

Ants of Fraser Island

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Ants are one of the most abundant and diverse animal on earth. In natural ecosystems ants are important distributors of seeds and nutrients, movers of soil and are responsible for changes in soil structures, including aeration and drainage characteristics. Apart from their obvious functional importance, ants are one of the most diverse groups in the animal kingdom. There are at least 15000 species worldwide and probably around 6000 species in Australia. A survey of only 16 sites on Fraser Island in 2004 found 254 species of ants present and it is likely that a more thorough survey would see the list rival the 300 species described in Cooloola National Park by Thomson and Greenslade (1981).

This Backgrounder to MOONBI 111 (November 2005) outlines one of the very powerful reasons for better quarantine on Fraser Island to prevent unwanted imported pest species. Fraser Island already has a problem with some weeds which have been taken there by visitors either innocently or as garden plants. Alien ants are a potential threat potentially as bad as cane toads, foxes or many weeds as the outbreak of the Fire Ant invasion in Brisbane has shown.

Some Australian ant communities are dominated by aggressive species that limit the activity of other ants who then generally nest and forage in spatial and temporal gaps left by the dominant taxa. For example, in most of Australia the Meat Ants *Iridomyrmex* spp., are considered dominant and other species partition resources through space and time to coexist with them. In the absence of Meat Ants, other groups of ants may become numerically more dominant. There are only a few smaller and less aggressive *Iridomyrmex* on Fraser Island. The major group of ants numerically are the Forest Funnel Ants, *Aphaenogaster longiceps*. Their presence is easily detected in any of the tall moister forests on the island by their characteristic large nests which seem to cover much of the forest floor in these areas. The most diverse groups on Fraser Island are the , Spiny-ants (*Polyrhachis* spp.) and Big-headed ants (*Pheidole* spp.) both with 17 species detected in the 2004 survey.

Ant invasions

Since the increase in global commerce from the mid 1800's, some groups of ants now specialize in being transported around the globe by humans and are known as Tramp ants. These ants generally do not successfully inhabit areas that haven't been disturbed and live only in human structures. Some ants however are transported by humans and then successfully invade local areas, displacing not only other ants but many other insects, mammals, and birds. These invasive ants have the ability to establish large long-term colonies in new areas and change the ecosystem as they do not perform the same functions as the ants that they displace. For example most invasive ant species are smaller than the native ants

they displace and do not disperse large seeds and sometimes no seeds at all. Some invasive ants such as Fire Ants are a serious pest to humans. The success of invasive ant species varies between locations according to environmental and biotic factors including which native species are present. There are several reasons for their dominance but the main one is that unlike native ants they form large 'supercolonies' that work as a team that can surround and wipe out any small native ant colonies in their way. Subsequently an infested area may consist of only one invasive ant species and no native species at all, or occasionally only a very reduced number of native taxa.

Because ants are so functionally important in natural terrestrial ecosystems, disruption to the biodiversity of ants present can have implications for the functioning of the ecosystem. Basic ecosystem function such as seed dispersal, seed predation, nutrient cycling and parasite density may be affected. Indirect affects can change whole ecosystem function.

Yellow Crazy Ants: A dramatic case study is the Yellow Crazy Ant, a recent invader on Christmas Island. More than two million land crabs were killed by the ants and as a result a dense understorey developed in those areas where the crab was absent and not consuming young plants, seeds and leaf litter. Yellow Crazy Ants also 'farm' scale insects for sugary secretions and relocate them to maximise yield whilst providing protection from predators. On Christmas Island this led to an increase in dieback and sooty mould outbreaks and the subsequent gaps in the rainforest canopy have paved the way for further ecological changes. A Yellow Crazy Ant outbreak was reported in Hervey Bay, near the Urangan boat harbour early in 2005, but appears to have been controlled. Their appearance on the Island could be an environmental catastrophe. Yellow Crazy Ants are African or possible Asian in origin and are one of six species of ants listed in the worlds worst 100 invasive species of plants and animals (Baskin 2002).

Brown-House Ant: Another of these six species, *Pheidole megacephala*, known as the African Big-Headed Ant, Brown-House Ant, or Coastal Brown

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Ant is now common along the East Coast of Australia from Nowra to Cairns. It is the most common house ant in SE Queensland and well known for its voracious forays into pet food bowls. Coastal Brown ants are in several locations on Fraser Island. They have large colonies at Happy Valley, Eurong Village, Orchid Beach, Ngala rocks, Poyungan Valley, Dilli Village and Kingfisher Bay Resort and Village. There is an extremely large infestation around the beach end northern access track to Lake Wabby. The latter infestation is different to the others because there are no human structures in the area and because of its size it seems the ants have been there for a long time. We are aware of a road near this track in the 1930's, but would appreciate information from anyone who can remember any buildings existing in this area. Recent inspection of this infestation found it extends several hundred metres off the beach and more than a kilometre along the beach.

A major concern is the interruption of ecological integrity of the ecosystem because of displacement of native ant species by invasive ants. An inspection of the Lake Wabby infestation using about 100 ant baits found only one native ant species in this area. Yet only 5 metres past the edge of the infestation I observed 6 native ant species in a 1 square metre area. At Dilli Village I walked along the Northern third of the perimeter fence and observed no invasive ants and 27 native ant species. Walking around the remaining 2/3rds there was only Coastal Brown Ants and not one native ant species present. Scientific research from other parts of the world suggest that many other invertebrate groups, such as spiders, beetles, cockroaches, etc will also be severely affected by this infestation. Further investigation into both these infestations is being performed by the University of the Sunshine Coast.

The Black Crazy Ant, *Paratrechina longicornis* is not thought to have such a detrimental effect on native species and may be considered more of a tramp than an invasive pest. However it is present in very large numbers around Kingfisher Bay and the subject of current research into its interactions with native ant taxa by a graduate student at the University of the Sunshine Coast. We have observed these ants attacking and destroying native flies and centipedes in this area and will be performing further studies into their relationship with native ants and other invertebrate animals.

The QPWS rangers at Eurong have observed first hand some of these infestations and are keen to help retard the expansion of the supercolonies. At the moment the University of the Sunshine Coast is running observational trials on the effects of a QPWS fire on the colony spread at Dilli Village. This is

important because the Lake Wabby infestation terrain is extremely difficult to traverse and lay ant baits in, making eradication complicated. However combining fire with the application of toxic ant baits in the area may be a suitable approach. We have also completed a field survey of which ant species are not occurring and appear to be displaced by Black Crazy Ants at Kingfisher Bay, results will be available in October 2005. We have completed a trial of non-toxic baits to find the taste preferences of Black Crazy Ants with the possibility of implementing a trial eradication sometime in the future. As well as monitoring the rate of expansion of some of the infestations in Spring 2005 we will be doing some experiments to observe the interactions between Coastal Brown Ants and other invertebrates that usually eat ants including spiders, antlions and centipedes.

Because of their unpleasant interactions with humans, Yellow Crazy Ants and Fire Ants are targeted by the Australian Quarantine Inspection Service who carry out regular baiting and monitoring programs in Queensland. Yellow Crazy Ant infestations near Caboolture and Cairns and presumably Urangan have been successfully eradicated in the last couple of years. The Brisbane Fire Ant outbreak also appears to be under control. The Coastal Brown Ant and Black Crazy Ants of Fraser Island do not have pest status in Queensland however. They are both common in Australia unfortunately and whilst not controllable on the large scale they now occur in should be controlled in areas of high conservation value.

Coastal Brown ants have been successfully eradicated from remote areas within Kakadu National Park (Hoffmann & O'Connor 2004). Hence the first steps towards gaining acceptance that they are a serious threat on Fraser Island is the documentation of their impacts on the native fauna. To this extent the current work by the University of the Sunshine Coast on Fraser Island is important for all concerned.

Baskin, Y. (2002). A plague of rats and rubber vines. Washington, Island Press.

Hoffmann, B. D. and S. O'Connor (2004). "Eradication of two exotic ants from Kakadu National Park." Ecological Management and Restoration 5: 98 - 105.

Greenslade, P. J. M. & Thompson, C. H. (1981) Ant distribution, vegetation, and soil relationships in the Cooloola-Noosa River area, Queensland. In: Vegetation Classification in Australia (Eds, Gillison, A. N. and Anderson, D. J.) pp. 192-207. CSIRO and ANU Press, Canberra.
