Translocation of Species using Islands

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Abstract

The principles, objectives and procedures of translocation are examined and illustrated by some case studies.

INTRODUCTION

The moving of animals from one place to another is not new. It occurred with the early expansion of native peoples, e.g. the Polynesians in the Pacific took the dog (*kuri*) (*Canis familiaris*) and the rat (*kiore*) (*Rattus exulans*) with them. The pattern continued with European explorers and colonists. These transfers of species had the specific aim of providing food and sport or were for purely aesthetic reasons. Today translocation of species is being successfully used as a management technique for conservation.

The use of islands for this work has distinct advantages over mainland or continental situations because they are isolated from external influences or can be rehabilitated (Bell, 1989). New Zealand is particularly fortunate in this regard as it has wide variety of islands and most reflect similar habitats to that on the neighbouring mainland. However, when we come to select an island for a particular requirement the choice is still very limited (Atkinson 1989). The value of islands is also evident in the number of species which have survived on them but which have succumbed to habitat modification, competition and predation on the mainland. These populations are a source for translocation programmes.

Historically, translocation for conservation purposes began in New Zealand just prior to the turn of the century when Richard Henry transferred c. 400 kakapo (*Strigops habroptilus*) to Resolution and other islands in Dusky Sound, Fiordland, (Williams) 1956). His efforts were thwarted by the invasion of these islands by stoats (*Mustela erminea*). In the early part of the century (although records are far from complete) kiwi (*Apteryx* spp.) were transferred to Little Barrier and Kapiti Islands and buff weka (*Gallirallus australis hectori*) were moved to the Chatham Islands. These latter moves were designed more to enhance the island rather than to conserve the species. In retrospect two of the transfers saved the species; little spotted kiwi (*Apteryx owenii*), and the buff weka, have subsequently disappeared from the mainland. In the 1920s-1950s efforts were made to transfer North Island saddleback (*Philesturnus carunculatus rufusator*) then confined to Hen Island, but these failed probably because an insufficient number were transferred. Later moves were successful.

Translocation has become a recognised tool of management but today there are some major differences as many of the species are endangered, some critically. Several moves have been emergency operations. The major differences between these and earlier operations are, that whereas earlier transfers could afford to have some losses because they could be repeated, in a number of more recent cases we had only one chance; any loss would have been total extinction for the species involved.

PRINCIPLES AND OBJECTIVES

Before undertaking any translocation it is necessary to set the objectives. These should be both immediate and long-term. The primary objective is usually the security of the species. In achieving this policy one should consider some principles. Wherever possible, the species should be maintained in its existing habitat; for example, the North Island kokako (*Callaeas cinerea wilsoni*) should be retained in its North Island forest habitat. Moves to Little Barrier Island are only for additional security.

Where moves are contemplated, islands where the species formerly occurred should be used if this is practical, that is, if the original problems which resulted in local extinction are removed. For example, the removal of cats (*Felis catus*) from Little Barrier Island preceded the re-introduction of saddleback. If such a habitat is not available then one should be selected within the geographical range if possible. North Island species should be restricted to North Island islands and, similarly, South Island

species to South Island islands unless there are compelling reasons for doing otherwise.

Obviously not all requirements can be met and sometimes it will be necessary to move outside these guidelines in the case of a critically endangered species, or where the species is confined to an isolated island group and there is no alternative, for example, the Antipodes Island green parakeet (*Cyanoramphus unicolor*). Some islands must be specifically excluded from translocation programmes as they are too important in their own right because of their unmodified nature or very specialised ecology, the Poor Knights for example.

Longer term objectives could include reinstating the species back in its original habitat. This presumes that some of the problems facing it originally have been removed. The usual reason is to provide a secure habitat for species endangered elsewhere. A new island population can also be used as a reservoir for future transfers either to other island habitats or to its original mainland habitat, again presuming the cause for the demise of the species locally has been corrected.

The programme could also be used to "teach" a species to cope with a wider range of predators. In effect, this is a process of speeding up natural selection but it is wasteful as it involves a succession of liberations to compensate for high mortality. The introduction of North Island saddleback to Kapiti is an example of this. Aiming to get saddlebacks to a stage where they could survive in the presence of Norway rats (*Rattus norvegicus*) 300 birds were released over a 3 year period but as anticipated few of these survive today. Although the project showed some promise it was abandoned, primarily because of a shortage of resources which had to be directed to more urgent priorities.

A further reason can be to make rare and endangered species available to the public by transferring them to a more accessible "open" island. This reduces the pressure on the critical habitats and at the same time encourages the support of the public, a very necessary element in any conservation programme. A final objective could be to maintain the diversity of the gene pool. This could apply to both offshore and mainland (ecological) islands isolated by habitat modification.

PROCEDURES

Over the first few years of the programme the Wildlife Service developed a number of operating procedures as a guide to such translocation work. At the same time the Survival Service Commission published a set of guidelines for such work and for taking species into captivity (Anon 1969). These are summarised as follows:

1. The project should be under the supervision of the appropriate conservation agency.
2. It must be thoroughly planned through all stages and under the direct supervision of experienced personnel.
3. Removal of birds from a population should not jeopardise the viability of the original population unless it is in imminent danger of extinction.
4. A sufficient number should be transferred to ensure there is a reasonable chance of a population establishing.
5. Relocations should be made only into suitable habitats or to one which has been prepared to receive the species concerned.

When time permits, and often this is not possible, research should be carried out to determine the species' requirements and use of the habitat. It is also essential to assess the new habitat to see if it provides all these requirements or as many as possible.

In emergency situations it may be necessary to take an intuitive guess (Bell 1978) but even then the process contains the same elements of assessment if reduced to the bare minimum.

A word of warning needs to be sounded with regard to habitat studies. In many cases where a species has retreated in range or has been reduced to low numbers, its present habitat is not necessarily the preferred one. The species may have persisted there because some factors are absent or have had less effect than in its former preferred habitat, e.g. a habitat less favoured by predators or competitors.

Much of the research will have to be of an experimental nature to determine the adaptability of the species involved and to see what techniques can be used. Such questions as means of capture, the species' reaction to trapping, handling and temporary captivity, acceptance of food in temporary confinement, and ability to expand from the small founder population have to be answered. This experimental work can be tested with a commoner related species if one is available. A source of considerable skill in this field is available from avicultural and zoological people, many of whom have had long experience in handling birds, including such techniques as anaesthetics and stress suppressants.

The actual methods of catching and moving species varies from one to another. They can range from the use of mist nets, drift-traps, clap-traps,

cannon nets etc through to the use of dogs and hand nets. Irrespective of the method, the well-being of the individual bird is paramount. The caging and transfer of the birds falls into two main categories. Quick capture and immediate transfer is possible if using islands close by. This reduces the stress to a single period involving capture, transfer and establishment in the wild.

The second, where the translocation site is more distant, involves the stress associated with capture followed by a period in captivity while the birds adjust to confinement. This is followed by a further period of stress when the species is transferred and released. The actual transfer can be done in small confined boxes where feeding is difficult but the bird is kept in a dark environment with a minimum of disturbance. The alternative is to use a larger cage where the birds are able to feed. If the species will adapt to this it has many advantages. We have even had some birds which have increased in weight during transport. The wire front to the cage needs to be covered on the inside with scrim or hessian to cut down the light and reduce disturbance. It is essential to determine before holding and transporting the birds whether it is possible to handle them as a group, or pairs or as individuals. While guidelines can be established, the operator has to have sufficient flexibility to adapt these for his immediate needs as no two situations are identical.

Following release it is essential that the population be monitored. At a bare minimum all released birds should be banded so that breeding can be assumed if a bird is seen without a band. In other cases more detailed studies involving individual colour banding or radio telemetry may be warranted. The more information that can be gathered without causing unnecessary disturbance, the easier it will be to identify any reasons for the population's failure to establish. What level of disturbance is acceptable is the critical issue.

CAST STUDIES

We can look at the implementation of some of these principles and methods in some practical examples from New Zealand. In 1964 we began our current translocation policy with the transfer of North Island saddleback from Hen Island to Middle Chicken. North Island saddleback, restricted to Hen Island, was considered to be endangered as long as it remained on the one island, an "all eggs in the one basket" situation. The policy was to correct this, and then tackle other species of similar status. Before any move was made studies were carried out to learn the habitat requirements of saddleback. A feeding study was made (Atkinson 1964, 1966) which showed what foods were important at different seasons and where birds were feeding in the habitat. An examination of islands in the Hauraki Gulf showed that several appeared to provide suitable habitat. Transfers from Hen Island were made to Middle Chicken Island in 1964, Red Mercury Island in 1966, and Cuvier and Fanal Islands in 1968. A transfer from Middle Chicken to Big Chicken (Marotiri) Island was made in 1971 (Merton 1975).

The birds were caught in mist nets. J. Kendrick developed the use of play-back tape-recorded song to attract the birds to the nets which proved very effective. Later this technique was improved by using speakers positioned on either side of the net so that the calls could be switched from side to side to draw the bird into the net. It has also been found that far better results can be obtained using the local song dialect rather than one from further away. This often means the local song has to be recorded before trapping can begin. Play back calls can also be used in association with mounted specimens or models which can be made to move by pulling strings.

It was fortunate that this programme had begun, because later in 1964 the Wildlife Service was faced with a crisis when ship rats (*Rattus rattus*) were found to have invaded Big South Cape Island off the south west corner of Stewart Island. This island and two neighbouring islets were the final refuge for three subspecies of birds.

There was no time for detailed studies but several islands were checked for suitability while the recovery team was on its way to Big South Cape. Finally, Big Island and Kaimohu were selected as the most suitable islands immediately available.

Because of the remoteness of the islands and the inclement weather in the region (the transfers were made in winter) it was necessary to build a holding aviary for the birds while awaiting transport. The actual transfers were made in darkened boxes. South Island saddleback (*P. c. carunculatus*) were successfully re-established but Stead's bush wren (*Xenicus australis steadi*), while persisting for four years after transfer, failed to establish. This was probably because only 6 birds could be caught (2 of which died before we learnt how to handle them). This was possibly insufficient to establish a population although other species have been established from a similar number (see below). The demise of the wren was a tragedy as this was the sole surviving race of this endemic species. We were also unable to catch sufficient numbers or maintain alive the Stewart Island snipe (*Coenocorypha aucklandica iredalei*). This also became extinct although other races occur on subantarctic islands.

Since the initial transfers both races of saddleback have been transferred to a number of islands. The North Island race is now very secure as it is firmly established on ten large islands. It has been possible to introduce it to less favourable habitats to (i) make it available to the public, and (ii) to try to adapt it to a wider range of predators. Although this latter attempt appears to have failed, when time and funds are available it may yet prove possible. Although the South Island race has been established on 9 small islands it still needs to be established on a large island to secure its future.

One of the better publicised translocations is that of the black robin (*Petroica traversi*) in the Chatham Islands but much of the detail and planning is not well known. The precarious position of this species was recognised for many years and a census in 1968 showed some 18 birds remained on Little Mangere Island. A scientist was employed in 1972 to study the related South Island robin and to extrapolate these studies to the black robin during limited visits to the island. The studies were mainly biological but failed to produce any real answers apart from one experimental research project to test the ability of South Island robins (*Petroica a. australis*) to establish a population on an island from only 2 pairs. This was achieved on both Motuara and Allports Island (Marlborough Sounds). This gave hope for relocating the black robin.

By 1974 it was recognised that the black robin population was declining and the habitat was deteriorating, partly as a result of climatic changes and partly because of modification by man. By 1975/76 the population had fallen to 9 individuals. A decision was taken to move one of the pairs to neighbouring Mangere Island which was regenerating after years of grazing, although only a small bush remnant remained.

The transfer was planned for September 1976 and the best staff available were assigned to the job. On arrival the party found the position more serious; only seven birds remained and of these only 2 were females. They decided that it was inadvisable to separate the two established pairs so took the brave step of transferring both pairs plus a "spare" male. The male was moved first to try out all procedures - communications, transport, caging, catching and release techniques.

Following this initial transfer the recovery of the species was incredibly slow and as only one female bred successfully the fate of the species hung in the balance. In 1980 a programme of cross-fostering eggs using other species was begun. This increased productivity more than one hundredfold and the species appears now to be on the way to recovery. Cross-fostering and manipulation are other techniques than can assist endangered species and are mentioned here only because there are times when a translocated species may require additional management to become established.

While I have concentrated on the translocation of birds and the two case studies relate to passerines, bird translocations have covered a wide range of families, see Table 1. Most have involved moving wild-bred individuals from one place to another but at times captive-reared populations have been used. The techniques outlined above have been used with various modifications. A new method will be used to re-locate petrels. It has already been shown that petrel eggs can be moved to a burrow in a new location using another species to incubate them and raise the chick (Byrd *et al.*) 1984). The new proposal involves moving a significant number of chicks to a new location after the parents have deserted them just prior to fledgling. They will be placed in either abandoned burrows or artificial ones. There will be a need to encourage the progeny to establish on the new site once they have reached breeding age. This can be done by scenting the area with petrel oil and by playing tape recordings of their calls. Two experiments are planned: (i) to transfer black petrels (*Procellaria parkinsoni*) from Great Barrier to build up depleted numbers on Little Barrier (as a result of cat predation - cats now removed), and (ii) to establish fluttering shearwater (*Puffinus gavia*) on a totally new island although within its breeding range.

Table 1
Bird species translocated in New Zealand by Wildlife Service

Ratites	North Island brown kiwi, little spotted kiwi
Procellariiformes	Black petrel, fluttering shearwater*
Anatidae	Paradise shelduck (Tardorna variegata), brown teal# Anas aucklandica chlorotis), New Zealand scaup# (Aythya novaeseelandiae).
Rallidae	North Island weka (Gallirallus australia grey), takahe (Notornis mantelli)
Charadriformes	[Shore plover], Chatham Islands snipe (Coenocorypha aucklandica pusilla), [Stewart Island snipe]
Columbidae	Chatham Islands pigeon (Hemphaga novaeseelandiae chathamensis).
Psittacidae	Kakapo (Strigops habroptilus), red-crowned (Cyanoramphus n. novaezelandiae) and Antipodes green parakeet.
Passerines	[Stead's bush wren], South Island and Chatham Island black robin, stitchbird (Notiomystis cincta), saddleback (both races), North Island kokako.

*proposed
#ex captivity
[ ]unsuccessful

(Note - the Great Barrier transfer has taken place since the paper was presented)

These programmes while helping the black petrel in particular, are aimed primarily at proving a technique that may be essential for saving a species such as the Chatham Islands taiko (*Pterodroma magentae*).

The Wildlife Service's translocation programme has not been restricted to birds. However, the principles outlined are applicable to all animal groups. To date one transfer, within the same island but to an isolated habitat, has been successfully made with the endemic Hamilton's frog (*Leiopelma hamiltoni*). Plans are in hand to re-establish a rare skink (*Leiolopisma whitakeri*) on an island but this will have to await the removal of Polynesian rats from that island which is planned to begin in 1986. In addition to vertebrates, some work has also been done with invertebrates. The initial work was done in 1934 by Dr W.R.B. Powell who transferred the flax snail (*Placostylus hongii*) to Motuhoropapa Island in the Noises Group, Hauraki Gulf (Powell 1938). Recently, other threatened species of this genus were transferred to islands off northern New Zealand after being bred in captivity. Indications are that most have already bred in their new locations. In 1977 Mr Meads, Ecology Division, DSIR, with the approval of the Wildlife Service, transferred the Cook Strait giant weta (*Deinacrida rugosa*) (wingless cricket) from Mana Island to Maud Island. This population has established and is expanding its range on the island.

Translocation of species is a valuable tool in saving endangered species or making them more secure. It is a technique that has proved to be of outstanding value in New Zealand but it should be used with care and with as much planning and research as possible to avoid pitfalls and to achieve the best results for the effort involved. It may also become a very important tool in maintaining genetic diversity in fragmented populations isolated by habitat destruction or severe modification.

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