

Feral Pig Impacts and Control

Issues in Tropical Forest Landscapes



Rainforest CRC

Feral pigs pose ecological, economic and disease threats to around 40% of the Australian mainland, with population estimates ranging from 3.5 to 23.7 million. In the Wet Tropics bioregion population density ranges from 3.1 pigs per sqkm in the World Heritage Area to 2 per sqkm outside the listed area. These feral pigs are a possible host for foot and mouth disease – a potential disaster for Australia's \$14 billion agricultural industry. It is estimated an outbreak would have an immediate \$6 billion impact and cost \$8 million a day. It may be extremely difficult to eradicate this disease if it were to establish in a feral pig population, particularly in inaccessible terrain.

This issues paper looks at the current state of knowledge of feral pigs, principally in the Wet Tropics bioregion, the effectiveness of current control methods, management problems and the possibilities of emerging biotechnology solutions.

Feral pigs were listed as a threatening process under the Environment Protection and Biodiversity Conservation Act 1999 largely because of their role in modifying habitat across as much as 38% of the Australian continent.

Feral Pig Impacts

Introduced into Australia by early European settlers, the feral pig is a mobile, social animal with very high reproductive potential that prospers in response to environmental opportunities and a lack of natural constraints such as disease and predators. Human attitudes to this animal vary from regarding them as a resource, such as a sport animal or meat export, to considering them a serious pest animal threat or potential agent of disease.

Feral pigs prey on and compete with a range of native plant and

and flexible activity patterns allow feral pigs to range widely across habitats. These include subalpine grasslands and forests, dry woodlands, tropical rainforests, semi-arid and monsoonal floodplains, swamps and other wetlands.

Research suggests that digging activity decreases seedling survival rates in moist microhabitats by as much as 36%. Rooting by pigs in soil along roadsides and streams, and the sight of pigs themselves, is a significant aesthetic impact in pristine and



Evidence of the rooting damage caused by feral pigs. (photo: Jim Mitchell DNRM)



Researcher Jim Mitchell using radio tracking equipment to find feral pigs

animal species, and almost certainly contribute to the spread of weeds and exotic fungi. The most obvious ecological impacts are in the area of habitat degradation, predation and disturbance. Signs of pig activity include patches of grassland or forest litter rooted up in the search for food along drainage lines, in depressions, and around grassy flats. Disturbance of soil in these habitats may affect ecosystem processes and water quality.

A large robust body, a snout specifically developed for rooting up the ground, omnivorous diet

beautiful environments like the Wet Tropics World Heritage Area. Feral pigs use their powerful snouts to root up moist areas, selectively feeding near roads and tracks looking for fruit and seeds, leaves and stems, bulbs, tubers, fungi, soil invertebrates and insects. Such disturbance can damage soil structure resulting in erosion, affect plant succession or play a role in dispersing exotic plant seeds. Studies are needed on the effects of pigs on the demography of potentially vulnerable species such as cassowaries, ground-nesting birds, endemic





A captured male feral pig.

earthworms, or stream-dwelling frogs. There is also some evidence that pigs cause the spread of feral earthworms.

Perceptions of “the pig problem” vary. Pig hunting is a significant recreational activity, generating economic benefits. Hunting feral pigs for human consumption by Indigenous communities helps to maintain rainforest traditions and connection to country.

To date pig control has been expensive. While pigs are responsible for crop damage, there is some industry acceptance that they play a role in controlling fruit fly in banana plantations. It is conceivable that a cost-effective population threshold exists below which the impacts could be tolerated and their services accepted. Discovering this threshold and evaluating the cost of holding a population below it could only be achieved by large-scale experiments.

Ecology

Populations

Pigs have the capacity for rapid population increase. Female pigs breed all year round with birth numbers peaking in January, or at the start of the wet season. On average, pigs have 1.64 pregnancies a year, with litters averaging 6.4 individuals. The first litter is likely when a sow reaches a weight of 20kg if the individual is under 18 months, and at 25-30 kg if older. Mean litter mortality in the first year is 50%, rising as high as 81%. Research suggests feral pigs in the Wet Tropics rainforest environments have faster growth rates and are, on average, heavier than pigs in dry tropical

regions. While group sizes range from 1-12 up to 40-50, depending on the season and location, it is not unknown for groups of 100 individuals to gather around waterholes in the dry season.

Essential requirements for permanent populations include water, shelter, and suitable food. Pigs are opportunist omnivores, preferring a diet of carrion, earthworms, a wide variety of animals, succulent green

and endangered animal and plant species. Current stomach and faecal sampling found plant material in 100% of subjects. Earthworms are the most common source of animal protein in the Wet Tropics region. The pig diet has been found to include: centipedes, beetles and other insects, snails, frogs, lizards, the eggs of the freshwater crocodile, *Crocodylus johnstoni*, turtles and their eggs.



Pigs on the move. (photo: Jim Mitchell DNRM)

vegetation, fruit and grain. The energy requirements of pigs are also relatively high, particularly in sows in the last month of pregnancy and lactation. Feral pig population growth in Australia is most commonly limited by periodic protein shortages like those found in the dry season.

Diet

Research is underway to quantify what effect feral pigs have on threatened species. Measurements of length and weight and biological data collected from stomach and faecal analyses will be used to produce a detailed picture of feral pig dietary preference. There is a perception pigs threaten rare

Movement patterns

Contrary to general community perceptions research has produced no evidence of large-scale seasonal movements of feral pigs in the Wet Tropics bioregion. Surveys suggest landholders believe feral pigs migrate from highlands to



Signage in the Wet Tropics World Heritage Area.



lowlands in the dry season to forage in ripening sugar cane and banana crops, returning in the wet season after harvesting. Home range studies have revealed most pig populations are located in transitional areas such as the rainforest-crop boundary. Males have a larger mean home range (8.95sqkm) than females (2.35 sqkm) and both have a larger mean home range in the dry season (9.94 sqkm) than the wet season (3.1 sqkm). There is some evidence pigs are not territorial and do not defend an area, preferring groups of up to 30 individuals, based on a matriarchal structure of related females and young at foot in a home range that overlaps other groups and individuals.

Economic

Landholders regard pigs as a significant agricultural pest, controlling numbers according to the perception of negative economic impacts.

Recently completed work for Queensland Department of Natural Resources and Mines found that in the Wet Tropics pig damage costs \$300 for every 1000 cartons of bananas and \$813 for every 1000 tonnes of harvested cane.

This research used an average yearly figure estimated from harvest returns, finding \$828 worth of damage per banana farm and 3.5% or \$5,352, rising to 5.6% or \$8,515 per farm in the sugar cane industry.

Sugar cane in the Wet Tropics is predominately grown close to feral pig habitat. Damage, such as trampling of young cane and physical destruction to paddocks, is severe in some locations, ranking third after cane grub and rat damage.

Total on farm pig damage and management costs were \$4,099 for each banana farm and \$10,632 for each cane farm annually. Landholder trapping was found to be the most effective control technique,

costing \$141 for every pig caught. Contract trapping cost \$209 per pig capture, dogging cost \$257 per pig and shooting \$1,048 per animal.

Indigenous perspectives

A Central Land Council study on the perspectives of Indigenous people on feral animals found a marked difference between the Aboriginal and non-Aboriginal views on animals such as feral pigs. Feral pigs are highly regarded as a food source for Aboriginal people and provide an outlet for the maintenance of aspects of traditional culture. The question of "what should be done about pigs", creates one of the points of difference between Indigenous and non-Indigenous

Disease

Feral pigs carry a range of diseases of high importance to public health and are potential hosts of exotic animal disease plagues like foot and mouth and swine flu. Exotic diseases carried by feral pigs include screw worm fly, Japanese Encephalitis, Cysticercosis and Trichinosis.

Endemic diseases include Tuberculosis, Brucellosis, Leptospirosis, Meliodosis and Sparganosis.

Phytophthora cinnamomi

There is growing evidence feral pigs may help spread the root fungus *Phytophthora cinnamomi*, which is responsible for dieback disease in native vegetation.



Wallowing is typically how feral pigs pick up diseases and infected plant and soil material. (photo: Jim Mitchell DNRM)

perspectives. Because Aboriginal communities regard feral pigs as a resource, they have difficulty with any management options that favour eradication. For some Aboriginal peoples the effect of pigs on bush tucker – digging up of turtle eggs, yams, bulbs, water lilies – is an issue. Further research into the impacts of feral pigs on Aboriginal economic and ecological life is needed if new control programs are to be properly assessed.

There is no evidence pigs spread this fungus by eating infected material, but there is growing evidence the organism is carried in soil on hooves. Pigs could also carry infected material on other parts of their body, particularly after wallowing during warmer conditions when the fungus produces spores. The spread of the fungus has also been associated with soil disturbance and reduction of litter cover. Pigs also chew or tusk the bark on buttress roots and lower trunks of trees, which might allow the entry of fungi.



Management Considerations

Unless pig populations are reduced by 70% or more, recovery to pre-control levels is likely within two years. Rates of increase can vary according to the availability of protein sources and are generally dependent on rates of first-year mortality and mortality in the weaning phase.

Control Programs

The capacity to produce maximum population reduction over a short period of time is clearly fundamental to effective control. Currently, reductions to population numbers of between 60% and 80% are most common. Failure to control pig populations below 30% allows pre-control numbers to return within two years. Poisoning, trapping, shooting from the ground or from helicopters and dogging are the most common techniques used in Australia to manipulate feral pig populations. Reductions of up to 100% have been recorded in favourable environments.

Controlling pigs in the Wet Tropics World Heritage Area

Feral pigs have become established and wide-ranging in the Wet Tropics World Heritage Area, presenting a major management question for the region. Community perception is that pigs have a negative impact on the conservation values of the World Heritage Area, but very little quantitative information on their ecological impact is available. A significant relationship between pig diggings and rainfall has been established and while only a small area of the region is affected, those microhabitats experience intense disturbance, particularly as the soil dries at the end of the wet season.

The Queensland Parks and Wildlife service is the government land manager responsible for the Wet Tropics World Heritage Area, controlling over 76% of the region as either state forest, timber reserve or national park. The burden of responsibility on private land rests with individual

landholders. Friction exists between some sectors of the community and government over the efficiency of current control measures. Wet Tropics Management Authority research indicates adjacent land holders demand government agencies take responsibility for pig control, because they regard areas protected in the 1988 World Heritage listing as breeding grounds safe from outside disturbance.

Current options for reducing pig populations in the Wet Tropics are limited. Many control methods have been attempted:

- Advances in trap design and trapping techniques have proven to be the most effective method of catching large numbers of pigs in the region, and trapping is

- Poison baiting is regarded as the most effective method of quickly reducing feral pig numbers. However, baits may be taken by other species and are therefore not a preferred method of pig control in the region.
- Fencing can be effective for small, critical areas but the most successful pig-proof fences are the most expensive with high maintenance costs.

The Community Based Feral Pig Trapping program is an example of land managers and primary producers working together to deal with a mutual problem. Funding for the program came principally from Wet Tropics Management Authority, Natural Resources and Mines, Natural Heritage Trust and Queensland Parks and Wildlife Service, with



(photo: Jim Mitchell DNRM)

becoming more widely accepted. A pig specific gate trip mechanism has been developed to minimise the risk of trapping non-target native species such as cassowaries and wallabies.

- Shooting and hunting with dogs have been commonly used to control pigs. While they may be effective in dry seasons when pigs are congregated at available waterholes, there are strict controls over the use of firearms in protected areas and shooting is ineffective in rainforest areas.

minor funding from a range of other sources. The pig trapping program has caught over 15,000 pigs, but this count may not include trapping done by some private land owners. Trapping by landholders themselves was the cheapest trapping option. While the trapping program has had minimal effect on pig populations in the region, it has been successful at reducing pig damage in local areas and has been a benefit to farmers. Cairns City Council has also had some success with baiting of pigs in the Copperlode Dam area.





A palm seedling uprooted by feral pigs looking for food. (photo: Jim Mitchell DNRM)

Biotechnology

Biotechnology may increase the effectiveness of existing management programs by providing researchers with an understanding of the chemical signals that influence pig behaviour.

The Pest Animal Control CRC estimates that it would cost in the order of \$12 to \$20 million to take a biotechnology solution to pig control from proof-of-product stage to an on-the-ground solution. These figures suggest shorter-term research and development and control programs may provide a more secure investment than either virally-vectored or bait delivered immunocontraception.

Fertility Controls

Research has established a virally vectored anti-fertility vaccine is technically possible.

More community consultation is needed to establish whether genetic modification is acceptable. The domestic pig industry may need to take protective action but is unlikely to accept added cost,

particularly one that may have market ramifications. Economic consequences such as compensation would make genetic modification less attractive.

Achilles Heel

An Achilles Heel is a small but fatal weakness. Research into an Achilles Heel solution in feral pig physiology is underway and may be found among particular metabolic responses to drugs, pesticides or carcinogens and their toxicity or within its blood, hormone or digestive system responses.



Researchers weigh a captured feral pig.



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