

Managing Biosecurity Threats to Fraser Island

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Abstract

There are hundreds of invasive species established on Fraser Island and thousands of potentially invasive species, including vertebrates (mammals, reptiles, birds, fish and amphibians), invertebrates (ants, earthworms etc), plants and fungi/diseases. Some species are ruderals (symptomatic of disturbance) and relatively benign, whereas others are “transformer” species capable of causing serious and irreversible damage. Collectively, and in some cases individually, invasive species could cause significant modification to Fraser Island’s unique ecosystems. This paper does not attempt to provide a comprehensive list of threats. Instead, this paper highlights some opportunities to avoid or minimise negative impacts of significant invasive species. General approaches for identifying potential threats (including listing, risk assessment and ranking), incursion pathway analysis (identification of likely entry points), early detection and surveillance, and effective management approaches for invasive species incursions will be presented. Strategies such as biosecurity planning, improving public awareness, accepting responsibility, maintaining ecosystem resilience (avoiding disturbance), improving hygiene and quarantine options will be discussed. Over-riding all these approaches is the adage that “prevention is better than cure”. Excluding potentially invasive pests from Fraser Island is perhaps our most powerful and effective weapon. Once established, population suppression/control is almost always expensive, challenging and on-going, as eradication of invasive pests may not be possible.

Background

Collectively, and in some cases individually, biological invasions pose a significant threat to Fraser Island’s native ecosystems. Invasive species can replace, damage and/or kill native plant and animal species. For example:

- the South African shrub bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*) can replace native frontal dune vegetation
- The European fox (*Vulpes vulpes*) has a significant negative impact on the abundance of a range of small to medium-sized native ground mammals
- myrtle rust could kill native myrtaceous plants
- the pandanus leaf-hopper (*Jamella australiae*) can damage and kill pandanus
- the yellow crazy ant (*Anoplolepis gracilipes*) can remove other ground-level invertebrates.

Moreover, invasive species can have profound effects on ecosystem function, including changes to natural fire regimes (intensity and frequency of fire), nutrient levels/cycling and water-table levels.

There are hundreds of invasive species already naturalised on Fraser Island and thousands of potentially invasive species, including vertebrates (mammals, reptiles, birds, fish and amphibians), invertebrates (insects, ants, spiders, earthworms etc), plants, fungi, bacteria and viruses. While most are non-native species, there are also a significant number of Australian native species that do not occur naturally on Fraser Island but still pose a threat. A timely example is the recent detection of the pandanus leafhopper.

While many invasive species are ruderal species (generally restricted to highly disturbed habitats such as cleared areas, roadsides etc) and often benign, some are “ecosystem transformers, capable of causing serious and irreversible damage.

Some key pest management principles

This paper does not attempt to provide a comprehensive list of invasive and potentially invasive species. Instead, it aims to highlight some general pest management principles and opportunities to avoid or minimise the negative impacts of invasive species. Reference should also be made to existing documentation such as the draft ‘Pest Management Strategy for Fraser Island’ developed by QPWS and available on FIDO’s website, as well as information provided by local government.

There are four important types of pest management (“intervention points”) arranged sequentially along a standard population growth curve, *viz*:

- Exclusion (preventing the entry of a pest into an area)
- Early detection and eradication (destroy the population while it is small and vulnerable)
- Containment (minimise spread once naturalised in an area)
- Population-level suppression (on-going control) and long-term biological control

This paper is focussed on the first two intervention points, as they are preventative and have the greatest chance of success with modest resources.

There are some important principles embedded within the ‘exclusion’ and ‘early detection/eradication’ intervention points:

Identify (and understand) the enemy: It is desirable to list and rank potentially invasive species (using ‘pest risk assessment’). This allows you to identify a manageable list of “top priority targets” and focus finite resources where they will yield the greatest return on investment. The impact of invasive species in similar habitat types interstate and overseas provides a useful insight into potential impacts here and hence, levels of risk. A target list provides the foundation for effective strategies to exclude particular species from Fraser Island and to detect incursions quickly.

“Choose your battles wisely” – don’t spend valuable time on intractable problems (there is a tendency for people to focus on widespread, conspicuous problems that

have become highly resilient and/or intractable). “Pick your fight, get a win under your belt and go from there”. People tend to give up if you keep “getting beaten”.

“Pathways analysis” and quarantine: Identify the most likely invasion pathways for target species so these can be blocked (using island-level quarantine). Plan to minimise (and hopefully avoid) risks. Effective quarantine relies heavily on public awareness and willingness to help (so-called shared responsibility). For example the community’s willingness to avoid introduction and cultivation of potentially invasive garden plants will have a significant impact on the number of invasive plant species in an area (research suggests as many as 80% of invasive plants are escaped garden plants). In the case of invasive invertebrates such as yellow crazy ants, people’s willingness to avoid transportation of soil and contaminated (imported) timber will make a big difference to incursion frequency.

Surveillance, early detection and eradication: once you have identified high-risk enemies, look for them and try to detect them early. If detected early enough, eradication may be feasible. If detected too late, eradication either impossible or too expensive. Firmly naturalised populations are highly resilient – small populations are naturally unstable and vulnerable. Eradication can be as simple as destroying a few potentially invasive garden plants – the key is early detection. The larger the population the more expensive and difficult eradication becomes. Worldwide experience suggests eradication is rarely achieved for invasive species that have established over more than 1000 hectares and most successful examples of eradication targeted populations over a few hectares. Surveillance and early eradication relies on public awareness. The more people willing to look for a pest, the greater the chance of early detection. Surveillance is most effective when people have received training on what to look for (and where).

Perhaps most importantly, **“Focus on people”**. Pest management is more about managing people than the pests *per se* – in most cases, we are the problem/vector of spread (our attitudes, ignorance and willingness to make an effort to help).

Learn from the experience and mistakes of others. People love to re-invent the wheel. All forms of pest management have been tried repeatedly by multiple groups over the decades. Before embarking on any form of pest management it is vital to consult other groups and people who have already tried to control pests in a similar habitat type elsewhere.

Over-riding all these approaches is the adage that **“prevention is better than cure”** (“turn the tap off before you mop up the spill”). Excluding potentially invasive pests from Fraser Island is our most powerful and effective weapon. Once a pest becomes widespread, population suppression/control is expensive, challenging and on-going.

There are three important forms of “prevention”:

1. Exclusion (preventing entry of a pest into an area)

- Target selection (prioritise threats)
- Identify and block entry points (via pathways analysis, quarantine and public awareness)

- legislation (where possible) and effective compliance
2. *Early detection and eradication* (grab opportunities while you can)
 - select targets and be prepared to act quickly
 3. *Avoid disturbance* (maintain ecological resilience/integrity)

Invasive species often become most abundant in disturbed habitats, areas where the original native plant and animal assemblages have been damaged or destroyed in some way. For example, loss of native tree cover allows opportunistic, quick-growing, early successional invasive plants to take advantage of extra sunlight, water and nutrients. Disturbance can be anthropogenic or natural (cyclones, flood, wave action etc). While natural events cannot be managed, human-induced change can be.

The structure and composition of Australia's native communities has been shaped by historic fire regimes (timing, intensity and frequency of fire). If we change the fire regime at a particular site, the plant community will change accordingly – eg. shift from open forest to mesic littoral rainforest. This change can take decades and tends to go un-noticed by most people. Hence, the pervasive effects of fire tend to be forgotten when managing invasive pests – most pests are “symptoms of an underlying disease” (i.e. a human-induced change in the ecosystem itself). It is fair to say that we often “shoot the messenger” without thinking about why the pest has become so successful. An understanding of the ecology associated with biological invasions is vital if such invasions are to be managed effectively.

Conclusion

Most of the native vegetation on Fraser Island remains largely in-tact and relatively free from the effects of biological invasions, when compared to many other parts of Australia and overseas. However, significant long-term threats exist and management intervention is no doubt required to protect this iconic island's outstanding natural values.