

The impact of domestic animals on urban wildlife - eradication or damage control

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ABSTRACT

Urban, rural and island environments in New Zealand are considered from the viewpoint of eradication or control of introduced animals. Examples of animal control in mainland rural areas are given and some principles of animal control discussed. Most of the control methods used on islands and in rural areas are not appropriate for urban areas although the principles of the operating methods remain true.

INTRODUCTION

Prior to the arrival of human beings, the only land mammals present in New Zealand were bats. The entire fauna therefore evolved in the presence of predatory birds but not of predatory mammals. The flora evolved in the presence of browsing birds but not of browsing mammals.

The impact of 'domestic' animals on wildlife throughout most of New Zealand cannot be separated from the impact of a variety of predatory and browsing mammals which were introduced during colonisation and settlement by human beings. This settlement and introduction began with the Maori people bringing the Pacific rat (*Rattus exulans*) to New Zealand between AD 800 and 1000 (Atkinson and Moller 1990) and the kuri (*Canis familiaris*) about AD 900 (Anderson 1990). Then, between the late 18th century and the early 20th century, attempts were made to introduce a wide variety of species with varying success and, during the same period, there were accidental introductions resulting in 54 species of land-breeding mammal reaching New Zealand (King 1990). As a result 16 species of exotic land-breeding mammal are now widespread in New Zealand and a further 18 species are localised or rare (King 1990). Most have a detrimental impact on natural ecosystems.

As a result of the destruction of forest habitats by human beings and introduced herbivores and the impact of mammalian predators, forty bird, one bat and one lizard species have become extinct while others continue to decline in number (Gaze 1994; Bell 1986).

ENVIRONMENTS

Urban New Zealand today is an environment which contains few elements of natural New Zealand. While there are reserves of native forest and areas with scattered native vegetation in urban areas the majority has little native vegetation and few native birds. Introduced plants and birds generally dominate the scene. This change has been brought about by human beings deliberately modifying the environment. Even if all the introduced predatory animals were removed it would still be a poor habitat for native birds.

Rural New Zealand is little different although pockets of forest remain giving an appearance that there are habitats for native fauna. These forest remnants have often been grossly modified in the recent past, are likely to contain a wide range of introduced browsers and predators and may have serious weed problems (Timmins and Williams 1991). Native bird life is similar to that of urban areas and a greater variety of introduced species is present.

Land which has been reserved for conservation purposes is considerably larger in area and contains a greater diversity of environments which are closer to those of pre-human New Zealand. They have generally been substantially modified by browsing animals, contain a full array of mammalian predators and may have weed problems. Native wildlife is more diverse and fewer introduced species are present in lower abundance.

Inshore, offshore and outlying oceanic islands contain the least modified habitats in the New Zealand region but few can be listed as totally un-modified by human activities. Many have had Pacific rats introduced to them and some of these same islands and others have had a range of animals introduced since European colonisation. Recent conservation action has cleared many islands of introduced animals (Veitch and Bell 1990).

We therefore have a variety of situations with very differing natural or un-natural habitats and in each of these we have, of necessity, taken different approaches to the control or eradication of introduced animals.

CONTROL MEASURES

In urban and rural New Zealand, as described above, there have been few attempts to control predatory mammals for the purpose of conserving native wildlife. There has, however, been considerable effort expended on control of browsing animals, particularly rabbits (*Oryctolagus cuniculus cuniculus*) and brushtail possums (*Trichosurus vulpecula*). As a result of this effort rabbit numbers are under control in most of New Zealand while possum numbers continue to be unacceptably high in many areas.

Within mainland reserve lands there have also been few attempts to control predatory mammals but there has been a continuing effort to control browsing animals, particularly goats, deer and possums. The level of control achieved has, for the most part, reduced the rate of change and allowed forest areas to remain as functioning ecosystems, although some plant species are severely diminished or even absent.

In some selected mainland reserve locations there have been concerted efforts to control both predators and browsers with the intention that threatened bird and plant species can survive. Examples of this are discussed in more detail in the 'Special Sites' section below.

On islands our usual strategy has been to attempt eradication of introduced animals. This has largely been successful with 120 operations removing animals of 14 species from 88 islands (after Veitch and Bell 1990, Veitch 1992). The removal of these animals has allowed natural regeneration of flora and fauna, re-introduction of species previously exterminated from that location and even the use of islands as refugia for threatened species which are not known to have occurred there naturally.

Control measures or eradication operations have largely been successful due to target specific methods and due to timing the action to occur in a period when natural food supplies are low.

SPECIAL SITES

Special sites are mainland areas where a higher than usual degree of protection from the impacts of introduced mammals is considered desirable either in the short or long term. Protection can be achieved by a variety of methods and usually involves more than one method. At any given time the result is a higher level of protection - not absolute protection - but, as the objective has often been to allow a species to survive until permanent protection is possible or to gain a sufficient rise in reproductive productivity to ensure survival, this increased protection is adequate.

Special site protection may take the form of special fences, use of natural barriers or control of mammals over a larger area than that required by the species being protected. The following examples are typical of special site protection projects in New Zealand.

Fences have been used to good effect around selected black stilt (*Himantopus novaezelandiae*) habitats varying in size from 25 to 70 hectares where protection against cats (*Felis catus*) and mustelids, particularly ferrets (*Mustela furo*), is needed. The fences have taken two forms: the first being approximately two metre high netting with a single electrified wire part way up the outside; the second being 1.3 metres high with two sets of electrified wires (Murray 1994). Both fence types exclude predators but have been subject to failure, so continual surveillance and trapping within the fenced area is necessary. The inability of farm stock to adequately graze the introduced vegetation within some of these areas has had a detrimental impact on quality of the habitat for black stilts.

Natural barriers in the form of grazed farmland have contributed to the success of animal control in 1400ha Mapara Forest, an area managed principally to enhance survival of kokako (*Callaeas cinerea wilsoni*), a threatened bird species. Goat (*Capra hircus*) control began in the 1980s and since 1990 this area has been treated with aerial applications of pollard baits loaded with compound 1080 (sodium monofluoroacetate) targeting brushtail possums and rats. Seasonal ground control work in the form of traps and poison bait stations has continued to target possums and rats. Trapping specifically for mustelids and cats has returned a low capture rate but numbers of these predators may be controlled by reduced rat numbers in the longer term. The result of this work is that kokako numbers at Mapara have increased from about 45 birds in 1990 to 70 in 1994 (Phil Bradfield pers. comm.). While the cost of fencing has been avoided, ongoing control is now needed and this is likely to be more difficult as available natural food increases.

Animal control over an area larger than the principal area occupied by the species being protected was effectively carried out over 5500 hectares of southern Stewart Island to protect kakapo (*Strigops habroptilus*), an endangered, nocturnal, flightless parrot. Here cats were the sole predator and they could be targeted with the seasonal use of appropriate baits and traps. In 1980 and 1981, prior to initiation of control measures, predation of kakapo was in the order of 50-60 percent of the population per annum. Following initiation of control measures one kakapo was killed by a cat in 1983 and all 29 kakapo known during the period 1984-1989 remained safe (Roberts 1992). The kakapo have now been shifted to cat-free islands.

DISCUSSION

Predator-proof fences are seen by some as the panacea of predator control over small areas. The use of fences to protect nesting black stilts, and other species at other locations within New Zealand, has shown that few, if any, of these fences are 100 percent effective in the longer term. Initial costs are often high, maintenance can be a frequent need and predator trapping within the enclosed area will, at least, be a seasonal task. In some locations the fence serves a useful double purpose where there is also a need to keep the species being protected in captivity or to carry out other management practices within the enclosure.

Poison baits need to be used with care to ensure that the target species does not become bait shy and that non-target impacts are not detrimental to the overall project. Both aerial application of bait and bait stations should be used at the time of year when they are likely to be most effective – often late winter or early spring. For most target species pulses of bait are more effective than a continuous supply being available and for some target species pre-feeding with non-toxic baits is desirable. Each baiting regime needs to be designed for maximum impact on the target species.

Traps also need to be carefully selected for greatest effect on the target species. Many traps depend on the target animal being attracted to a food or scent item, often in an enclosed space, and in some cases depending on the target animal actually grasping and pulling on the bait. In general terms these traps are similar in effectiveness to poison baits although poison baits can be more readily placed in bait stations or spread over a larger area. Traps need to be checked daily. Traps which have no bait but are placed in a pathway may be more effective than baited traps but they are far less target-specific.

Changes of natural food supplies within the treated area will change as numbers of predators or browsers decline. A result of this is that poison baits and trap sites are less attractive and the target species will increase in number. Bait type, bait station and trap location, or bait pulse timing will then need to be changed to improve bait take. Some new study of the target species in these changed circumstances may be needed to determine appropriate baiting changes.

FUTURE DEVELOPMENTS

Browsing by possums is seen as a major threat to New Zealand forests. Possums are also a predator of bird's eggs and nestlings and carry the agent for bovine tuberculosis. The use of aerially spread bait is achieving a level of control in selected areas. Research targeting alternative control methods is continuing.

Mustelids are considered to be the least controllable predatory mammals. To date we have no methods which can predictably capture or kill stoats. The young disperse over long distances (>65 km) and individuals are known to swim up to 1100 metres.

While rat eradication from islands has been highly successful, using the aerial application of anticoagulant baits, this method is not permitted for the ongoing control of rats in mainland areas. Other methods have, however, proved successful and research on bait flavours should improve our ability to control rats when natural foods are abundant.

The recent development of a dry pelleted poison bait which is attractive to cats provides some hope that aerial application or bait stations for cat control on the mainland may be possible. This development has yet to reach the stage where use over an extended area on the mainland has been attempted.

CONCLUSION

Eradication of animals which are well established over extensive mainland areas is not possible but, with the appropriate input of quality effort and the correct choice of timing, ongoing control is possible.

Most of the methods used for animal control in rural New Zealand are not appropriate, and often are not permitted, for use in urban areas. The principles of target specific control measures at selected times of the year remain true.

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Dick Veitch has been involved in wildlife conservation and ecological restoration work in New Zealand for more than 30 years with occasional additional overseas experience on Pacific and Indian Ocean islands, in Australia, the USA and Great Britain. Early species rehabilitation work was made possible by the natural regeneration of ecosystems following fire but this was followed by the removal from islands of the larger introduced mammals. More recent technological advances are now assisting with the removal of small rodents and introduction of a wide variety of species to islands. Techniques developed on islands are proving useful for management of habitat 'islands' on mainland New Zealand. Dick is now responsible for wild animal control and ecological restoration of island and mainland reserves in the Auckland Conservancy of the Department of Conservation.

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