central America and has been identified as a high priority surveillance target for Queensland. It is a significant weed in Papua New Guinea and other Pacific and South-East Asian countries. It is not known to occur in Queensland but has the potential to become a serious invasive plant. Being a pioneer species, it will readily invade disturbed habitats, forest margins, roadsides, waterways, and pastures (Starr et al., 2003). To enable early detection of spiked pepper, sentinel sites have been established, recognising flying foxes (fruit bats) as a likely seed spread vector. If plants are present within the foraging range of flying foxes, it is probable that seedlings will germinate under roosts. Twenty-six current and past roosts have been identified as sentinel sites, with 52 surveys, totalling 33.5 km, surveyed since the beginning of 2022.

High-risk invasive ants

High-risk invasive ants for Central Queensland include red imported fire ants (RIFA) (*Solenopsis invicta*), tropical fire ants (*Solenopsis geminata*), electric ants (*Wasmannia auropunctata*), browsing ants (*Lepisiota* spp.) and yellow crazy ants (YCA) (*Anoplolepis gracilipes*). Of these, only YCA is known to be regionally present and subject to local eradication efforts led by Whitsunday Regional Council. RIFA (previously extirpated from two incursions at Gladstone) and electric ants are being targeted for state eradication. Regional surveillance for these species commenced in December 2020.

Surveys involve setting multiple lures (sausage) fixed to the ground with a skewer and marked by flagging tape along customised line transects, though grid-based surveys are also sometimes used. Survey focus is influenced by both suitable micro-habitat and the type, volume, location and frequency, duration of goods and materials movement). Lures, 1 to 20 m apart, are left for approximately one hour and ant samples collected for later identification. Visual surveys may also be undertaken to gauge ant activity and spot sampling occurs if suspect ants are observed or reported by the community. Since 2020, 193 surveys have been conducted over a total of 132.5 km with 10,573 lures used. Additionally, 27 spot checks have been undertaken in response to community reports. There have been no high-risk invasive ant detections,

providing a degree of proof of freedom confidence for the region. Survey sites include ports, marinas, defence land, landfill and waste transfer facilities, landscape suppliers, council depots, freight terminals, camping and recreation areas.

Asian black spined toads

Asian black spined toads (ABST) (*Duttaphrynus melanosticus*) are an invasive species similar to that of the cane toad (*Rhinella marina*). It is native to China, southern Asia, India, Pakistan, Nepal and Indonesia. The species is not known to be established in Australia, although incursions have occurred in the past through airports and seaports.

In Central Queensland, monitoring is conducted at sites within close proximity to airports and seaports and fresh water. This is due to the likelihood of ABST seeking fresh water. Sites include Mackay Sand and Gravel, NQBP waste facility, Gladstone waste facility and Rockhampton Golf Course. Currently, surveillance for ABST involves deploying cage traps that have been modified with a smaller mesh hole size to reduce toads escaping. The trap also has an audio lure and light installed that has pre-recorded ABST calls and a light to attract toad prey (Animal Control Technologies (Australia) n.d.). Surveillance commenced at Mackay in January 2021 with 20 trap nights. This was expanded to three sites and 74 trap nights during 2022-23, three sites and 58 trap nights in 2023-24 and two sites and 36 trap nights 2024-25 year to date. Captures have mostly been cane toads (total 50) and one green tree frog (*Litoria* sp.).

Plans are in place to further refine ABST surveillance. Preliminary research from a literature review of toad and frog surveillance has identified visual surveillance as a potential surveillance method (Department of the Environment, Water, Heritage and the Arts n.d.).

Exotic turtles

A number of exotic turtle species have been intercepted in Queensland, with the most common being the red eared slider turtle (*Trachemys scripta elegans*). Red eared slider turtles are established in New South Wales and parts of south-east Queensland with efforts to eradicate ongoing. Although no exotic turtles have been detected in Central Queensland, entry is likely due to the illegal pet trade and residents moving from both inter and intrastate. As such, Central Queensland has implemented a preventative surveillance program utilising a variety of surveillance methods. Surveillance is conducted at likely dumping locations such as ponds within suburbia. The use of basking platforms with camera traps is one surveillance method, used across the state with proven results (Biosecurity Queensland 2025). Platforms are fitted with a camera trap and set to timelapse at 15 minute intervals. Images are then reviewed ex-situ. To increase the likelihood of detection in Central Queensland, other methods including visual surveillance and standalone camera traps have been used. Visual surveillance involves officers surveying sites for approximately one hour using spotting scopes with 16-48x magnification similar to that of Lindeman (1999) and Akre et al (2019). Lures can be used however are not necessary. Turtles are assessed for exotic features such as red stripe along the ear, striations on the neck and legs or highly domed shells. Standalone camera trap surveillance involves placing cameras in inconspicuous places at turtle basking sites for example on nearby trees.

Since the beginning of the project in early 2023, 115,438 images have been captured by basking platform and standalone camera traps and a total of 27 visual surveys have been conducted across the region. No exotic turtles have been detected giving us further confidence no exotic species have established in the region. Future surveillance in the region aims to incorporate drone surveillance with a trial conducted at Pioneer Lakes in Mirani in February 2025 proving promising.

CAPACITY BUILDING AND PASSIVE SURVEILLANCE

Passive surveillance utilises community and stakeholder awareness, skills and interest to assist in the early detection of targeted invasive plants and animals. The main stakeholders in Central Queensland are local governments, the Department of Transport and Main Roads, the Department of Defence, NRM and landcare groups, and Queensland Parks and Wildlife Service. In the past two years, several activities have been undertaken to improve the capacity of these stakeholders, including three cacti identification masterclasses, invasive ant training workshops, and regional pest management groups talks with interactive displays and presentations from State experts. On-site training of individual stakeholders and joint surveys with partner stakeholders have also increased the ability of stakeholders to identify targeted species, potential spread pathways and priority sites for surveillance. Complementary regional awareness materials have also been produced and distributed.

DISCUSSION

While Siam weed and spiked pepper have not been found, preventative surveillance has resulted in multiple detections of high-risk cacti including first-time regional detections of wheel cactus, violet prickly pear, Engelmann's cactus and Aaron's beard cactus. A recent detection of black spined prickly pear is its first known detection in Australia. Such detections and their subsequent extirpation prevent potential establishment and impacts within the region. There have been no detections of high-risk invasive ants, Asian black spined toads or exotic turtles. However, surveillance is critical in providing a degree of proof of freedom confidence from these pests in the region.

Developing and strengthening the skills and knowledge of stakeholders through capacity building may be resource intensive but creates opportunities in the long-term. Many stakeholder groups now undertake surveillance on the land they manage which has increased not only the area of active surveillance but also the number of people participating in surveillance regionally. Another benefit to capacity building and passive surveillance is the early identification of invasive species. Stakeholders have an increased confidence in their abilities to identify targeted species leading to early eradication actions and reducing long-term environmental impacts and economic costs.

Regional preventative surveillance has been reviewed annually with continual best practice refinement and adoption of innovative surveillance techniques. A review of targets in late 2024 led to high-risk cacti surveys being expanded to high-risk

ornamental plant surveys with recognition of emerging weed threats that may emanate from township gardens.

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