PREVENTING THE NATURALISATION OF HIGH-RISK ANIMALS AND PLANTS IN QUEENSLAND

Steve Csurhes
Biosecurity Queensland, Queensland Department of Agriculture and Fisheries,
Ecosciences Precinct, Dutton Park, Brisbane

ABSTRACT

Queensland enjoys freedom from hundreds of invasive species that cause major problems overseas or interstate. This paper summarises current work on exclusion, early detection and eradication of high-risk pests in Queensland. Partnerships, in particular, are essential for effective pest prevention and this paper outlines several initiatives designed to maximise their effect. A range of success-stories are presented, highlighting the value of partnerships and the importance of dedicated staff.

Keywords: invasive species, pest prevention.

INTRODUCTION

While Queensland is home to a significant number of invasive plant and animal species, there are hundreds of additional species that could invade if provided the opportunity. Most people are aware of cane toads, feral cats and lantana, but few are aware of emerging threats such as Asian spined toads, Burmese pythons, saw-scaled vipers, pit vipers, savannah cats, palm squirrels, Karroo thorn and purple witchweed. This paper outlines a number of prevention initiatives managed by Biosecurity Queensland and local governments of Queensland in partnerships with other organisations.

POST-BORDER EXCLUSION

Post-border restrictions on sale and possession of high-risk pests are highly effective and relatively cheap compared to other forms of pest management. In the case of potentially invasive plants, more than 900 species were pre-emptively banned from sale in Queensland, effectively preventing these species from entering the mainstream trade in garden ornamentals, the primary invasion pathway for invasive plants. Csurhes (1991) selected targets from a list of over 8000 candidate species using a process of evidence-based pest risk assessment. The list comprises species that are climatically suited to Queensland and have major impacts overseas and interstate. Pest risk assessments for most targets are available on-line (DAF 2019). In the case of potentially invasive pest animals, almost all non-native mammals, reptiles and amphibians (except for domestic species) have been banned from sale. Clear evidence has emerged that restrictions are particularly effective, with only four species of non-native reptiles and amphibians naturalised in Queensland, compared to more than 50 in Florida (where post-border restrictions have been historically absent and far less comprehensive) (Csurhes *et al*. 2016). Post-border restrictions have a powerful synergy with border-level restrictions on import and help reduce smuggling by removing most of its commercial incentive. Moreover, propagule pressure generated by a modest black-market is far less significant than if such species were legally traded as pets.

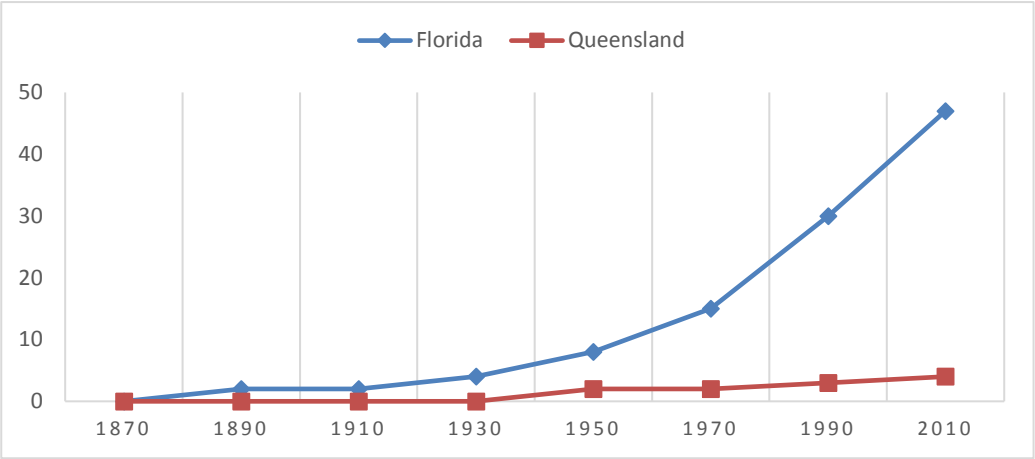

Figure 1. Number of non-native reptile and amphibian species naturalised in Florida (USA) and Queensland since 1875 (Florida data redrawn from Meshaka 2011).

EARLY DETECTION

Much like dealing with skin cancer, early detection is vital. If detected early, when populations are very small, complete eradication is often feasible. Historically, surveillance has relied on passive techniques such as public awareness campaigns. While still a worthwhile activity, many targets have not been detected early enough and opportunities for eradication have been missed.

Currently, novel forms of active surveillance are being explored, with the goal of much earlier detection. These techniques are being targeted at specific high-risk pest species and utilise pathways analysis to identify high-risk sites where surveillance efforts are most likely to yield a result. A targeted, strategic approach, involving partnerships, is essential since resources are modest and finite. A particularly effective approach is the Weedspotters' network, a group of more than 1300 trained volunteers actively looking for specific high-risk potentially invasive plant species. The network is managed by the Queensland Herbarium in partnership with Biosecurity Queensland and local governments and has links to the 'Northern Australian Quarantine Strategy' (NAQS) and 'Land and Sea Rangers'. History has shown that most successful cases of early detection are achieved by trained people who have an interest and capacity to notice unusual new plants, rather than landholders or the public in general.

The use of sentinel sites to monitor and detect specific targets is a well-established technique in other sectors of biosecurity but has not been used for invasive plants. A partnership with the Department of Defence aims to deploy an array of acoustic traps for Asian spined toads near the Port of Brisbane, in close proximity to container and equipment imports, where the toads are perhaps most likely to be first detected. Similarly, military land in Brisbane is being targeted to search for Siam weed. A partnership has also been established with the community group 'Frogwatch', a network of native frog enthusiasts, who are likely to notice Asian spined toads.

In partnership with City of Gold Coast and the Queensland Herbarium, Biosecurity Queensland has established a network of five sentinel sites targeting cecropia (*Cecropia peltata*) and miconia (*Miconia calvescens*), two potentially invasive plant species that are major weeds overseas. This involves monitoring the ground beneath five flying fox camps

on the Gold Coast. In theory, if the target weeds exist within a few kilometres of the camps, the bats should be carrying seeds back and dropping them below their day-time roosts. To-date no target weeds have been detected, perhaps providing some confidence that these species are either absent or rare in the area and, therefore, ideal targets for prevention. Field observations have confirmed that bats are dispersing a number of common weed species. Observations from north Queensland confirm that cecropia can be carried by bats to their camps (M. Graham pers. comm.). Other sentinel sites have been established, including a site near Ipswich where the stomach contents of millions of cattle are disposed, providing an ideal site to detect cattle-dispersed weeds such as Tropical soda apple (*Solanum viarum*) and prickly acacia (*Vachellia nilotica* subsp. *indica*). Perhaps more importantly, the use of sentinel sites, and other novel forms of surveillance, has generated valuable publicity for pest prevention and has made people think about dispersal risk and invasion pathways. New ideas attract interest.

Environmental DNA (eDNA) and genetic analysis offer powerful new tools to improve surveillance and detection. Work is underway to use eDNA to detect red-eared slider turtles north of Brisbane and a new project exploring the utility of DNA-microsatellite analysis to "reverse engineer" the dispersal architecture of a discrete population of cecropia is underway. The latter could provide a high level of confidence that a target population has been effectively delimited and could be a "game changer" for eradication projects. Similarly, the drones and machine-learning are predicted to radically improve the effectiveness of surveillance. When directed at suitably conspicuous target species, drones could methodically search large areas with a high degree of comprehensiveness, far superior to foot-based searching. However, not all targets are suitable and work from north Queensland has experienced difficulty with aerial-based searching for cryptic targets hidden under forest canopies.

On-line sale of potentially invasive species is an emerging risk and compliance is essential. In partnership with local governments, and with regular advice received from Agriculture WA, Biosecurity Queensland has seized and destroyed over 315 specimens of *Opuntia* and *Cylindropuntia* (14 different taxa) being offered for sale on-line, sending a clear message that these species cannot be traded.

ERADICATION

Provided high-risk species can be detected early enough, when their populations are very small, eradication can be a feasible and desirable objective. Since the early 1990s, 20 high-risk weed species appear to have been eradicated in Queensland, with an additional 17 species considered to be "on track" for eradication (for a complete list of species see Csurhes 2018). Notable success-stories include: (1) Karroo thorn (*Vachellia karroo*), a species considered to pose greater weed risk than prickly acacia, was detected by local government at a single location on the Darling Downs. In partnership with Biosecurity Queensland this population is on-track for eradication, as the soil seed-bank is being gradually exhausted. (2) bitou bush, a WoNS and one of NSW's worst weeds, is close to eradication in Queensland, thanks to more than 30 years of dedication by a team of people from local governments, National Parks, indigenous rangers and Biosecurity Queensland. Considering the scale of the task, and the multiple land-tenures involved, partnerships have been essential to success.

Thanks to highly effective restrictions on possession and sale, both border and post-border across Australia, the need to eradicate new incursions of pest animals has been minimal,

with only a single species, the red-eared slider turtle targeted. Responses are generally limited to seizures of illegally held animals and, in Queensland, these number just under eight specimens per annum. Species vary but include American corn snakes, Indian palm squirrels, boa constrictors, saw-scaled vipers and white-lipped vipers, all extreme risk species with the long-term potential to naturalise over substantial areas of Queensland.

ACKNOWLEDGMENTS

The author acknowledges the operational staff of Biosecurity Queensland, Local Governments of Queensland, the Queensland Herbarium and other state land management agencies.

REFERENCES

Csurhes, SM (internal report 1991). *Potential weed species that represent a threat to the Australian economy and environment*, an unpublished report prepared under contract to the Australian Government, Queensland Government, Brisbane.

Csurhes, SM, Swan, D and Ryan, M (2016). Preventing the naturalisation of non-native reptiles and amphibians in Queensland, *Proceedings of the 5th Queensland Pest Animals Symposium,* Townsville.

Csurhes, SM (2018). Pushing 37 weed species to extinction in Queensland, *Proceedings of the 21st Australasian Weeds Conference*, Sydney.

DAF (2019). Pest risk assessments, Biosecurity Queensland, Department of Agriculture and Fisheries, Queensland Government, Brisbane, https://www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/pest-risk-assessments

Meshaka, W.E. (2011). A runaway train in the making: The exotic amphibians, reptiles, turtles and crocodilians of Florida, Monograph 1, Herpetological Conservation and Biology 6: 1 – 101.