8-1-2007

ISLAND BIOSECURITY AS A PEST MANAGEMENT TACTIC IN NEW ZEALAND

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Abstract: New Zealand is an archipelago with many islands of conservation significance, none of which has the full suite of invasive vertebrate pests found on mainland New Zealand. Managing invasive species on New Zealand islands involves prevention of pests establishing and controlling or extirpating those already there. Prevention measures, referred to as island biosecurity, focuses on the three major pathways for pests to arrive: deliberate release, accidental release and swimming. Managing deliberate release is largely reactive but does have opportunities for prevention depending on the motivation of offenders. Managing accidental release is where most proactive work is done by Department of Conservation staff to protect remote high-value nature reserve islands. A comprehensive quarantine, surveillance and contingency response system is in place for these sites. When managing self introductions, the size and nature of the water gap and the species involved largely determine the risk. Many islands are beyond the swimming range of all pests, but for some closer ones, we are exploring the feasibility, costs and benefits of managing reinvasion across various water gaps and trying to improve our detection and elimination techniques. Eradication backed up by successful ongoing island biosecurity in many cases compares well with alternative management options at mainland sites.

Key Words: biosecurity system, incursion response, invasive species, islands, pest management, prevention, surveillance.

Managing Vertebrate Invasive Species: Proceedings of an International Symposium (G. W. Witmer, W. C. Pitt, K. A. Fagerstone, Eds). USDA/APHIS/WS, National Wildlife Research Center, Fort Collins, CO. 2007.

INTRODUCTION

New Zealand is an archipelago of more than 2000 islands (greater than 0.1 ha) covering 23 degrees of latitude. Many of these islands have some conservation significance. Mainland New Zealand (the two largest islands) has 28 introduced mammal and many other exotic fish, bird and herpetofauna species. None of the other islands has this full suite of invasive vertebrate pests. Therefore, managing invasive species on New Zealand islands gives priority to prevention as well as taking opportunities toward restoration through pest eradication. The costs and risks of managing reinvasion is a pre-requisite consideration to removing pests from islands.

Preventing pests from establishing a breeding population on islands is the goal of island biosecurity, a term used in New Zealand to encompass quarantine (prevention), surveillance (detection), and response to incursions (contingency). To achieve this goal, the focus is on managing pathways for island invasion. Invasive vertebrate species reach islands through either deliberate or accidental release by people, or they swim (self introductions) from nearby islands or the mainland islands.

This paper describes actions taken by New Zealand Department of Conservation (DOC) to address each pathway.

DELIBERATE RELEASE

People release animals on islands deliberately for three reasons:

- They didn't think or know about the potential consequences
- They want to take advantage of commercial or recreational opportunities
- They acted maliciously because of anti-conservation or anti-government sentiments

Didn't Think - Didn't Know

The most common scenario involves visitors bringing pets (e.g., ferrets [*Mustela furo*] or brushtail possums [*Trichosurus vulpecula*]) to islands and allowing them to escape. Pet owners are usually unaware that the island does not have these species in the wild and are reluctant to accept that their pet could do any harm. From their perspective, they are "letting them go free to live out their life in the wild".

Commercial or Recreational Opportunity

Releases in this category are usually for hunting opportunities, either for those people involved or for fee-paying clients. Commercially-motivated releases are rare today, but prevalence is connected to the monetary value of the animals or the enterprise. Those people engaged in subsistence living "off the land" often regard the release of animals as within their rights. Examples of species released for this reason include deer (*Cervus* spp.), pigs (*Sus scrofa*), and in the past, possums.

Malicious Release

Such releases most often are not actually carried out, but are threatened or set up as a hoax. They usually are precipitated by grievances among participants. In some cases, the offender has a completely different world view of introduced species. For example, an Auckland man deliberately set out to establish a wild population of rainbow lorikeets (*Trichoglossus haematodus*) because he felt they would "add colour to the local wildlife".

There are three ways of managing the deliberate release pathway: information, law enforcement, and contingency response.

Information

Increasing public awareness of the potential threats and consequences of deliberate release is an important component of the overall strategy. This can be done in different ways, including distributing pamphlets and permits to island visitors, engaging media coverage of incursion responses or prosecution, and consulting with people affected by conservation-related activities.

Law Enforcement

New Zealand law is relatively stringent in these matters, but bringing perpetrators to justice is always challenging. For example, the maximum penalty for deliberately releasing a wild animal without authority is NZ$50,000. Under other legislation, penalties for similar offences range up to $100,000. However, maximum penalties are rarely, if ever, handed down.

Contingency Response

Responding to information received on deliberate releases is vital to demonstrate commitment to our own prevention messages. Failure to respond professionally undermines credibility. DOC has a process which facilitates information collation and decision-making on the most appropriate response. We follow this process even when deciding not to take further action.

ACCIDENTAL RELEASE

Stowaway pest animals potentially impact most on nature reserve islands. These islands have restricted public access and are, therefore, less vulnerable to deliberate release. DOC has the greatest opportunity to manage this pathway, especially on reserve islands where most visitation is by DOC employees or scientists operating under DOC supervision. DOC's island biosecurity system aims to prevent pests reaching islands accidentally with the supplies and equipment of people visiting. For islands outside DOC control, DOC raises awareness of the accidental release pathway and advocates others to follow DOC's example.

SWIMMERS

The size and nature of the water gap and the invasive species involved appear to be most important predictors of invasion risk through this pathway. For islands far offshore, pest animals unable to fly have virtually no chance of arriving unassisted. However, for islands closer to the mainland DOC is exploring the feasibility, costs and benefits of managing reinvasion across water gaps of various sizes.

For example, stoats (*Mustela erminea*) are accomplished swimmers that can cross water gaps up to 3 km to reach islands. The eradication of stoats from several islands in Fiordland and subsequent modelling of their reinvasion indicates that islands beyond 500 m have a manageably low reinvasion rate by swimming stoats – about once per 3 years.

Similar work is underway for rodents in an effort to understand the frequency of invasions by swimming and also to improve the technology for efficient surveillance and contingency response to better manage reinvasion. For example, Norway rats (*Rattus norvegicus*) have been detected arriving about once per year on average over the last 10 years on Ulva Island from Stewart Island, a distance of about 800 m. Norway rats equipped with radio transmitters and released on rat-free islands are variable in their behaviour, but tend to go through an exploratory phase for about two weeks before settling into a territory.

Managing islands within the swimming range of pest animals is less efficient (because of reinvasion risk) than more remote islands, but may offer a

better alternative than managing pests on the mainland where reinvasion is constant.

THE DOC ISLAND BIOSECURITY SYSTEM

The first opportunity to prevent pest animals from establishing on islands through accidental release by DOC staff is at the source of expedition supplies. For example, fresh vegetables are no longer bought from home gardens or roadside vendors; they are sourced from supermarkets with good quality control systems so that their suppliers eliminate animal infestation. The second opportunity comes from checking provisions and equipment through a quarantine store and packing everything in suitable containers to deny entry by pests after checking.

Further opportunities arise at departure points, in transit, and in some cases, upon arrival where DOC rangers require unpacking and checking of equipment in a sealed room for a final time. Ongoing surveillance and a contingency incursion response capability for pests considered most likely to arrive (e.g., rodents) are also required to cover unauthorised landings and shipwrecks.

As each opportunity to detect and eliminate pest animals passes, the risk of pests establishing increases for many organisms. By the time pests have actually arrived on the island, the chances of finding and eradicating them before they reproduce is much reduced (Figure 1).

At the national level, key components of the DOC system are as follows:

- A Standard Operating Procedure (SOP) that provides the overall structure and standards
- A Best Practices Manual that provides a basis for sharing current knowledge on the tools and methods available to meet island biosecurity goals and standards
- An incidents database on pest incursions and interceptions that can be used to improve the system and to demonstrate to people that incursions really do happen

The SOP and Best Practices Manual provide the basis for writing island biosecurity plans for each DOC conservancy. These plans set the biosecurity standards expected of people visiting islands. The system is audited to look at actual biosecurity practices in the field compared with standards laid down in the plan. Attempts are made to resolve differences through modifying field practice or plan standards. Audits also identify new best practices that can be shared with other conservancies (Figure 2).

Conservancy plans provide an incursion response procedure to allow information to be gathered and appropriate action to be planned with help from the Best Practices Manual. Every incident, be it an incursion or a near miss, is logged into the database, and there is some investigation into how well the system worked and what could be improved for the future.

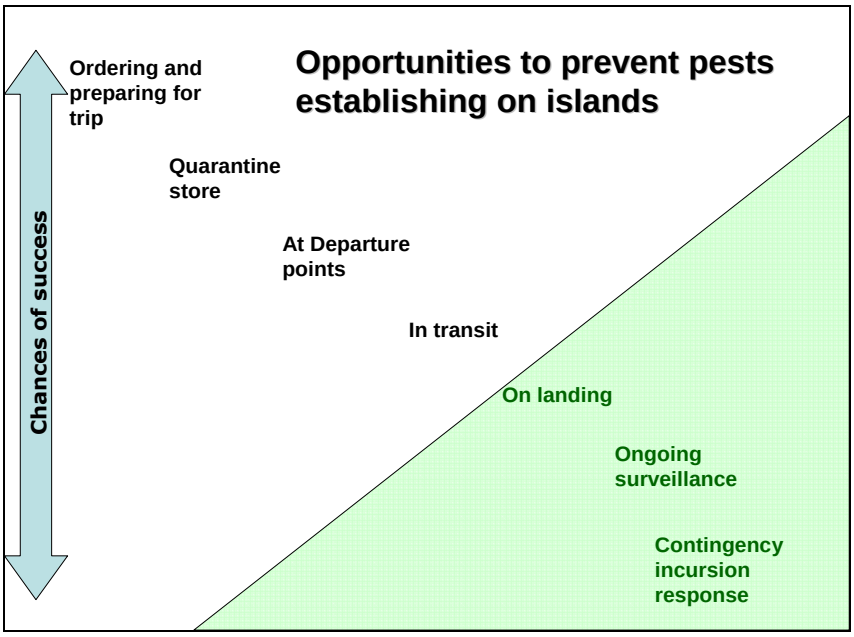

Figure 1. Intervention points to prevent invasive pest animals from establishing populations on islands.

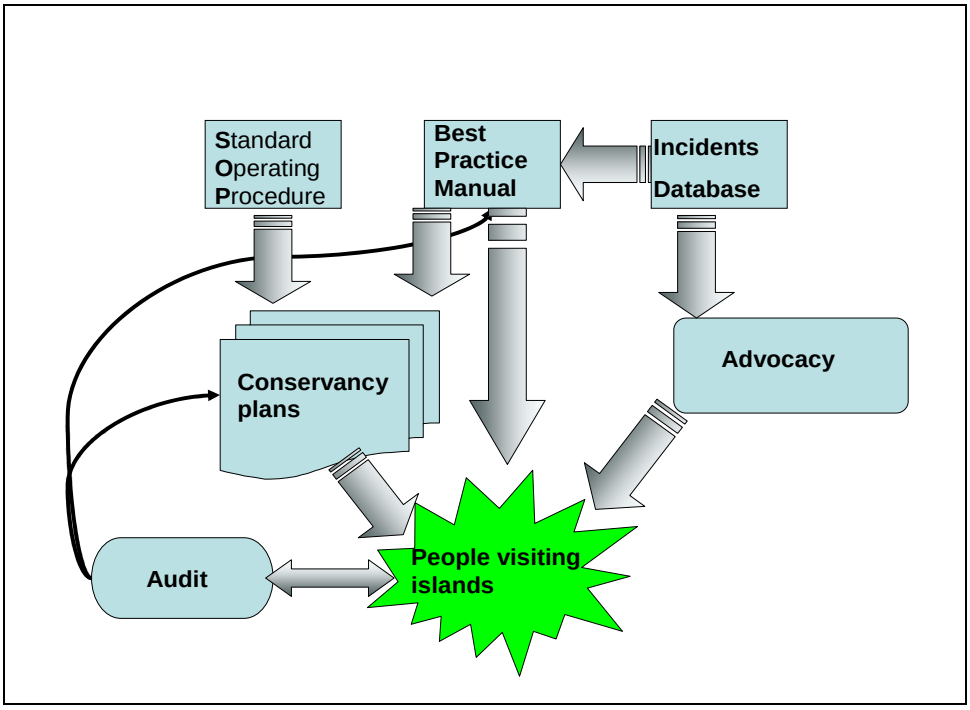

Figure 2. The New Zealand Department of Conservation's island biosecurity system.

CONCLUSION

The invasive pest animal status of our islands is changing, and there is potential for things to get worse through inaction. Island biosecurity is an important part of New Zealand's overall management of invasive pests, not only in prevention of further invasions, but also securing gains made in restoration (eradication) projects and as a cost-effective alternative to mainland pest management. The key to success is being effective across as many pathways as possible. The opportunity for further benefits lies in increased effort to raise public awareness and to support island communities taking biosecurity actions for themselves.