

RECOVERY PLAN FOR WHITAKER'S SKINK AND ROBUST SKINK

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FOREWORD

This recovery plan is one of a series of Threatened Species Unit publications produced by the Department of Conservation. Recovery plans are statements of the department's intentions for the conservation of plants and animals for a defined period. In focusing on goals and objectives for research and management, and the tasks by which these will be achieved, recovery plans serve to guide the department in its allocation of resources.

Following the preparation of a technical report which was refined by scientists and managers within the department a draft of this plan was forwarded to the N. Z. Conservation Authority and relevant Conservation Boards and other interest groups for comment. After further refinement this plan was formally approved by the Director-General of Conservation on 1 April 1992.

The department acknowledges the need to take into account the views of the tangata whenua and the application of their values in the conservation of natural resources. As the expression of these values may vary between iwi, it is not possible to incorporate these variations within a general theme in all recovery plans. This recovery plan will be refined and implemented in such a way as to ensure that consultation with tangata whenua of the areas in which Whitaker's and robust skinks are present has been carried out. Conservancy Kaupapa Atawhai managers are available to assist this process.

A recovery group consisting of people with knowledge of Whitaker's and robust skinks and an interest in their management has been established to review progress in implementation of this plan and to recommend to the department any changes which may be required as management proceeds. Comments and suggestions relating to the conservation of these skinks are welcome and should be directed to the recovery group leader via any office of the department.

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ABSTRACT

Recovery options are provided for two species of rare endemic lizard, Whitaker's skink (*Cyclodina whitakeri*) and robust skink (*Cyclodina alani*). Distribution of subfossil deposits of these species in sand dunes, caves and midden indicates that they were once widespread over the North Island of New Zealand and on some of the larger islands. The two species are now confined to a fraction of their former range - a few mammal-free islands and, for Whitaker's skink, one highly vulnerable mainland location. The two species coexist at some locations and appear to occupy similar habitats, so recovery options can be defined for both in one plan.

The preferred short term (5 yr) recovery option takes advantage of success with eradication of rodents from islands and proposes translocations of Whitaker's skink and robust skink to islands freed of rats near existing natural populations of these lizards. Achievement of this option would provide a total of six populations of Whitaker's skink and eight populations of robust skink within five years. The long-term option (10 years) is to attempt duplication of most existing populations of both species by combinations of translocations and captive breeding for release. This option should be planned around eradication campaigns against rodents already underway, and to complement restoration of habitats for other species (e.g. rare wets and tuatara) requiring rat-free islands around northern New Zealand.

1. INTRODUCTION

Eight species of the lizard genus *Cyclodina* are endemic to the New Zealand Region. At present only six species are described (Vos 1988). The genus holds some of the rarest lizards in New Zealand, two of which are covered in the following recovery plan. These are the robust skink, *Cyclodina alani* (Robb), which is the largest member of the genus, and Whitaker's skink, *Cyclodina whitakeri* Hardy, which is a medium-sized member of the genus, but is nonetheless one of the largest lizards now found on the mainland North Island. The remaining rare species of *Cyclodina*, including the robust skink, are now confined to islands between Cook Strait and Ninety Mile Beach (Pickard and Towns 1988).

Whitaker' skink reaches 20 cm length and 20 g weight. It can be spectacularly marked with gold spots on a dark brown to black background (see Robb 1980, Towns 1988a). The species was apparently first discovered at Pukerua Bay near Wellington by collectors in the 1960s. A second population was subsequently found on Middle Island in the Mercury Group, and the species was formally described by Hardy (1977) with Middle Island as type locality. In the early 1980s a third population was discovered by Macredie (1984) on Castle Island off the Coromandel Peninsula. Despite intensive searches at likely locations around Wellington and on northern islands no further populations have been found.

The robust skink is an extremely robust, large-bodied skink with a short blunt head and strikingly large eyes. Adults in the Mercury Islands can reach over 25 cm in length and up to about 60 g weight (Robb 1980, Towns 1991), but in captivity even higher weights (80 g) have been recorded (I. McFadden pers. comm.). Robust skinks were first discovered in the Mercury Islands and Moturoa Islands between 1962 and 1968 and described by Robb (1970). The species was placed in *Cyclodina* by Hardy (1977) and later recorded from Castle Island (Macredie 1984) and Matapia (Motupia) Island (see Pickard and Towns 1988).

Whitaker's skink is listed in the Red Data Book of New Zealand as "vulnerable" (Williams and Given 1981) and has been recommended for listing in the IUCN Red Data Book (the edition on lizards has yet to be published). Bell (1986) lists the species as "threatened", with "limited distribution". Whitaker's skink is therefore one of the highest rated of the officially listed lizards in New Zealand.

The robust skink is listed by Williams and Given (1981) as "rare" and has been recommended for listing in the IUCN volume on lizards. Bell (1986) gives the species the same rating as Whitaker's skink: "threatened", with "limited distribution".

Whitaker's skink and the robust skink overlap in range and in habitat use. At some locations, therefore, recovery action can be undertaken to benefit both species so both have been covered in this recovery plan. The plan also seeks to co-ordinate recovery options for these lizards with other species likely to require management at the same locations. Rather than single-species management restoration of biotic communities is therefore advocated at some locations.

Preferred options for recovery are outlined below within a five-year timetable. Implementation of the recovery strategy will be assisted by a recovery group with the following composition:

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2. PAST AND PRESENT DISTRIBUTION

2.1 Past distribution

Whitaker's skink and the robust skink have a relict distribution pattern similar to a number of reptile species once widely distributed in lowland forest throughout the North Island (Towns et al. 1985). A much wider previous distribution for both skinks can be inferred from subfossil and midden remains of tuatara (a species often sympatric with these skinks) (e.g. Whitaker 1978, Worthy 1987a), from the discovery of Whitaker's skink remains in central North Island cave deposits, and from the widespread occurrence of robust skink remains in sand dune, cave, and midden deposits throughout the North Island (Worthy 1987b) (Figs. 1, 2).

2.2 Present distribution

2.2.1 Wild populations

Three natural populations of Whitaker's skink separated by up to 500 km remain: Middle Island (Mercury Group), Castle Island (off Hotwater Beach, Coromandel Peninsula) and Pukerua Bay (Macredie 1984, Towns 1985b) (Fig. 1). A fourth population was released onto Korapuki Island (Mercury Group) in February 1988 using Middle Island stock (Towns et al. 1990a, Towns 1991). Robust skinks coexist with Whitaker's skink on Middle and Castle Islands and also occur on Green Island (Mercury Group) and two islands off Northland (Matapia and Moturoa) (Fig. 2). In north-south sequence the lizards occur in Aupouri (robust skink), Coromandel (both species) and Sounds-Wellington Ecological Regions (Whitaker's skink), and in Aupouri (robust skink), Mercury Islands, Tairua (both species) and Wellington Ecological Districts (Whitaker's skink). The secretive nature of these lizards means that the status of individual populations is difficult to determine accurately by any known census method (e.g. Towns in press). A rough measure of security can be given from area potentially occupied, although it must be understood that this assumes equal habitat quality and uniform habitat occupancy. On this basis the largest and most secure population of the robust and Whitaker's skinks is on Middle Island (13ha) and the smallest population of either

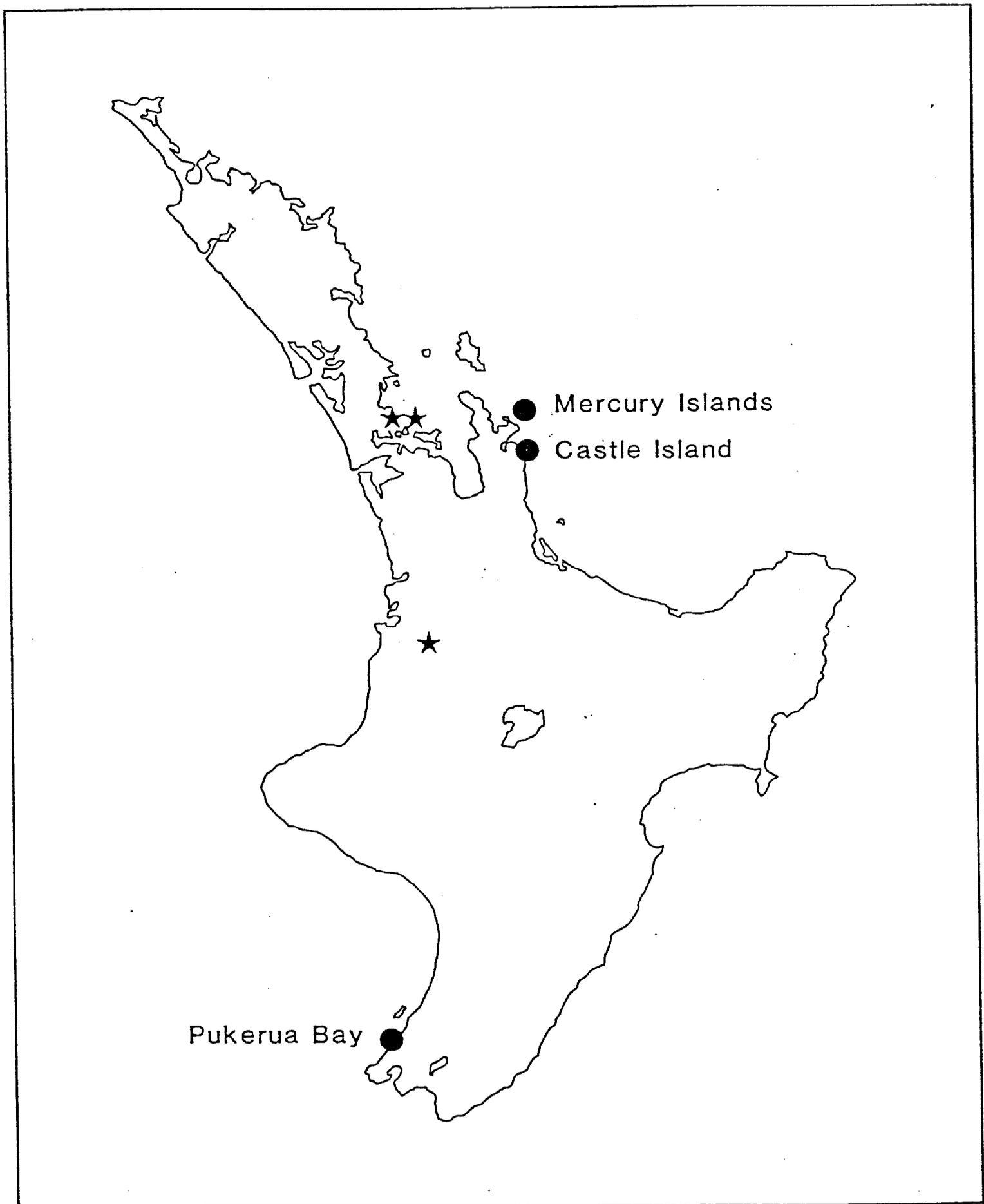


Figure 1. Whitaker's skink: geographic range of extant populations (circle) and subfossil deposits (star) containing locally extinct populations (from Worthy 1987, Pickard and Towns 1988).

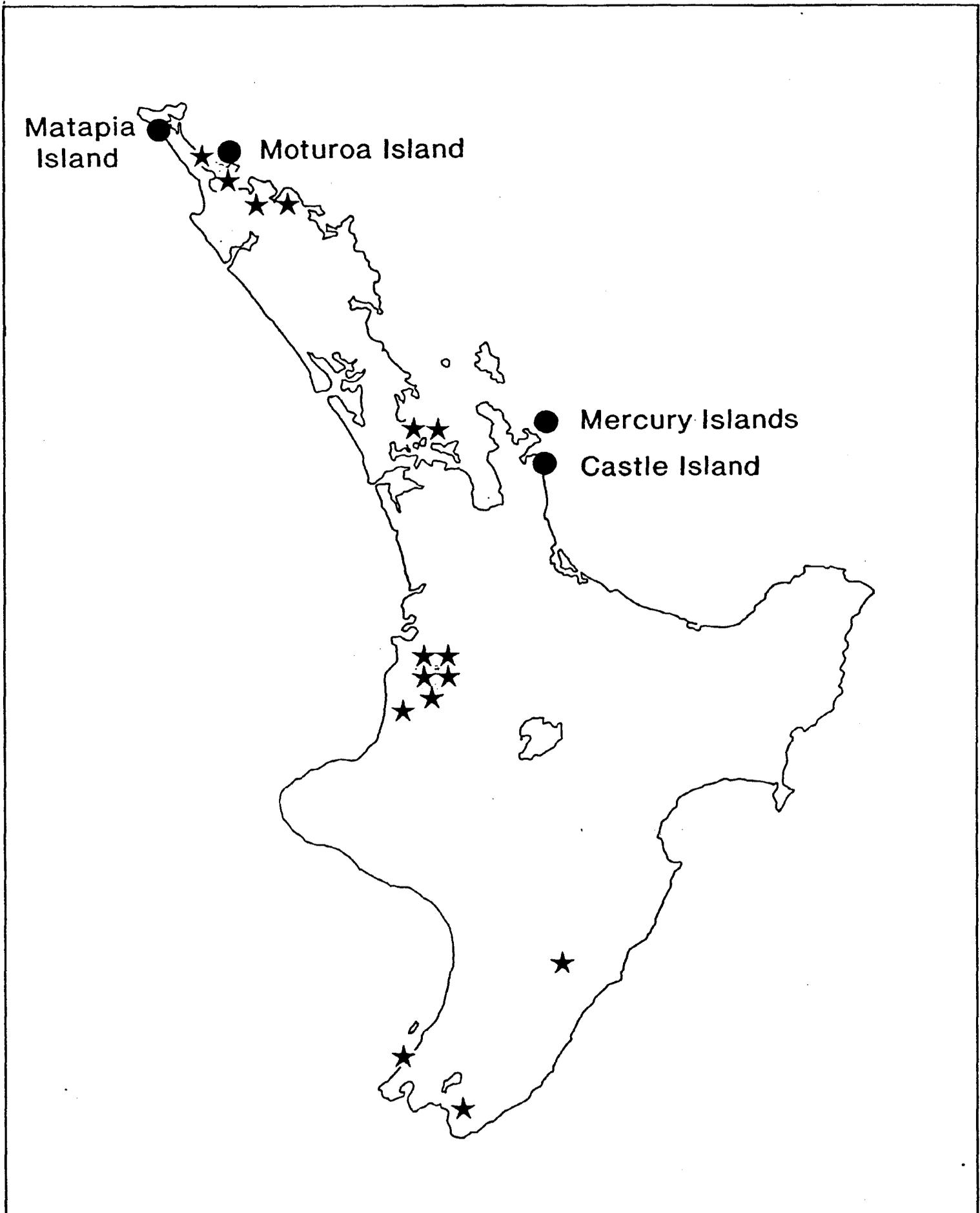


Figure 2. Robust skink: geographic range of extant populations (circle) and subfossil deposits (star) containing locally extinct populations (from Worthy 1987, Pickard and Towns 1988, M. Horwood pers. comm. 1991).

species is that of Whitaker's skink confined to less than 1 ha of available habitat at Pukerua Bay (see also Appendix 3).

A few rat-free islands off northern New Zealand, such as Piercy Island (Cameron and Taylor 1991), have yet to be surveyed adequately for lizards. Most of these islands are small (< 5 ha), and if either Whitaker's skink or robust skink were discovered on them, their presence would not add substantially to total inhabited area. However, populations on small islands might have considerable value from a genetic perspective.

The single mainland population of Whitaker's skink has also been affected by habitat destruction for farming and removal of lizards for private collections. By the early 1980s Whitaker's skink was regarded as possibly extinct at Pukerua Bay (D.G. Newman pers. comm.) and was only relocated following intensive surveys (Towns 1985b, Towns in press).

2.2.2 *Captive populations*

Whitaker's skinks in captivity have been held by the Department of Conservation for research purposes. One group, originally of 10 animals, is of Castle Island stock, and the second group of six animals originated from Pukerua Bay. There is no co-ordinated breeding programme for these animals at present, but one should be developed now that research needs are completed.

A breeding programme for robust skinks was initiated by the New Zealand Herpetological Society in about 1985 (Porter 1988). The programme was based on the consolidation of collections separated by source location so that populations would not be mixed. At present the programme involves up to four breeders holding a total of about 20 animals that have originated from Moturoa Island and Castle Island.

3. ECOLOGY OF ROBUST AND WHITAKER'S SKINKS

The following information summarises more detailed accounts of the biology of Whitaker's and robust skinks (Appendix 1).

Whitaker's skink is crepuscular/nocturnal, often being most active soon after dark (Southey 1985; Appendix 1). They may forage within seabird burrow complexes and boulder banks, emerging onto the surface infrequently and probably forming their own burrows. The species is most commonly seen in and around seabird burrows and in accumulations of leaf litter (Southey 1985). At Pukerua Bay Whitaker's skink inhabits stable greywacke scree at the base of coastal hills (Towns 1985a). Capture rates at Pukerua Bay indicate that Whitaker's skink has a very narrow temperature preference for activity, 15-20°C. Measurements of conditions inside burrows and in rocky banks in the Mercury Islands indicate that these would provide environments with a high humidity (near saturation) (Towns in press).

The robust skink is strongly nocturnal and lives under rocks or inhabits seabird burrows, tree stumps and fallen logs, generally in well-vegetated areas (Robb 1986, Southey 1985, Towns et al. 1985). A study by Southey (1985) on Middle Island defined aspects of habitat use by

the robust skink, Whitaker's skink and the related marbled skink (*Cyclodina oliveri*). Robust skinks were the most conspicuous of the three species, and were frequently found at night on the forest floor where they fed on a wide range of invertebrate prey.

4. THREATS TO LONG TERM SURVIVAL

4.1 Predation and habitat loss

The reduction in range of most populations of Whitaker's skink, and of all populations of robust skink, to locations free of introduced mammalian predators, indicates that these species are vulnerable to rodents, cats and mustelids (Whitaker 1978, Towns and Robb 1986). Both species appear to be highly vulnerable even to kiore or Pacific rats (*Rattus exulans*) (Towns et al. 1985, Towns in press). However, the two species are absent from some islands naturally free of rats, so other factors such as previous disturbance and time since island formation probably have also influenced distribution.

The two island sites where Whitaker's skink and the robust skink coexist (Middle and Castle) are small and inhabited by biotic communities highly vulnerable to invasion by rodents. This is especially the case on Middle Island because it is less cliffbound than is Castle. Middle Island is also a rather unstable island that in places is undergoing rapid erosion. Castle Island may be more resistant to natural erosion, but has been affected by habitat destruction during marine survey exercises (I.A.E. Atkinson pers. comm.).

The Pukerua Bay location of Whitaker's skink was apparently once under coastal broadleaf forest, but by 1985 most forest had been cleared and replaced by rough pasture and low coastal shrubs (mostly *Coprosma propinqua*). The few remaining stands of trees were rapidly diminishing due to wind damage and lack of understorey vegetation. In 1985 most of the actual and potential habitat of Whitaker's skink at the Pukerua Bay site was purchased by the Crown, much of the coastal hillside was fenced and stock were excluded. The reserve area still (1991) has to be gazetted and currently is Department of Conservation land without reserve status. With eradication of wandering goats, coastal vegetation is now regenerating. However, there is still evidence of habitat disturbance, presumably by lizard collectors. Wildfires are a constant threat at Pukerua Bay. Parts of adjoining Porirua City Council Recreation Reserve were extensively burned in the early 1980s and again in early 1990. There are also many exotic predators at this site, including mice, cats, rats and mustelids. These will represent a continual threat, because the close proximity of Pukerua Bay township means that some kinds of predator control (e.g. poisoning) may not be feasible (Towns in press).

4.2 Unprotected habitat

Castle Island is Department of Conservation Stewardship land without any reserve designation, so the rare skink populations there are not given a high level of security.

Neither Matapia nor Moturoa Islands are covered by sanctuary agreements (Appendix 3), and Moturoa in particular is vulnerable to escaped rodents because of the absence of restrictions on landing, and to the effects of activities on the neighbouring islands.

To date, therefore, legal protection and safety from introduced predators is only provided in the Mercury Group where the Middle Island and Korapuki Island populations of Whitaker's skink, and the Middle Island and Green Island populations of the robust skink occur. The vulnerability of these three locations in the Mercury Group, and the need for constant surveillance, was demonstrated by the discovery of a ship rat (*Rattus rattus*) on Korapuki Island in 1988.

5. ABILITY OF THE SPECIES TO RECOVER

Prospects for a substantial increase in the number of robust and Whitaker's skinks are limited by the availability of locations free of disturbance and of introduced predators. The first step in the recovery of Whitaker's skink was taken with the experimental release of 25 individuals onto Korapuki Island following eradication of kiore (Towns 1988b). The choice of locations for this release was based on ecological studies of this and related species conducted at Pukerua Bay (Towns 1985a and unpublished) and on Middle Island (Southey 1985). The continued survival of the lizards released on Korapuki Island indicates good prospects for substantial expansions in the number of populations (Towns et al. 1990a). This expansion is dependent on finding locations suitable for removing rodents. Given the current eradication campaigns now underway or being planned within the geographic range of Whitaker's skink and the robust skink there are prospects to significantly increase the number of populations of both species.

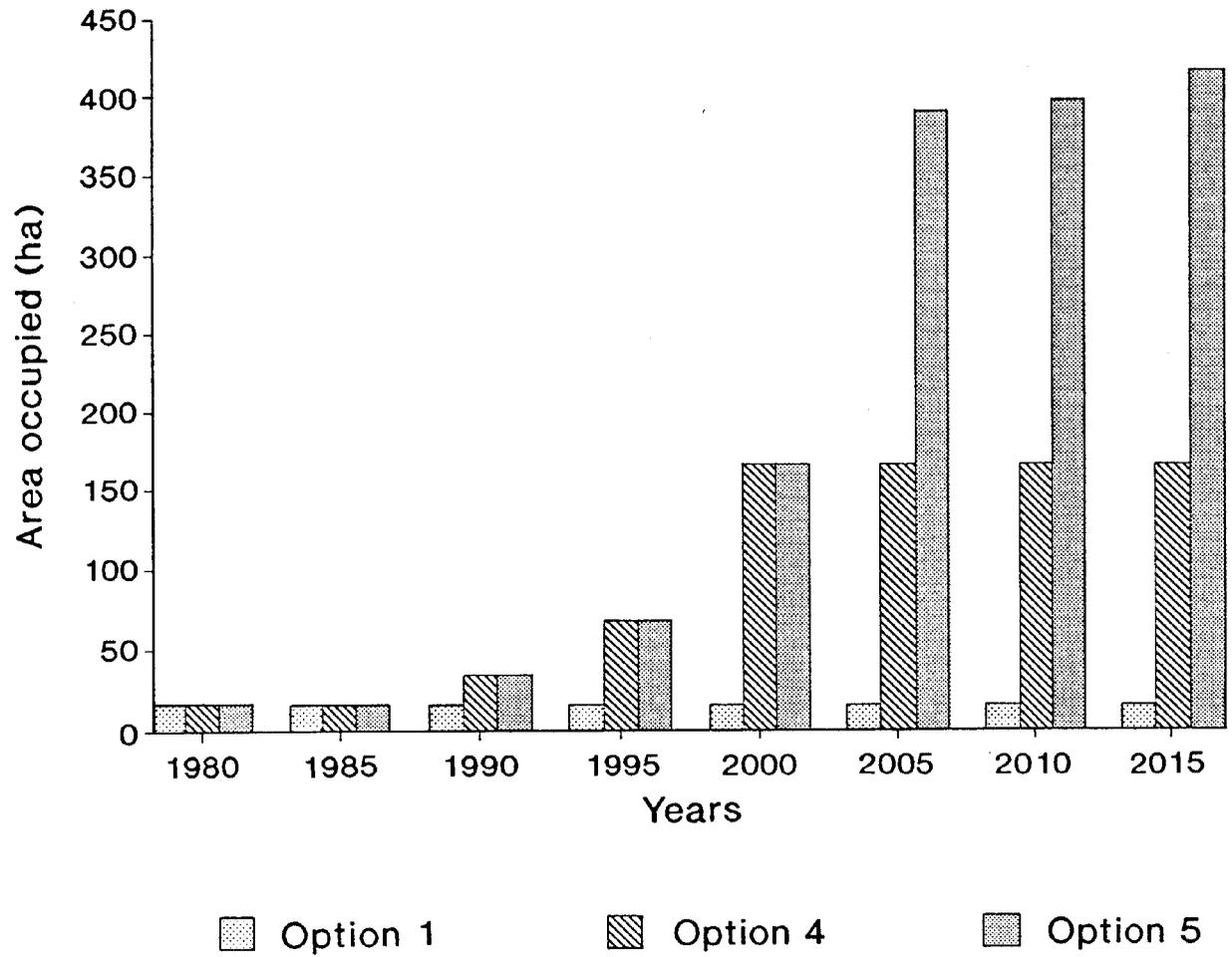
There is also capacity to improve the habitat quality, and therefore long-term prospects, for Whitaker's skink on the mainland at Pukerua Bay. Whitaker's skink is highly prone to desiccation compared with other lizards (Cree and Daugherty 1991) suggesting that efforts to improve vegetation cover at Pukerua Bay (Towns 1985c), and thus raise ambient humidities, could enhance the population there.

6. OPTIONS FOR RECOVERY

Six options for recovery in the wild are presented below (Fig. 3). They are presented as points in a continuum covering degree of recovery because mutually exclusive alternatives could not be identified. The options range from do-nothing options (1 and 2) to the ideal option (5), but all of the management options (2-5) are achievable. Options 3-6 are presented as additions to option 2. Options 2-4 focus on the Mercury Islands because they are among the few islands available in the short term that are in Crown control. In view of their demonstrated ability to co-exist, some joint projects involving Whitaker's and robust skinks are proposed.

Option 1. **No management and no Crown initiatives either in land acquisition or in management partnerships (Fig. 3).** This option was rejected for Whitaker's skink in 1985, when rodent eradication from Korapuki Island was planned and the Pukerua Bay site was purchased. Without the latter initiative it is likely that the Pukerua Bay population of Whitaker's skink would have become extinct - probably within the next 10-20 years. Preservation of Whitaker's skink would therefore have relied largely on Middle Island, with Castle Island remaining as a second population of uncertain status. With luck Whitaker's

Recovery options – Whitaker's skink



Recovery options – Robust skink

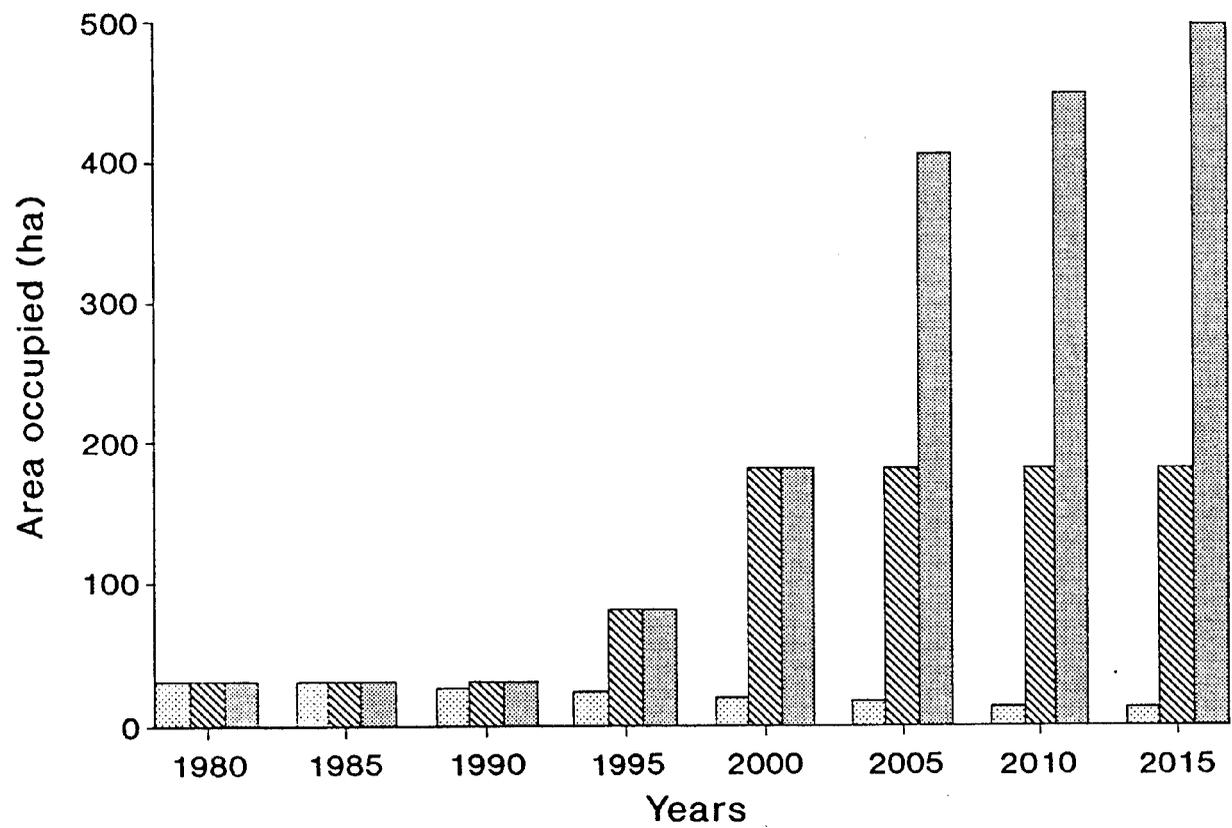


Figure 3. Recovery targets for Whitaker's and robust skinks based on do nothing (1), preferred (4) and ideal (5) options.

skink would have retained a total occupied area of about 16 ha. Similarly, this option for the robust skink would mean protection relying on Middle and Green Islands, without any clear directions or agreements for the management of the Matapia, Moturoa and Castle populations. This could result in the loss of one or two populations due to invasions from rodents, resulting in a total potential habitat of 15-30 ha.

Option 2. All management effort to be concentrated on the natural populations and one new population on Korapuki Island. For Whitaker's skink this option relies on consolidation of recent gains, as well as securing the Pukerua Bay and Castle Island populations both practically and administratively. This action should result in Whitaker's skink eventually occupying an area of 35 ha, or a 200% increase on the situation to 1988, prior to the reintroduction to Korapuki Island.

Within the next two years the robust skink should be reintroduced to Korapuki, the success of which could provide an area occupied of 50 ha or a 156% increase of the present situation. This action would also provide a third population under Department of Conservation control. In addition to Castle Island, further efforts will be required to achieve management agreements over the two northern populations of robust skink.

Although not strictly a "do nothing" option, this option is certainly a "do little" one and should be regarded as the absolute minimum effort required for both species.

Option 3. Establishment of at least one further island population for both species in addition to their establishment on Korapuki. The most suitable site immediately available is Double Island (Mercury Group). Like Korapuki, Double Island is close to the source location, thereby minimising translocation difficulties (Towns et al. 1990b). Double Island had kiore until 1989, but unlike Korapuki, has never been inhabited by rabbits. The diversity and quality of forest vegetation is therefore far higher than on Korapuki (I. McFadden, I.A.E. Atkinson pers. comm.), thus providing high potential for rapid recovery of litter invertebrates. Successful establishment of Whitaker's and robust skinks on Double Island would represent a 400 % and 260 % increase of area occupied by the two species (respectively) compared with 1988.

Reintroduction of the two skinks to Double Island could be commenced within 36 months. This should be regarded as an inexpensive achievable option that depends on confirmation within 12 months that Double Island is free of kiore and that invertebrate populations are recovering (see also Appendix 4).

Option 4. Establishment of two further island populations in addition to Korapuki. (Fig. 3). In addition to Double Island a third population could be established in the Mercury Islands on Stanley Island. Until 1991 Stanley Island was inhabited by kiore and rabbits. Confirmation of the successful removal of these two species is expected in 1992. Whitaker's skinks have shown the ability to establish on Korapuki Island following removal of rats and rabbits, and Stanley Island would be suitable for both Whitaker's and robust skinks. Although the eradication campaigns are aimed at protecting a relict population of tuatara (*Sphenodon punctatus*), careful planning and sequencing of reintroductions should enable all three reptile species to re-establish on different parts of the island. The three species co-exist naturally on Middle Island.

Reintroduction of Whitaker's and robust skink to Stanley Island should be achievable within five years and could lead to a 990% and 570% increase in area occupied by the species respectively compared with 1988. This option is regarded as a realistic and achievable preferred short-term goal for which the eradication campaigns are already being planned.

Achievement of this option would provide a total of six populations of Whitaker's skink and eight populations of robust skink with the potential for some of the populations to become very large. It would also enable a review of the conservation status of the two species.

Option 5. Duplication of most populations of each species. (Fig. 3). With eradication and restoration programmes being planned for various reasons throughout much of the range of Whitaker's and robust skinks, the ideal long-term option would be for duplication of at least the Wellington population of Whitaker's skink and Castle Island population of Whitaker's and robust skinks, as well as the Mercury Island ones (Options 2-4).

With eradication of rats from islands near North Cape (Motuopao), there are prospects also for duplication of the Matapia population of robust skink.

Suitable locations will need to be identified in the Wellington area for Whitaker's skink, and these should be considered when additional eradication campaigns are being planned in this ecological district. There are potential habitats on Kapiti Island, but these cannot be exploited while the island is inhabited by rats. In the long term robust skinks could be reintroduced to Mana Island, but only when sufficient forest cover has been provided.

The Castle Island Whitaker's and robust skinks should be considered if restoration programmes are undertaken in the Ohinau and other islands in Mercury Bay. In addition, if plans proceed to preserve the tuatara population on Red Mercury Island by removal of kiore in 1992, reintroduction of Whitaker's and robust skinks should be considered as part of the restoration plan.

Establishment of the two skink species on Red Mercury in addition to Double and Stanley Islands would by itself represent about a 2500 % and 1275 % increase in area occupied (respectively) compared with 1988. **This should be regarded as the preferred long-term option for the two species.**

Option 6 . Proceed with option 5, but include additional islands within the historic geographic range as possible transfer sites.

Increasingly ambitious eradication campaigns are being proposed, including one to eradicate all mammalian predators and restore Rangitoto/Motutapu Islands (Craig 1990). These proposals have a strong advocacy component and could well be successfully conducted with existing technology -- but not with existing funds. Public support could be sufficient to enable such projects to proceed, so planning for a successful outcome should include identification of suitable sources of lizards for these islands (Appendix 2). This should be regarded as a possible long term option for the two species.

The preferred short-term option (4) could be met within five years of approval of the plan. The long-term option (5) could be achieved within 10 years of acceptance of the plan and should be met within 20 years.

Whether the preferred short-term (4) and long-term (5) options can be met depends on:

1. The ability to eradicate kiore from large islands (for which the impact of these operations on kiore is discussed in Appendix 5).
2. Adequate in-house support through completion of required research, and public support through effective advocacy.

7. RECOVERY STRATEGY: GOAL AND OBJECTIVES

LONG-TERM GOAL: To maintain and enhance existing populations of Whitaker's skink and the robust skink, and to improve their conservation status by establishment of at least three new populations of both species by the year 2000.

Establishment of new populations will be as part of a restoration programme in the Mercury Islands Ecological District. The programme involves projects that are underway or have received financial commitments for their completion. They involve a community approach to conservation and enhancement of invertebrates, lizards and tuatara.

OBJECTIVES:

The following objectives are developed on the assumption that:

- (a) Options 2-4 above would be approached in approximately chronological sequence;
- (b) Options 5 and 6 would be reviewed and planned at a later date but short term planning should accommodate them as a possibility.
- (c) Surveys for additional populations of these species on small, rat-free islands would continue as opportunities arise.

1. Eradicate rodents from large islands

Development of cost-effective mechanised techniques for the dispersal of rodenticide on islands of more the 50 ha.

2. Determine strategies for translocation and monitoring of Whitaker's and robust skinks.

Use translocated populations of Whitaker's and robust skinks to determine survivorship, rates of expansion of populations, extent and rate of movement from release sites, and ideal numbers, size and demographic structure of animals to be released.

3. Determine the rate and form of invertebrate recovery following removal of rats, and their role as potential food species for reintroduced lizards.

Monitor litter invertebrate communities on at least one island, determine whether key groups have been eliminated by previous disturbances and predation by rats, and develop techniques for enhancement of invertebrate populations.

4. Determine causes for vulnerability to extinction.

Investigate the extent to which unusual water-loss characteristics could effect future management options.

5. Maintain captive populations of both species.