Economic and environmental risks from feral pigs in Northland

1. Introduction

Northland Regional Council is considering including feral pigs in its regional pest management strategy. A pest must be capable of causing a serious adverse and unintended effect on one or more of the following:

- Economic wellbeing
- The viability of native plants and animals
- The sustainability of ecosystems, ecological processes and biodiversity
- Soil resources or water quality
- Human health or recrerational values
- Maori taonga.

The Council requested Landcare Research to summarise the risk posed by feral pigs to the economic and environmental factors in the above list.

2. Background key facts on pigs

Feral pigs occur over about 93 000 km^2 of New Zealand (34%) and over about 5585 km^2 of the Northland region (Fraser et al. 2000).

Densities are not known in Northland, but elsewhere densities in unhunted areas can reach up to 43 pigs/km^2 (McIlroy 2005).

Feral pigs can increase very quickly when food is abundant. Finite rates of increase of 2.4 (= an exponential rate of 0.9) means populations can double in size within a year. Numbers can also collapse very quickly when food is short (Nugent et al. 1996).

However, when pigs are increasing control has to be very intensive to be able to halt the increase let alone reduce pig densities.

3. Economic risks

Feral pigs may affect economic values directly by damaging grass or crops or by predation on lambs, or indirectly when they harbour diseases.

3.1 Impact on production values

Feral pigs can affect pastures and compete with domestic stock directly by eating grass, although no measure of this competition is avaliable in New Zealand. However, the more obvious damage to pastures comes from their rooting. This can be spectacular but has only been measured in one place in North Canterbury. Here, one farmer claimed a reduction of 500 stock units due to the presence of feral pigs - an annual loss of about $32,000. Another farmer in the area had to resow areas of pasture after pig rooting at a cost of about $10,000.

In a study area of mixed native forest, exotic scrub (broom and gorse) and tussock and unimproved grassland in North Canterbury, 7.2% of the 286 ha was rooted by feral pigs. Tussock grassland (and areas in bracken fern) had more rooting than area in forest or scrub (Batema & Meddens (2006).

Damage to crops and young plantation trees has been noted but the extent is unknown.

Loss of lambs to feral pigs is apparently rare and localised (McIlroy 2005). However, on the North Canterbury farms reported above, over 50% of lambs were killed by pigs in local areas with high pig densities (B. Macfarlane, Ngaroma Station, pers. comm.).

Conclusion: In the absence of information on impacts of pigs in Northland, it appears elsewhere that damage to production values is patchy and depends on the coincidence of the values and perhaps high densities of pigs. A reactive approach at these sites would make more sense than widespread control of pigs. The trick will be to react in time to prevent the damage!

3.2 Potential as vectors of bovine Tb

Nugent et al. (2003) reviewed the role of pigs as hosts of bovine Tb for the Animal Health Board. They concluded:

- Pigs are highly susceptible to infection by bovine Tb, with more than 90% of some populations being infected.
- It appears from the location of lesions that pigs become infected by scavenging infectious carcasses of animals such as possums or deer.
- Despite the high prevalence of disease, feral pig populations cannot maintain infections of Tb by themselves, i.e. they appear to be spill-over end hosts.
- However, they may help maintain Tb in a region when infectious pig carcasses (or bits of them left behind by hunters) are scavenged by ferrets, cats and possibly possums.
- Because they are so susceptible to Tb, Tb-free pigs can be useful as ‘canaries’ to detect the presence of Tb in wildlife in an area.

Conclusion: There is no good reason to control feral pigs in areas where bovine Tb is absent, and no good reason to do so in areas with Tb and where the main wildlife vectors (possums and sometimes ferrets) are effectively controlled unless there is some need for urgency.

4. Environmental risks

Feral pigs may damage biodiversity values directly by eating native plants and animals, by competing for food, and indirectly via their rooting if it alters the ‘trajectory’ of the ecosystem at the rooted sites. Whether these impacts are of concern depends on the effect on the native species at a population level or on the consequences of places ending up being different if they are rooted by pigs from places not so rooted.

The hard evidence for these potential impacts is sparse for New Zealand, and largely absent for Northland.

3.1 Impacts on native birds

Pig predation on flightless and ground-nesting birds (presumably on eggs and chicks) has been suggested but rarely confirmed. For kiwi, pig predation was not a feature of the causes of mortality in the overview of McLennan et al. (1996), although it has been noted that few kiwi existed in areas of Waitangi Forest where pigs were most numerous (D. McKenzie quoted in Nugent et al. 1996).

Nevertheless, pigs were the key threat to the weka-sized Lord Howe Woodhen on that island, rather than the abundant ship rats or feral cats (Miller & Mullette 1985).

3.2 Impacts on native invertebrates

Feral pigs eat a lot of native invertebrates. Native earthworms can form a large proportion by dried weight of pigs' diet (26% on Auckland Island, 10% in the Urewewa forests, 4.1% in North Canterbury, 3.4% on D'Urville Island, and only <1% at Waitutu) (Chimera et al. 1995; Thomson & Challies 1988; Batema & Meddens 2006; Parkes, et al. 2004, and J. Parkes, unpubl. data, respectively). This is a lot of worms eaten, but we have no measure of the effect of this on earthworm abundance – other than on D'Urville Island where exclusion of pigs had no significant effect on the biomass of earthworms (Parkes et al. 2004).

Pigs also eat giant landsnails (*Powelliphanta*, *Paryphanta* and *Placostylus*, the latter two having several threatened species in Northland). However, so do other introduced predators such as rats, possums, hedgehogs and thrushes so it is not clear whether any predator is the key one or whether their impacts are cummulative when each predator targets a different age/size class of snail as suggested for *Powelliphanta* by Parkes et al. (2004). That is, thrushes appeared to be the primary predator on young snails, rats could only handle snails up to mid-size, while (judging by the remains of crunched shells) pigs ate only the larger snails.

3.3 Impacts on native plants

Vegetation usually forms about 70% of pigs' diet but as they are monogastric they favour the most digestable food such as improved pasture grasses, herbs, fruit, tubers and bulbs over tussock grasses or the leaves of forest trees.

There is no measure of the consequences of herbivory by feral pigs on plant communities, although the indirect effect of rooting may play some role in regeneration processes.

4. Current management

In 1988, an estimated 23,000 hunters killed about 100,000 feral pigs in New Zealand. Current hunting effort and harvests are unknown but probably similar to those in 1988.

So far as I know, no official pig control is conducted for biodiversity protection other than minor harvests as by-catch during feral goat control operations. Feral pigs are controlled on Molesworth Station (largely for Tb reasons) and in the Hawkeswood Range in North Canterbury to protect native habitats.

The high potential rate of increase of pigs means that casual recreational hunting is unlikely to succeed in stopping population irruptions, let alone reduce pig densities. Targeted effort using aerial hunting where suitable, or trained hunters and dogs in forested habitats is the best control method.

One strategy for control has been successfully applied by a New Zealand company in a large-scale eradication attempt on Santa Cruz Island in California. They wanted to apply control methods in some order that started with those that induced least behavioural changes in the pigs (trapping with baited traps), went to methods that maximised the percent kill at first encounter (aerial shooting), then with methods that targeted individual pigs so few escaped (team ground hunting with dogs), and finally with methods that searched for and killed survivors (aerial and ground hunting using radio-telemetered Judas pigs). All these methods are available and have been used in New Zealand in New Zealand (Yockney & Nugent 2006).

5. Conclusions

With respect to Section 72(c) of the Biosecurity Act, feral pigs are definitely capable of causing economic damage and adverse impacts on biodiversity and natural ecosystems when they reach high densities.

Whether this is at sufficient scale and often enough in Northland to warrant inclusion of feral pigs in a regional pest management strategy is unknown.

The optimal control strategy for a ‘boom-bust’ animal such as feral pigs is similar to that for other such pests (rabbits, rodents) – a system to intervene at the right place at the right time to avert the acute damage from predicted increases in pig numbers. This compares with the ongoing control required to manage pests such as deer and possums where whose population dynamics are more stable and whose impacts are chronic.

It is clear that we do not have enough knowledge to confidently predict the economic of conservation benefits of pig control. Choquenot & Parkes (1999) recommended six areas that required further research:

1. Development of methods to measure pig densities and use of different habitats.
2. Assessment of the relationship between pig densities and the extent and distribution of pig rooting.
3. Assessment of the effect of rooting on vegetation succession.

4. Assessment of the effect of rooting on invertebrates.
5. Relative efficacy of control methods (recreational hunting versus lethal control by agencies).
6. Consequences of pig control on other pests such as possums and rats.

Preliminary research has been done on the third and fourth points at Waitutu (Fiordland) and D'Urville Island, respectively.

6. References

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