vive the natural vicissitudes of these 10–15 millennia.

Today the combined effects of humans and their introduced animals maintain bird populations in mainland forests at lower densities than occurs on landbridge islands. And mainland forest patches also tend to contain fewer native bird species than islands of similar size. The conclusion is that for long term survival on the mainland, a species like the kokako is going to need an area of forest **bigger** than island biogeographic studies predict. **For North Island kokako, there are no such areas left.**

The purpose of this short venture into the world of island biogeography is to illustrate that even in the absence of detailed biological studies on our forest-inhabiting birds, there are explanations as to why some species and not others are presently in the endangered category, and what sort of reserve size is needed to sustain them, long term, on the mainland. Island biogeography gives us some very clear messages.

- it is the highly endemic species, the truly unique New Zealanders, that are the ones most affected by forest fragmentation
- it is the highly endemic species that need to exist in minimum numbers over very large areas in order to survive long term. Island biogeographic studies help identify the minimum area required, and hence the minimum numbers.
- as forest fragmentation continues, those species now in the threatened category will also become endangered – yellowhead and whitehead, kaka, rifleman and robin, brown and great spotted kiwi are just some of the likely candidates.

It is the inevitability that more uniquely New Zealand birds will fall into the endangered category, and the realisation that present conservation resources (manpower and finance) are so stretched as to be unable to cope with the endangered species we already have, that calls for some radical and clear thinking. With the advent of a Department of Conservation and the expectation that accompanies it, perhaps this is an appropriate time to review conservation objectives, priorities and operations. What follows are but some of the topics which I believe are germane to that review.

An analysis of New Zealand forest bird species on landbridge islands was conducted by Rod East and the late Gordon Williams and published in the *New Zealand Journal of Ecology* (1984). Their principal findings are listed below.

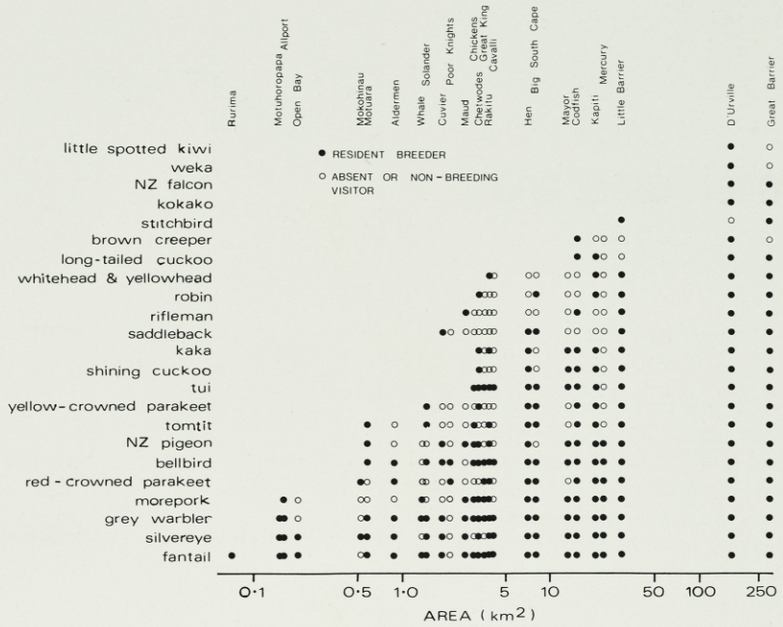

Figure 1: Occurrence of indigenous forest-dwelling birds on offshore islands of different size. For each species, symbols indicating absence are shown only for those islands larger than the smallest occupied as a resident breeder.

Conclusions

- As island size declines, species loss occurs sequentially in a predictable manner
- Apart from the falcon, species restricted to one or both of the largest islands or the mainland (eg brown kiwi) are partially or completely flightless and are endemic
- Species absent from islands of 15-30 km² are dependent on indigenous forests and belong to endemic families
- Other species dependent on indigenous forests occur less frequently as island size declines below 10 km², and are absent from islands of less than 1 km²
- Birds occurring on small islands are not dependent on indigenous forest

There is a disproportionate loss of species showing a high level of endemism and dependence on indigenous forest as the size of the island declines from above 100 km² to below 1 km².

Endangered vs threatened – where to concentrate the effort

Conservation efforts are directed almost exclusively at the highly endangered species – kakapo and takahe, black robin and black stilt, kokako and little spotted kiwi. But the monocular concern with these species is allowing others to enter the self-same category. Some can do so literally overnight, as little spotted kiwi did when the expectation that they occurred in Westland proved incorrect. The present distribution of North Island brown kiwi, great spotted kiwi, yellowhead, rock wren, weka, brown teal and blue duck (in the North Island) provide evidence for justifiable concern. Should we wait until they too become truly endangered before taking direct action? If the answer to that question is "no", does it mean that work on some already endangered species should stop? It would be a courageous decision indeed to abandon a species, but it is one that ought not to be shirked if considered necessary. The belief that the battle to save the kakapo and the black robin is already lost and should be abandoned in favour of species offering better chances of success is not without its supporters.

Islands or mainland

Factors which caused the decline or extinction of species on the mainland may stilll be present and it was logical to prevent total extinctions by establishing remnant populations on largely unmodified islands. But should our conservation horizons not now be extended? Should not our long term aim be to re-establish those species (like stitchbird, saddleback and little spotted kiwi) back on the mainland? What would this involve? When should this be attempted – now, next century or never?

Island biogeographic studies suggest another reason why the mainland ought now to receive greater emphasis. The number of species resident on an island is limited by the island's size. One simply cannot go on adding species after species to an island and expect them all to survive, even in the short-term.

Species or Sub-species

The islands of New Zealand have spawned a number of quite unique island races of mainland species (e.g. fernbirds, snipe, tit, robin, wren). Where do