

Systematic assessment of N Z island conservation

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This paper examines how we could develop a project reporting system for islands

Outline

- Define expectations for NZ island conservation
- Do we measure up to expectations?
- Use case studies to show how progress might be measured on islands
- Use examples of how this approach might be used for patches of mainland

Bean counters' questions

- **What have we done?**
- **Did it make a difference?**
- **How much difference?**



Behind the hyperbole, are the simplest of questions that bedeviled conservation activities everywhere: What has been achieved? These questions are increasingly asked by governments of their own agencies and by sponsors of community led projects.

Island invasive mammals*

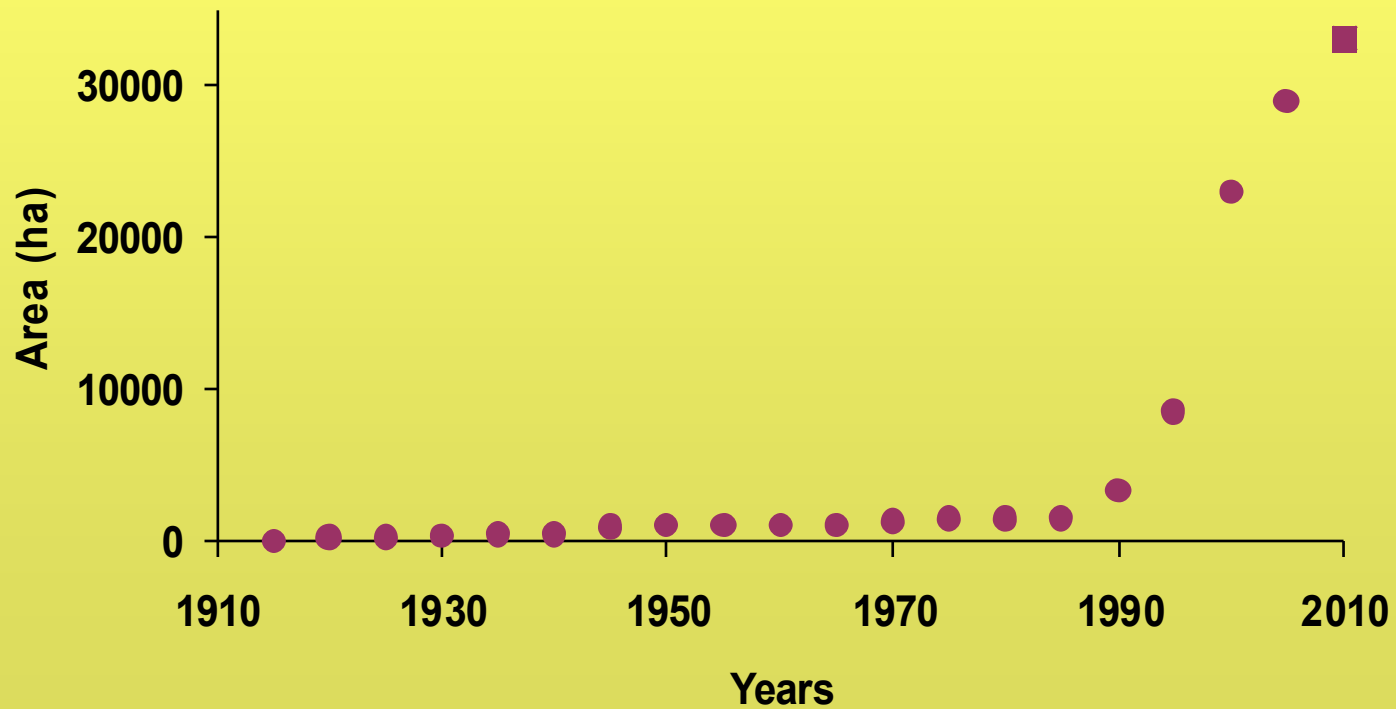
• House mouse	(14)	• Cat	(10)
• Pacific rat	(35)	• Brushtail possum	(15)
• Ship rat	(18)	• Rock wallaby	(3)
• Norway rat	(42)	• Goat	(19)
• Weasel	(1)	• Sheep	(4)
• Stoat	(20)	• Red deer	(1)
• Ferret	(1)	• Pig	(11)
• Hedgehog	(1)	• Cattle	(4)

(Success claimed)

*Source: ISSG

The first measures of success are to identify what species have been eradicated and over how many islands. Every one of them has somewhere been eradicated, a total 16 which rises to 18 species if two species of deer are included. These latter are most likely to have succumbed to over-hunting and poor habitat quality. In parentheses are the number of claimed successful eradications. First hints of inadequacy of data: success may have been claimed when in fact there have been subsequent reinvasions – but this is an issue only with mouse and two species of rats.

Cumulative area cleared of mammals



The cumulative area of mammal pest island has burgeoned since the early 1990s. By 2010 may have added at least Macauley (306) and Motutapu+Rangitoto (2333+1510)

Summary: by number/area

- 162 naturally pest free islands, 158 of which (97%) < 100 ha
- By area, 2162 ha naturally pest free
- About 70 “permanently” cleared of all introduced pests
- About 29 000 ha added

Unprecedented – but was this the goal?

Note that these figures relate to islands over about 1 ha; far more islands than this are very small. But this in fact was not the goal: the goal was to protect recover native species of plants and animals

Eradication benefits

- Plants: > 200 indigenous spp (Great King)
- Invertebrates: 14 spp
- Amphibians: 2 spp (50%)
- Reptiles: 26 spp (33%)
- Terrestrial birds: 29 spp (40%)
- Seabirds: 12 spp (14%)
- Mammals: 1 sp (bat)? (50%)

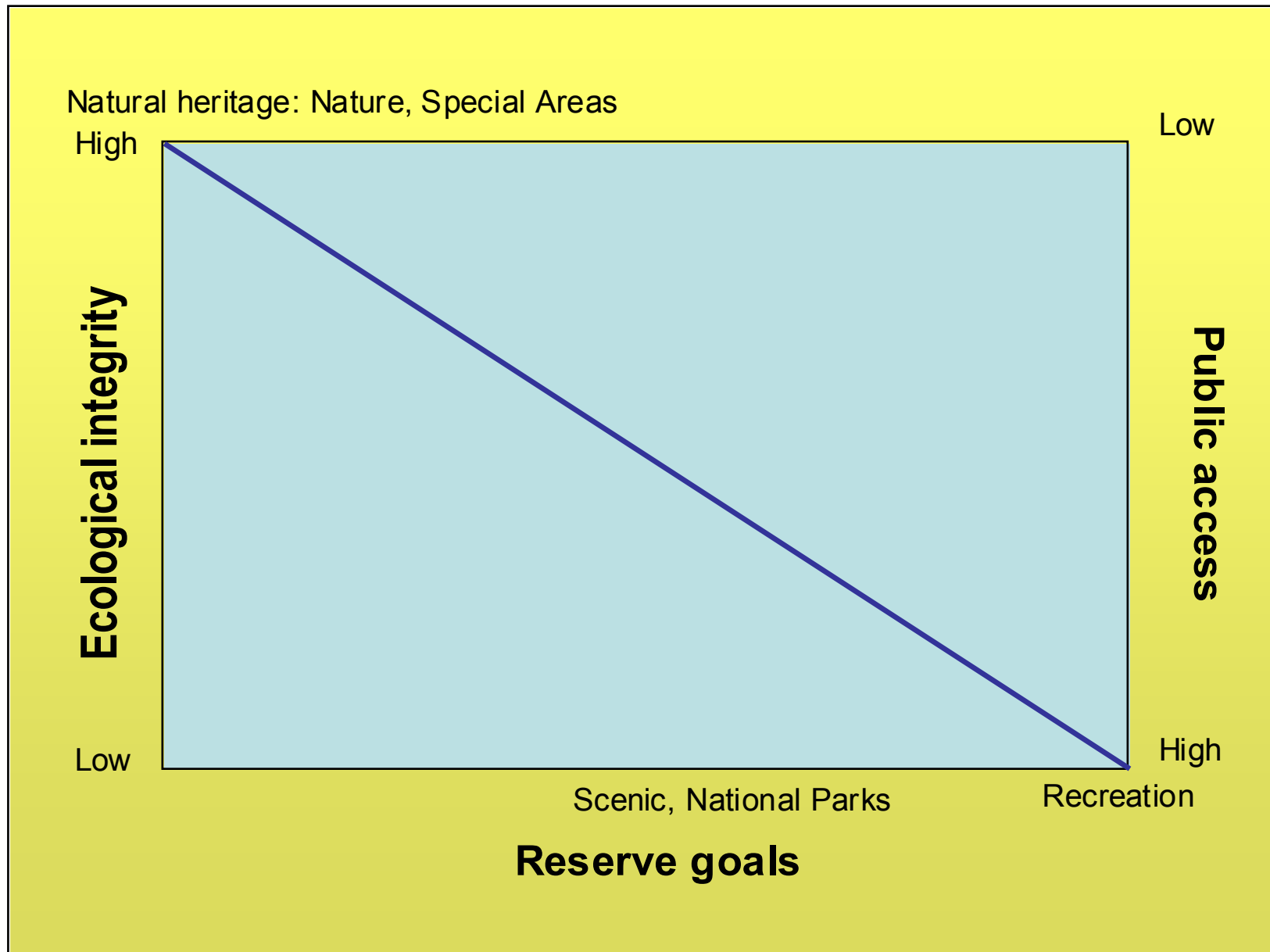
Total for vertebrates: > 70 species

Overall, achievements summarised for the 70 islands cleared of all vertebrate pests. For plants, excluded planting programs on highly modified islands. For vertebrates, total of 70 species. An underestimate because of short duration since some eradications completed. Nonetheless, the figures in parentheses demonstrate the benefits as a proportion of the total fauna, including 29 of the 73 species of terrestrial birds either benefited from or released on islands

Catering for broad goals

- “Offshore and outlying island strategy” – national goal – setting framework
 - Central philosophy: ecosystems and people each have a place
 - Outcome goal: ecological integrity
- “The full potential of **indigenous** biotic and abiotic features, and **natural processes**, functioning in **sustainable communities**, habitats and landscapes.”*

A proposed solution has been to develop an national island management strategy that is sufficiently flexible that it can be applied to public and private land depending on who wants to contribute. The central theme for this is the concept of ecological integrity. Three key components in bold: indigenous, natural processes and sustainable communities.



Once we have the central theme, it is then possible to model a spectrum of outcomes based on an overlay of nature protection (high-end ecological integrity) and public access and participation (lower expectations of ecological integrity). On the mainland where Nature Reserves are rare, we are dealing with areas in public ownership of moderate to low integrity, and usually high public access. [Private land is different!]

Focus: ecological integrity

- Cater for nature heritage AND use
- Sliding scale high to low integrity reflects community aspirations

Management goals (categorise)



Measures of success



Attributes for measurement

This then enables us to cope with the complexities of the legislation and land classification but clustering the islands into functional categories, of which we have identified six. We can also then start to define outcome measures for management under each category as generic and consistent assessment that can be applied nationally.

Components of ecological integrity

- *Environmental representation* (values) e.g. habitat types, notable spp: plants/animals
- *Ecosystem processes* esp. at highly protected sites e.g. ecosystem drivers
- *Effects of exotic spread* community restoration, weed/pest control
- *Avoiding extinction* e.g. native spp exported, threatened spp managed/sustained

There are four components of ecological integrity relevant to the presentation. The representation category is the way compare between sites; for processes, look for how intact they are; exotic spread, extent to which controlled; for avoiding extinction, how threatened species are managed.

Ecological integrity: ecosystem processes

<i>Level of integrity measured</i>	Max	Inc'ing	Mod	Low
Ecosystem drivers*				
Geochemistry				
Biotic composition				
Native sp occupancy*				

Examples of outcome measures relevant to the various levels of integrity (shaded) from max through increasing to moderate and low: and those marked * for specific examples. The purple MOD represents a hypothetical site on the mainland

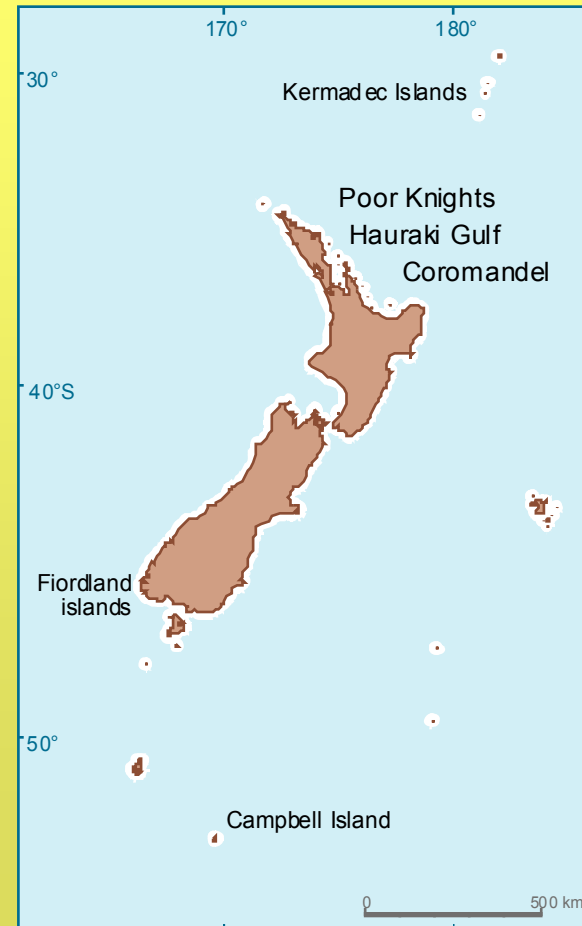
Ecological integrity: reducing exotic spread

<i>Level of integrity measured</i>	Max	Inc'ing	Mod	Low
Indigenous species recolonised				
Indigenous species released*				
Exotic species present*				
Pests and weeds controlled				

Note that on the highest level islands there would be no species releases, so this category is not relevant there

NE island case studies

- Middle (13 ha) no pests
- Aorangi (110 ha) ex pigs
- Korapuki (18 ha) ex kiore, rabbits
- Motuora (80 ha) ex farm
- Tiritiri Matangi (221 ha) ex farm, kiore
- Motuihe (170 ha) ex farm, mice, Norway rats, rabbits, cats



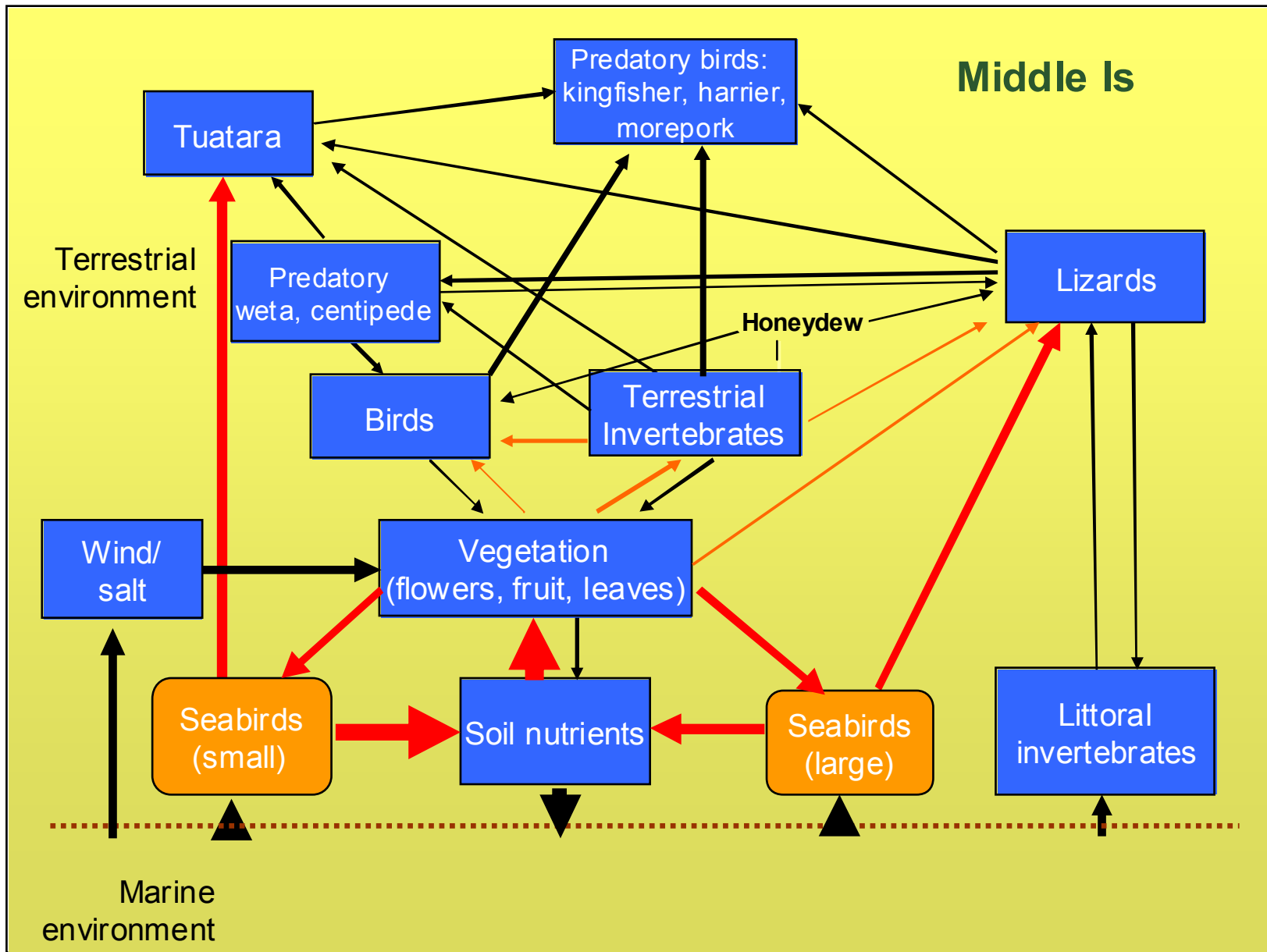
Examples to be used with those in black – high end reserves with restricted access; blue - high access reserves run as community-led projects. For comparison, also including two additional sites: Karori Sanctuary (community trust), Boundary Stream (DOC public land)



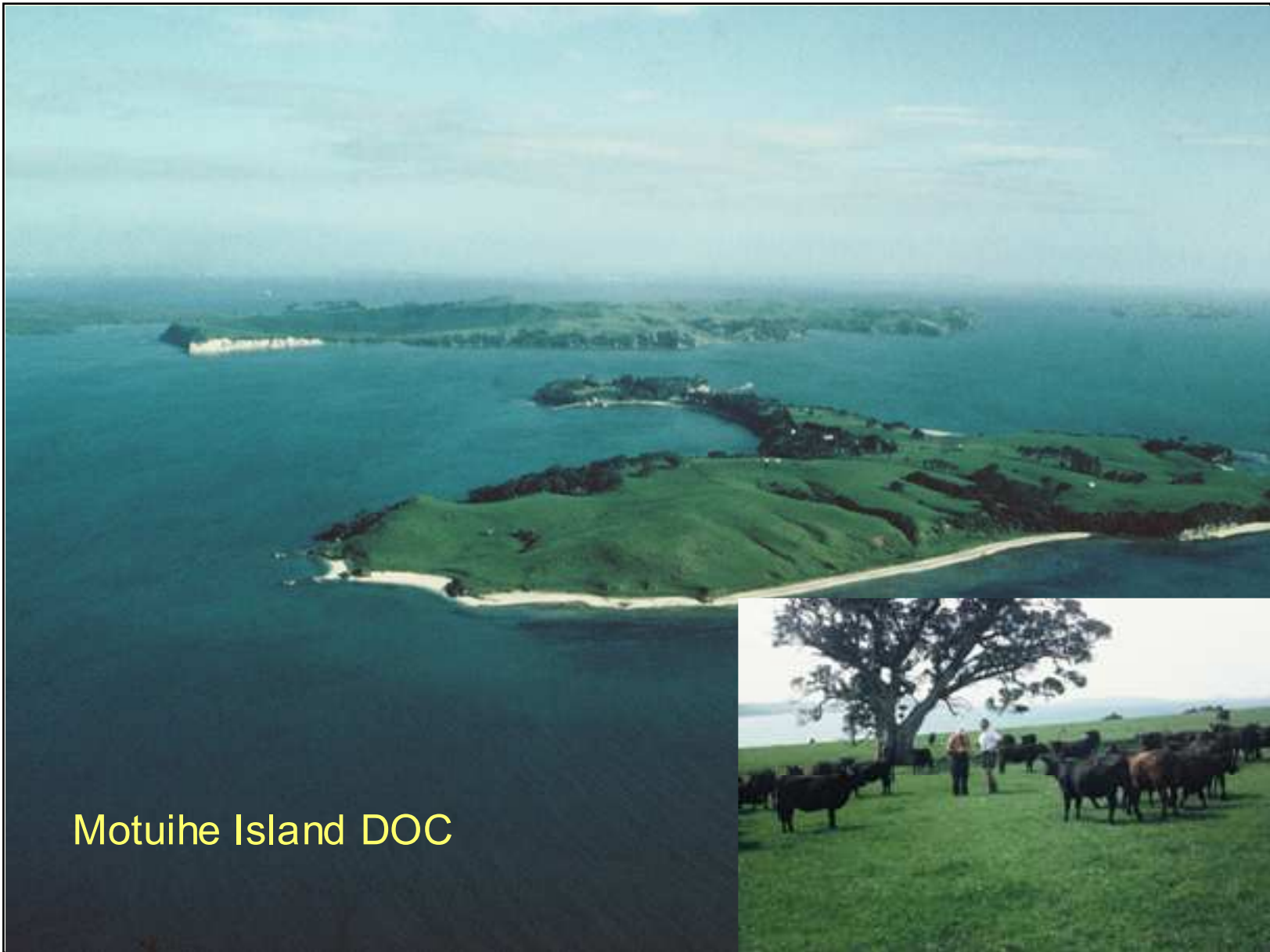
Middle Island

Diving petrel - DOC

Middle Island is unique milktree forest heavily burrowed by seabirds that also keep the forest floor bare



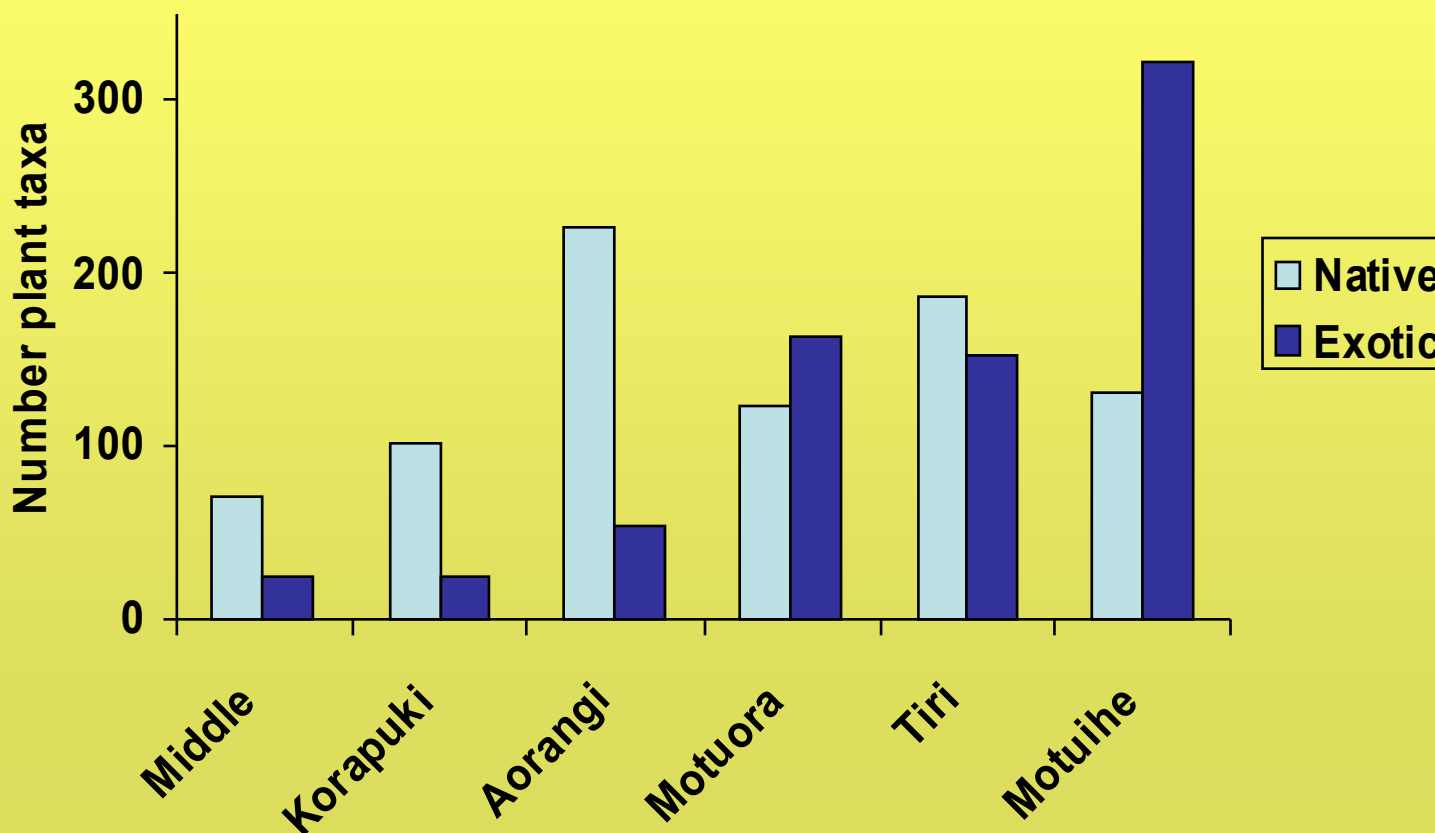
Compare the consumption based to the seabird-based system where the seabirds are seen as ecosystem engineers (drivers). They import marine material and incorporate it directly into the soil. This material then trickles up through the system



Motuihe Island DOC

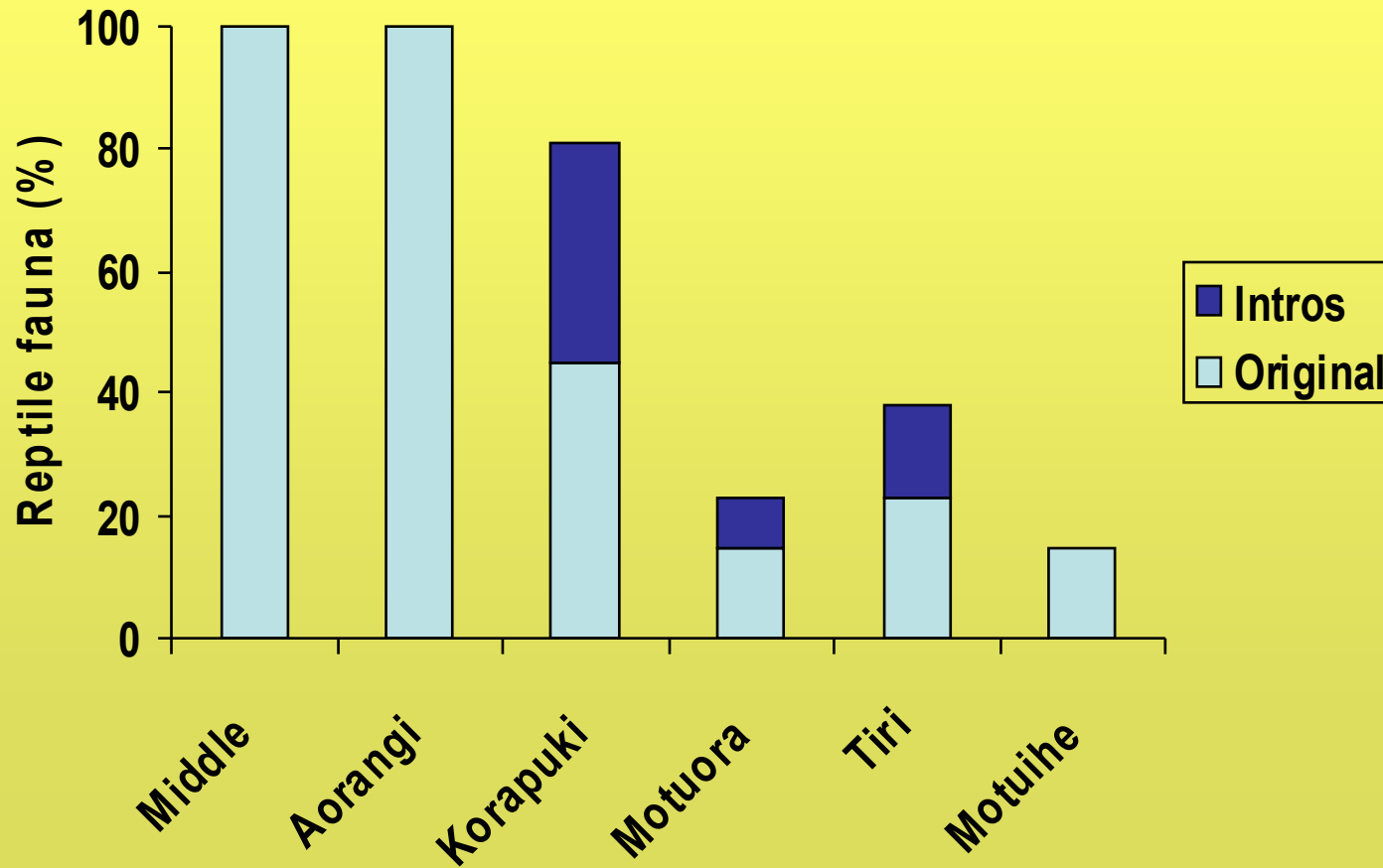
By comparison, Motuihe Island started as scattered native plants in a sea of cattle

Indigenous dominance on islands



Compared with the system-based component, a second component of integrity is species – based: to what extent do native species dominate the system. Note the low component of exotic plants (ca 20%) on the high end islands of the extreme on Motuihe, with only 30% of the flora native. We will come back to the plants on Tiri, because there are temporal issues that look interesting.

Species occupancy on islands



A third component effectively measures the amount of extinction and replacement. Two islands retain their entire reptile fauna with 11 species on Middle and 8 on Aorangi; Korapuki has almost reached its full complement with translocations from neighbouring islands.

Reducing exotic spread and dominance

Measure

Increase in area under native vegetation*

Species of indigenous fauna released*

Exotic species of pests and weeds present

Pests and weeds controlled (number, area)

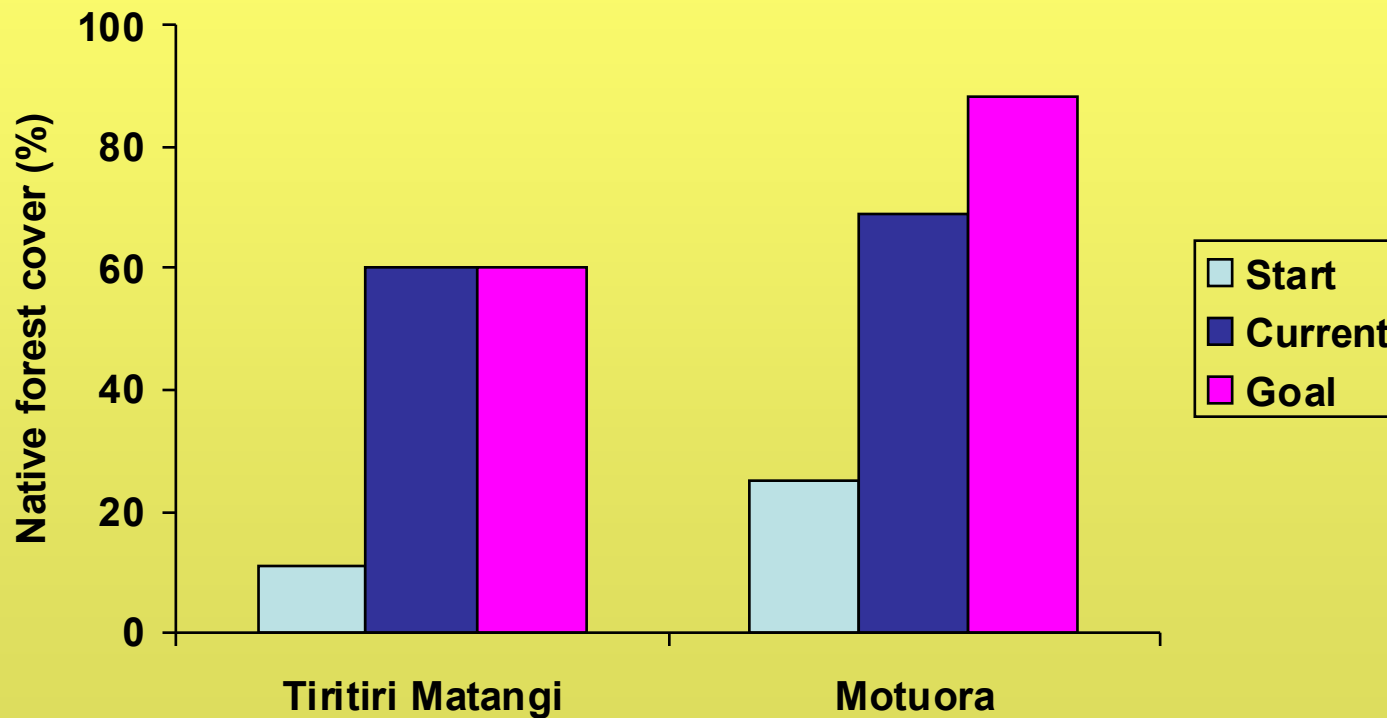
Other measures of ecological integrity relate to reducing the effects of exotic species, and these are probably the kinds of measures that you can provide

Preventing extinctions and declines

<i>Measure</i>
Species exported to other locations
Threatened species managed (not self sustaining)*
Threatened species self-sustaining
Translocations failed*

The final component relates to success in preventing the loss of native species either through high levels of production leading to export or through intensive management. However, the goal is to avoid being consumers of plants or animals that never establish

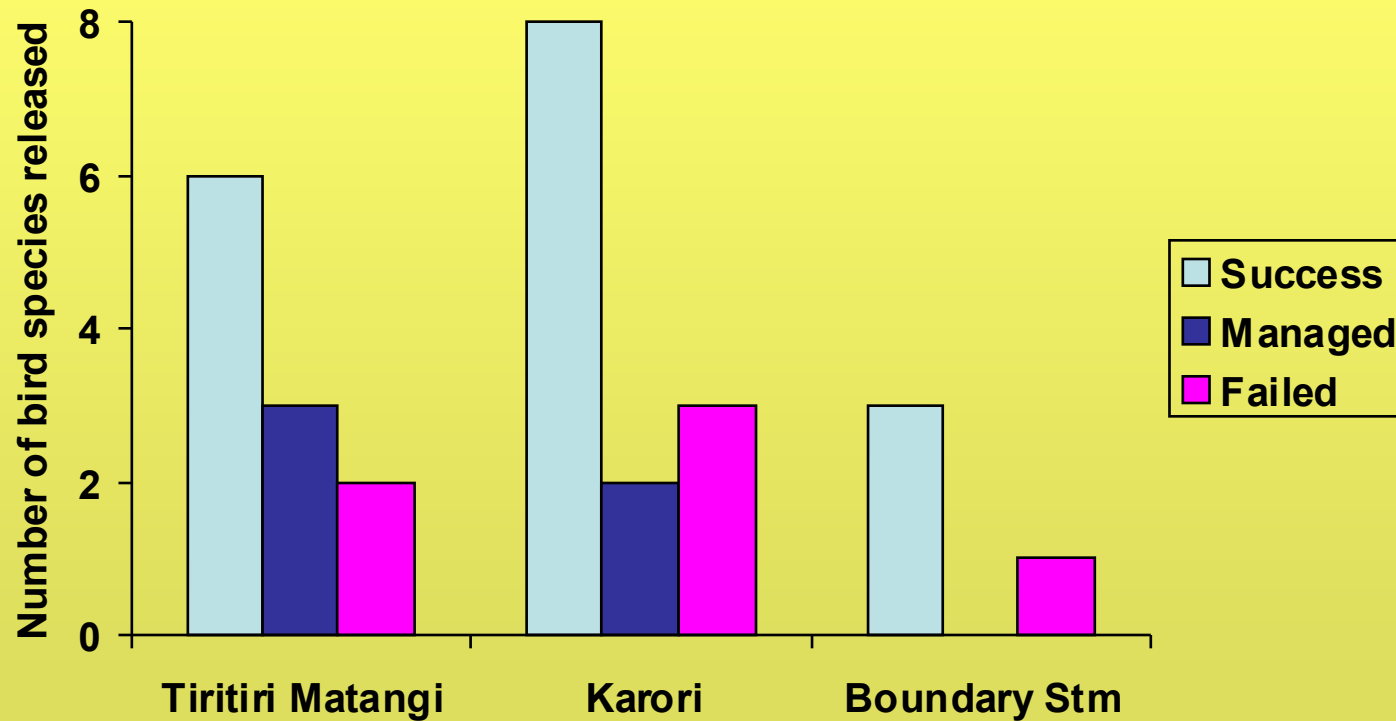
Reducing exotic spread



All data obtained for this and the next examples relied on websites or published material. Note that the two islands have different revegetation goals, with Tiri aiming at 60% cover to provide habitat for takahe.

What this figure does not show is that in 30 years, the proportion of native to exotic species on Tiri has barely changed – despite the huge increase in native forest cover; why is this so? Will it ever trend to the 80% native dominance found elsewhere? Will Motuora do better with more cover?

Preventing extinctions or declines



Managed populations are those that are sustained by artificial means (habitat or feeding) therefore debate re takahe on Tiri, except that excess is exported (producer). Two of the failures are the same species – Tomtit on Tiri and at Karori. What can we learn from this? Note: Tiri brochures/publicity material identify 11 translocations; in fact two failures (brown teal and tomtit) and three management dependent (kokako, hihi, takahe; of “successes” no data for fembird, but they are still there? Failure rate: 18% (Tiri), 23% (Karori), 25% (Boundary Stm)

Management expectations

- Criteria for success require statements of management goals
- Community led, highly modified sites could produce useful data
- Between and within site comparisons fundamental to measuring return for effort – and adaptive management
- Simple measures do work

In conclusion, with the right kind of measures, we will get useful data, a basis for collaborating between projects, even some idea of the speed with which changes might be expected

Ultimate measure of success on islands?

Outstanding universal value:

7 already listed (10%) – Te Wahipounamu,
Sub Antarctic islands

New sites for UNESCO World Heritage
nomination, 22 June 2007.

At least 20 may be added: total 39%

To return to the introductory topic, which was island based: of our original sample of 70 islands, almost 40% are now judged worthy of worthy of “outstanding universal value” – from a global perspective, perhaps that is best criterion of success?

Acknowledgements

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