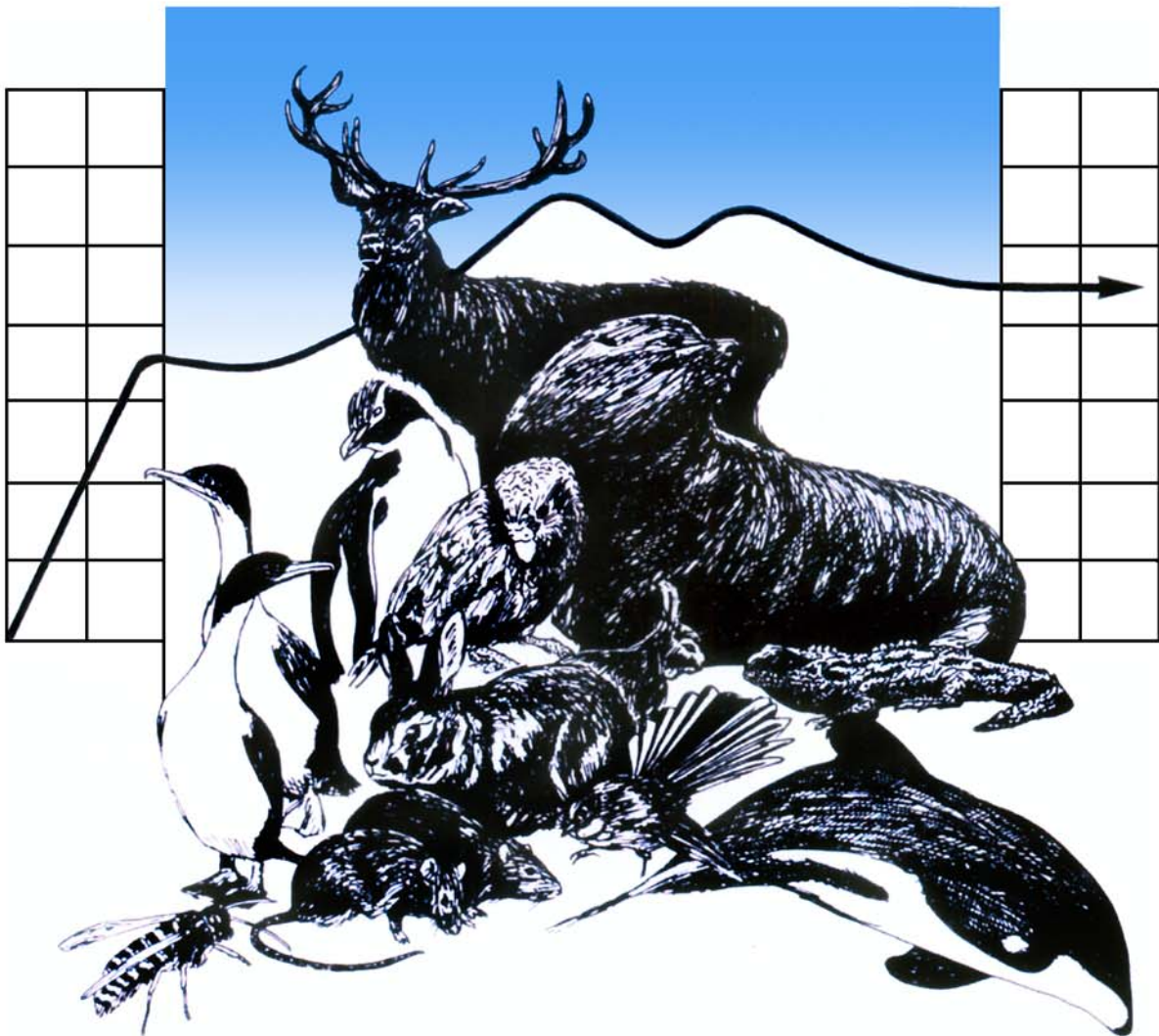




## DEPARTMENT OF ZOOLOGY



## WILDLIFE MANAGEMENT

Monitoring the Stewart Island  
robin (*Petroica australis rakiura*)  
**after translocation to Acker's**  
Point and Iona Island

Brooke McIntyre

A report submitted in partial fulfilment of the  
Post-graduate Diploma in Wildlife Management

University of Otago

2006

University of Otago  
Department of Zoology  
P.O. Box 56, Dunedin  
New Zealand

WLM Report Number: 200

## Abstract

Translocating a species into their former range is an important component of ecological restoration. The Stewart Island robin (*Petroica australis rakiura*) was formerly abundant on the mainland of Stewart Island, however due to predation from introduced mammalian predators its range is now restricted to the Freshwater flats region and offshore predator free islands. Since 2002, the Stewart Island/ Rakiura Community and Environment Trust (SIRCET) have been progressively eradicating pests from two sites (Acker's Point and Iona Island) in order to create an environment capable of accepting re-introduced species.

In the current project robin release sites will be monitored using play back call methods to determine whether the robins transferred to these sites in January/February 2005 have established a population. A second transfer of robins from Freshwater flats to Iona Island will also be carried out and the bird's presence and dispersal will be monitored as an indication of the success of the transfer. No robins from the initial transfer were sighted at Acker's Point or on Iona Island. By the end of the monitoring period only one of the nine robins in the second transfer was found on Iona Island. It is thought that the other birds dispersed to adjacent land 200 metres from Iona Island; however, continued monitoring is needed to substantiate this.

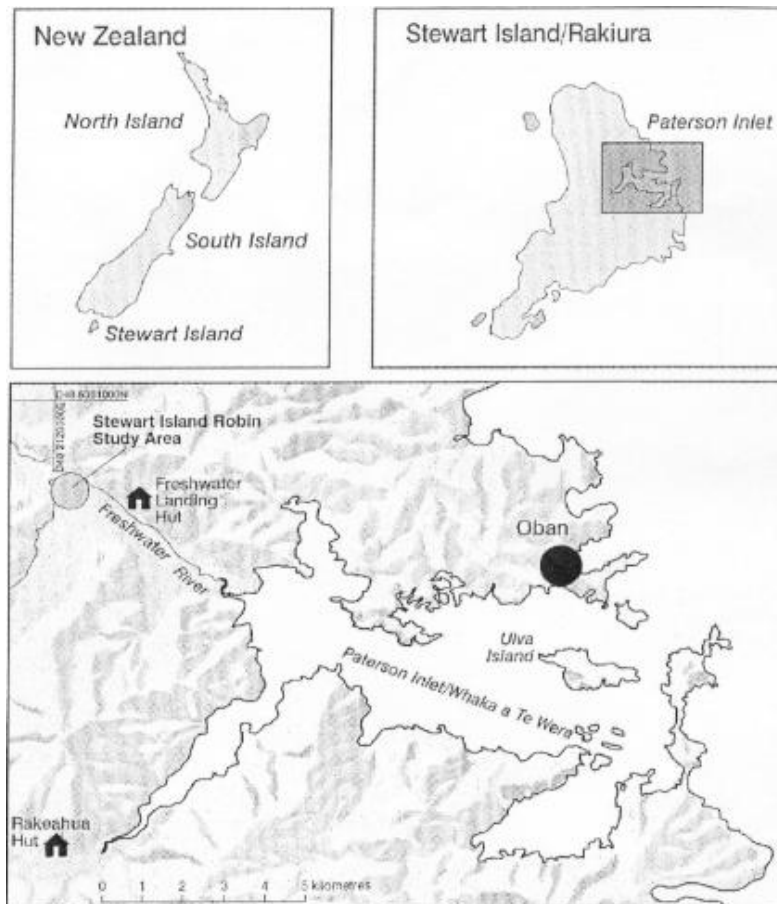
**Keywords:** translocation; Stewart Island robin; reintroduction

## Introduction

The New Zealand robin (*Petroica australis*) is a small (30-40g), endemic, forest dwelling passerine (Armstrong *et al.*, 2000). There are three subspecies whose populations have all experienced severe range contraction and a decline in abundance, due to the destruction of lowland forests and predation by introduced mammals (Powlesland, 1997). Subspecies include the North Island robin (*Petroica australis longipes*), the South Island robin (*Petroica australis australis*) and the rarest subspecies, the Stewart Island robin (*Petroica australis rakiura*) (Heather & Robertson, 1996).

New Zealand robins are ground feeding insectivores; they forage mainly amongst organic ground litter. Their plumage is grey to black, with a variable amount of white on the breast and belly. Generally the sexes are distinguishable; males being blacker whereas females tend to be greyer (Powlesland, 1997). Juveniles are similar in colour to the females. Adult robins tend to be sedentary and live as pairs or as solo males in territories of varying sizes, depending on population density (Steffens, 2003). Robins are non-migratory and remain in their territory all year round, usually staying with the same partner (Flack, 1979). Juvenile robins become independent about four weeks after fledging and are sexually mature at six to twelve months old (Armstrong *et al.*, 2005). Robins breed between September and March (Powlesland *et al.*, 2000).

The Stewart Island robin (hereafter referred to as robin) is classified as nationally endangered (Hitchmough, 2002). Cats (*Felis catus*) and rats, including the Polynesian rat (kiore) (*Rattus exulans*), ship rats (*Rattus rattus*) and Norway rats (*Rattus norvegicus*), are serious threats to the continued survival of robins on Stewart Island. Robins were once widely distributed on the Island but are now largely confined to manuka (*Leptospermum scoparium*) scrub forest, such as those in the Freshwater Flats region (Fig. 1), or on pest free islands.



**Figure 1.** Map showing location of Stewart Island, Paterson Inlet, Freshwater flats and Ulva Island.

It is thought that they inhabit this region due to the reduced predation pressure from kiore and ship rats (Greer, 2000). Only Norway rats persist in the manuka forest at Freshwater Flats (Harper, 2004). Due to their climbing inability, they do not prey upon nests high up in the trees. Despite the reduced rate of predation on robins at Freshwater Flats, monitoring has indicated that the population is experiencing further decline (Alexander & Beaven, 2002).

In 2000, in order to create a viable ‘back-up’ population, 16 robins (followed by a further six fledglings in 2001) were transferred from Freshwater Flats to rodent free Ulva Island in Paterson Inlet (Fig. 1). Despite the five birds that returned to their original territory at Freshwater Flats and four that were unaccounted for (Oppel & Beaven, 2002), the population is now self-sustaining with numbers over 150 (December 2005).

Reintroducing species into their former range is an important way of restoring the indigenous biological diversity of an area (ecological restoration) (Simberloff, 1990). Translocation, defined as the intentional release of plants or animals to the wild in an attempt to establish or re-establish a population (Griffith *et al.*, 1989) is a widely used conservation tool in New Zealand to augment or establish a new population. Robins are an ideal bird species to transfer as they are relatively tame and can be trained to approach people for a food reward, making them relatively easy to capture and fit with bands for efficient post-release monitoring (Powlesland, 1997). Over the past three decades more than twenty translocations of New Zealand robins into their previous range have been carried out (Armstrong *et al.*, 2000). The success of robins translocated to Ulva Island shows how effective translocation can be as a conservation tool.

Stewart Island is fortunate in that mustelids and mice have not yet invaded the Island (B. Beaven *pers. comm.*). However, cats, rats and possums remain a serious threat to the Islands ecological integrity. In order to reduce the number of pests around Halfmoon Bay and create an environment capable of accepting re-introduced threatened species, the Halfmoon Bay Habitat Restoration project (HMB HRP) was initiated in 2001 ([http:// www.glowingsky.co.nz](http://www.glowingsky.co.nz)). The project is community driven (by the Stewart Island/Rakiura Community and Environment Trust (SIRCET)) and covers 258 hectares of privately owned land around Halfmoon Bay which has been intensively trapped for rats, cats and possums since October 2003. The Department of Conservation has also carried out intensive trapping for possums and poisoning of rats on Iona Island in Paterson Inlet, in order to create a predator free habitat where threatened species such as the Stewart Island robin can be re-introduced. The Department of Conservation has proposed to transfer robins to these predator free sites with the long term objective of establishing another self-sustaining population of robins on the mainland by April 2008 (Beaven, 2004).

The objective of this project is to survey Ackers Point and Iona Island to determine if the eleven juvenile robins transferred there in January and February 2005, have established or not. I will also be assisting with the second transfer of robins from Freshwater Flats to Iona Island and monitoring their presence and dispersal as an indication of the success of the transfer.

## Methods

### Study Areas

Stewart Island is the smallest and southern-most of the three main islands of New Zealand. It covers an area of 1720 square kilometres which is mainly forest clad (Meurk & Wilson, 1989). The dominant vegetation type is lowland podocarp forest with the main canopy species being rimu (*Dacrydium cupressinum*).

### Halfmoon Bay

Halfmoon Bay is representative of the main forest cover found on Stewart Island. Dominant species include rimu, kamahi (*Weinmannia racemosa*), southern rata (*Metrosideros umbellata*) and miro (*Podocarpus ferrugineus*) (Meurk & Wilson, 1989). Halfmoon Bay is unique in that the main township (Oban) is nestled amongst this forest and is home to an abundance of native birds. The Halfmoon Bay Habitat Restoration Project encompasses 258 hectares of private land around Halfmoon Bay where extensive trapping for rats, possums and feral cats has been carried out since October, 2003. Trap lines have been set out across Ackers Point, Horseshoe Point, Deep Bay and Peterson's Hill (Fig. 2). Lines are spaced 100 metres apart and trap locations are marked every 30-40 metres. Victor professional rat traps in confluence tunnels and warrior kill traps for possums are used at all trap locations and are re-set and re-baited when necessary.



**Figure 2.** Map showing trap line layout across Acker's Point, Golden Bay, Deep Bay and Peterson's Hill. The location of Iona Island can also be noted.

### Iona Island

Iona Island is a seven hectare island situated in Paterson Inlet, 200 metres from Stewart Island (Fig 2). It is entirely covered with forest, predominately podocarp hardwood with rata and rimu making up the canopy. Hall's totara (*Podocarpus hallii*) and kamahi dominate the sub-canopy supporting dense curtains of supplejack (*Ripogonum scandens*). The under storey is composed of canopy regrowth and tree ferns (*Dicksonia squarrosa* and *Cyathea smithii*). Wind-shorn coastal scrub consists of hebe (*Hebe elliptica*), inaka (*Dracophyllum longifolium*) and *Coprosma* spp (Meurk & Wilson, 1989). On the periphery of the Island is mutton bird scrub (*Olearia angustifolia*) intermixed with kamahi and rata. The Island was made pest free in September 2004, and is guarded against reinvasion by a set of traps and bait stations. Naturally occurring predators for the robin on Iona Island include morepork (*Ninox novaseelandiae*) and six weka (*Gallirallus australis*) that had recently being released.



## Freshwater Flats

Freshwater Flats are an extensive swamp area ranging from the Ruggedy Mountains to Paterson Inlet, totaling an area of 6,900 hectares (Cromarty & Scott, 1996). Freshwater River runs from Northwest to Southeast with several creeks coming from the ranges to the flats. The area is considered a “Wetland of Ecological and Representative Importance” as well as a “Site of Special Wildlife Importance” (Department of Conservation, 1997). Manuka is the dominant tree species throughout the flats. The Scott Burn area of the flats is currently undergoing periodic intensive rat trapping.

## Transfers

*First Transfer:* Five juvenile robins were transferred from Freshwater Flats to Iona Island on the 28<sup>th</sup> of January, 2005. Six juvenile robins were transferred from Freshwater Flats to Ackers Point on the 26<sup>th</sup> of February, 2005 (Table 1).

*Second Transfer:* Two juvenile robins and one female adult were transferred from Freshwater Flats to Iona Island on the 20<sup>th</sup> of November, 2005. Three juvenile robins, two adult males and one adult female were transferred from Freshwater Flats to Iona Island on the 26<sup>th</sup> of November, 2005 (Table 2).

*Subsequent transfers:* A robin initially released onto Iona Island in the second transfer was later found at Peterson’s Hill. It was caught and transferred back to Iona Island on the 6<sup>th</sup> of December, 2005.

## Collection method

A tape recording of a robin’s territorial song was used to provoke counter-singing of territorial males and to bring the birds in closer to the observer. Birds were fed mealworms (*Tenebrio molitor*), whilst tapping the lid against the mealworm container. This action trained the robins to associate tapping with a reward. Successfully trained robins are easy to locate as they readily appear after tapping is heard. The location of the robins was recorded using a Global Positioning System device (GPS). Mealworms were fed the day prior to catching to familiarize the birds

with the routine and get the birds used to standing in front of the electronically controlled clap trap (Fig. 3).



**Figure 3.** Clap trap used to capture the robins.

Feeding behavior was observed, to determine if the robin was feeding a partner or fledglings. When a juvenile robin was sighted that fed independently, it was caught in the mealworm baited clap-trap. Although juvenile robins were targeted, some adults were also caught for transfer. All robins caught were given a unique band combination, with two coloured bands (size B butt bands) on one leg and one coloured band over a metal band on the other leg. Robins were held in cardboard cat carry boxes and transported to the release site via boat the same day of capture. It is unknown what sex the juveniles transferred were.

**Table 1.** Band combination, age, sex and release location of robins transferred in the first transfer (January/February, 2005). B=Blue, M=Metal, G=Green, Y=Yellow, O=Orange, R=Red, W=White.

Band Combination released	Age	Sex	Release Location	Date
BM/BB	Juvenile	Unknown	Iona Island	28/01/05
BM/GY	Juvenile	Unknown	Iona Island	28/01/05
BM/OG	Juvenile	Unknown	Iona Island	28/01/05
BM/OR	Juvenile	Unknown	Iona Island	28/01/05
BM/OW	Juvenile	Unknown	Iona Island	28/01/05
OM/GW	Juvenile	Unknown	Ackers Point	26/02/05
OM/GY	Juvenile	Unknown	Ackers Point	26/02/05
OM/WR	Juvenile	Unknown	Ackers Point	26/02/05
OM/WW	Juvenile	Unknown	Ackers Point	26/02/05
YM/WY	Juvenile	Unknown	Ackers Point	26/02/05
YM/YW	Juvenile	Unknown	Ackers Point	26/02/05

**Table 2.** Band combination, age, sex and release location of robins transferred in the second transfer (November, 2005). W=white, R=Red, O=Orange, M=Metal, Y=Yellow, B=Blue, G=Green.

Band Combination Released	Age	Sex	Release Location	Date
WR/OM	Juvenile	Unknown	Iona Island	20/11/05
WY/OM	Juvenile	Unknown	Iona Island	
20/11/05 WW/OM	Adult	Female	Iona Island	
20/11/05 OM/BB	Juvenile	Unknown	Iona Island	
26/11/05				
OM/BG	Adult	Male	Iona Island	26/11/05
OM/BO	Adult	Female	Iona Island	26/11/05
OM/BR	Juvenile	Unknown	Iona Island	26/11/05
OM/BW	Juvenile	Unknown	Iona Island	26/11/05
OM/BY	Adult	Male	Iona Island	26/11/05

## Monitoring

Trap lines on Iona Island, Deep Bay, Golden Bay, Peterson's Hill and Ackers Point were traversed and a tape replay of a territorial robin song was played at each bait station, or every 100 metres to provoke counter singing by territorial males and to bring the birds in closer. If a robin was found, their location and band combination were noted and they were fed several mealworms. Various locations around Halfmoon Bay where local residents had reported a robin sighting were also monitored, including Horseshoe Point and M. Hopkins private land. Monitoring was carried out at various times during the day between the 7<sup>th</sup> of November and the 8<sup>th</sup> of December, 2005. Trap lines on Iona Island were most intensively monitored as all nine birds from the second transfer were released there.

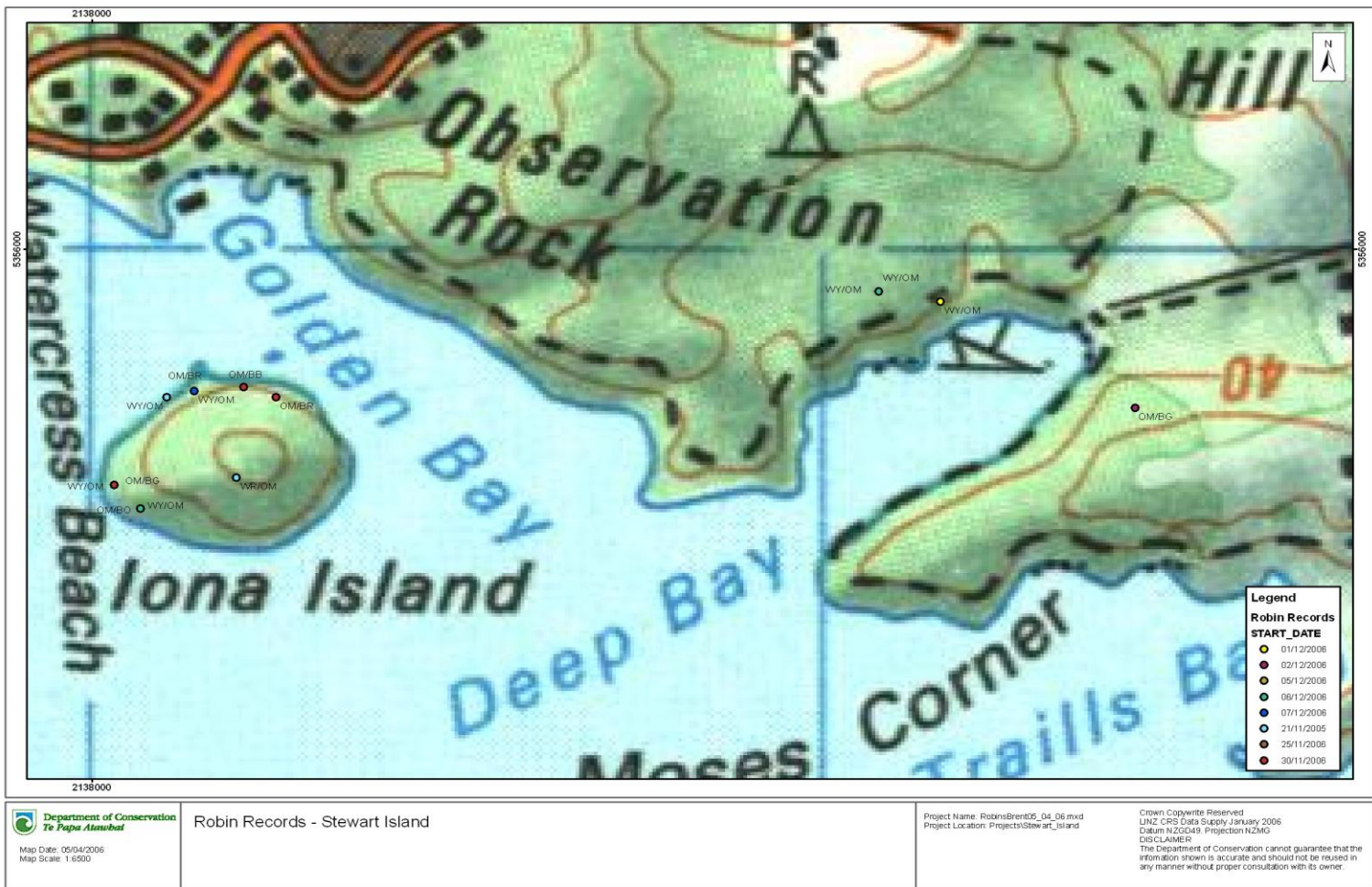
## Results

### Post-release monitoring

None of the robins released onto Iona Island or Ackers Point in the initial transfer were sighted during the monitoring period. Six of the nine birds released in the second transfer were re-sighted during the monitoring period (Table 3). Three robins (WW/OM, OM/BW and OM/BY) were never sighted after their release; two robins (WY/OM and OM/BG) flew off Iona Island and were found on adjacent land (Peterson's Hill and Deep Bay) (Fig 4). At the end of the monitoring period only one robin, (WY/OM) was sighted on Iona Island.

**Table 3.** Dates that robins were re-sighted after their release in November, 2005.

Band Combination	Age	Sex	Date(s) re-sighted
WR/OM	Juvenile	Unknown	21/11
WY/OM	Juvenile	Unknown	21/11, 25/11, 30/11, 1/12, 6/12, 7/12
WW/OM	Adult	Female	Not sighted
OM/BB	Juvenile	Unknown	30/11
OM/BG	Adult	Male	30/11, 2/12
OM/BO	Adult	Female	30/11
OM/BR	Juvenile	Unknown	30/11, 5/11
OM/BW	Juvenile	Unknown	Not sighted
OM/BY	Adult	Male	Not sighted



**Figure 4.** Location of robins (dotted) sighted on Iona Island, Golden Bay and Deep Bay during the monitoring period (7<sup>th</sup> November-8<sup>th</sup> December, 2005).

## Discussion

Surveys of Ackers Point and Iona Island carried out in November 2005, show that the nine robins released there in January/February 2005, had failed to establish a population. None of the robins released at either of these sites in the initial transfer were sighted during the monitoring period. Unfortunately, both release sites were not monitored until November 2005, thus it is difficult to ascertain when the robins from the initial transfer may have disappeared from the area. It is possible that the juvenile robins were predated by possums, rats or cats. However, Iona Island and Acker's Point were largely pest free so it is unlikely that all of the birds released at these locations were preyed upon. Rather than being preyed on, it is more likely that the robins dispersed from their release location, as both adults and juveniles have been recorded to disperse large distances. Juvenile robins have been recorded to disperse on Stewart Island up to 16km (Oppel & Beaven, 2004). Of the 18 adult robins transferred to Ulva Island in 2000/2001, four adult birds were recorded to have returned to their source location at Freshwater Flats, 20km away over open water (Oppel & Beaven, 2002).

To prevent robins flying back to their natal territories, Oppel and Beaven (2002) recommended that in future translocations juveniles be transferred as opposed to adults, as they have not yet established territories and are more likely to stay where they are transferred to. However, this has yet to be proved and the results from this study may indicate otherwise as juveniles and adults both dispersed off Iona Island. Although not beneficial to the current project, dispersal (given that the birds survive and breed) does increase the likelihood of robins re-establishing former adjacent habitats. Because Iona Island is a relatively small land mass (7 ha), there is hope that once robins do establish there, they will 'spill over' onto nearby predator controlled land and re-establish a population around Halfmoon Bay.

As the current project has proved, a large problem with translocations is establishing the initial population. As robins have been observed to cluster territories around each other, others are more likely to stay when there are already established birds on Iona Island (B. Beaven *pers. comm*). Increasing the number of birds transferred may increase the likelihood that at least two robins will stay and pair up,

but this was difficult to achieve in the second transfer due to poor weather conditions. In terms of management removing too many birds at a time may have adverse impacts on the declining source population at Freshwater Flats. Taylor *et al.*, (2005) analysed success/failure of reintroductions versus number of birds released for New Zealand robins and found that small numbers of released birds (< 15) were just as successful as larger numbers in terms of population growth, as long as introduced mammalian predators were controlled (Taylor *et al.*, 2005). Previous translocations of robins that failed to establish, were those that birds had to contend with mammalian predators at the release site (Armstrong *et al.*, 2000). In the current project, predators are intensively controlled at the release sites so other reasons for the robins failing to establish must be considered.

The close proximity (200m) of Iona Island to the mainland may provide an explanation for why the robins dispersed. One juvenile robin was sighted on the 21<sup>st</sup> and 25<sup>th</sup> of November, and appeared to be establishing a territory on Iona Island. However, five days later it was found on adjacent land at Peterson's Hill. It stayed there for a week until it was decided that it was best to re-transfer the bird back to Iona Island as there were no other robins in the vicinity to breed with. Peterson's Hill is part of the Habitat Restoration Project area and has been intensively trapped so it could be considered as a possible area to transfer more birds too in the future. Another robin, an adult male was also found off Iona Island at Deep Bay. Unfortunately time did not permit the Deep Bay area being surveyed more thoroughly and it is unknown whether or not any other robins may have established there. In the next six months another volunteer will be surveying Iona Island as well as Peterson's Hill and Deep Bay. Hopefully the robins that dispersed will be found to have established a population in these predator controlled areas. As robins from previous translocations have returned to their source location at Freshwater Flats (Oppel and Beaven, 2004) it would also be extremely useful to monitor this area to see if any of the birds from this translocation did the same.

Robins that have established breeding territories on Ulva Island are found almost exclusively around the periphery of the Island (Steffens *et al.*, 2005). In the current project robins also appeared to prefer the outer edges of Iona Island (Fig 4). In this habitat the under storey is relatively open with a thick litter layer providing an abundant food source for the robins. No robins were sighted on the interior of the island which has a dense under storey and mature podocarp trees. It has been



recommended that in order for translocations to be successful, the source and release locations should be similar in habitat to allow the translocated species to adapt as quickly as possible (Sullivan, 2005). The source population of translocated robins was Freshwater Flats, where the primary habitat type is open manuka forest (Greer, 2000). The forest makeup on Iona Island is very different from that at Freshwater Flats; it is predominately podocarp with no manuka scrub. Although the North Island and South Island robin both live in podocarp forest, there have been very few sightings of the Stewart Island robin in podocarp forest (Greer, 2000). It is possible that the robins were unable to adapt to their new habitat. However, the successful establishment of robins transferred to Ulva Island, which has similar habitat to Iona Island makes this theory implausible.

The time of year that the robins were transferred may have influenced dispersal, especially for the adult robins as they are in the middle of their breeding season (September-March). The next transfer of robins from Freshwater Flats to Iona Island will take place in winter, in the hope that the robins will be less inclined to disperse when they are not breeding.

In order to improve understanding about robin dispersal, in the current project it would have been beneficial to attach radio-transmitters to the robins before they were released. This would have given information on when and where robins dispersed to. However, at a cost of approximately \$300 for each bird and the short battery life of around a month (due to the light weight of the robins), and the limited budget of the robin project the use of radio-transmitters was unfeasible. After two transfers where robins have failed to establish, for future transfers I believe that this extra cost can be justified. It would be extremely useful to know where the dispersed birds settle so any birds that pair up can be monitored.

## Recommendations and Conclusion

In previous translocations of robins, those that have failed to establish were those where birds had to contend with introduced mammalian predators. As predators have largely been removed from both Iona Island and Acker's Point it is unlikely that this was the reason for birds failing to establish; it is more likely that the robins dispersed from their release location. Reasons for dispersal may be that the habitat

they were transferred to was too dissimilar to the source location, or the attraction to fly 200 metres to nearby land was more suitable. For future transfers it is recommended that if conditions permit more than three birds be transferred at a time to increase the chance that at least one bird establishes at the release site. Also, if budget allows, that birds are radio-tracked to determine where any dispersed birds establish. It is also extremely important to continue to monitor areas where birds have been transferred too. The robins released in the initial transfer were not monitored until November, 2005. Hopefully, another volunteer will soon be monitoring the areas around Iona Island (Peterson's Hill and Deep Bay) to determine if any robins from the second transfer have established. The time of year that the robins were translocated may have decreased the chance of establishment success due to it being during the breeding season. It is hoped that transferring the birds this coming Winter will increase the chance of establishment.

Translocating a threatened species into their former range is an important part of ecological restoration. Recent transfers of robins onto Ulva Island have resulted in an extremely abundant population. Unfortunately, the current transfer was not successful in terms of robins staying on Iona Island and establishing a territory during the monitoring period. Although, it is possible with continued monitoring that the birds will be found to have established in nearby predator controlled areas. Implementation of the above recommendations may increase the likelihood of the next proposed transfer this coming Winter being a success and the long term objective will be obtained where sighting robins on the mainland will be common place.

## Acknowledgements

I would like to thank Kari and Brent Beaven, Chris Rance, the Stewart Island/Rakiura Community and Environment Trust and the Stewart Island Field centre Department of Conservation staff for their assistance and advice in helping me to undertake this project.

## References

- Alexander, C.; Beaven, B. 2002. (unpublished) *Can Stewart Island robins survive on Stewart Island?* Department of Conservation report. Southland Conservancy, Invercargill, New Zealand.
- Armstrong, D.; Ewen, J.; Dimond, W.; Lovegrove, T.; Bergstrom, A.; Walter, B. 2000. Breeding biology of North Island robins (*Petroica australis longipes*) on Tiritiri Matangi Island, Hauraki Gulf, New Zealand. *Notornis* 47: 106-118.
- Armstrong, D.; Raeburn, E.; Lewis, R.; Ravine, D. 2005 (in press). Estimating the viability of a reintroduced New Zealand robin population as a function of predator control. *Journal of Wildlife Management* 00(0): 000-000.
- Beaven, B. 2004. (unpublished) *Transfer of Stewart Island robin (Petroica australis rakiura) from Freshwater Flats and Ulva Island to Iona Island, Ackers Point and Dancing Star Foundation between December 2004 and April 2008*. Reporting Summary. Stewart Island Field Centre, New Zealand.
- Cromarty, P.; Scott, D. 1996. A Directory of Wetlands in New Zealand. Department of Conservation, Wellington, New Zealand.
- Department of Conservation. 1997. Conservation Management Strategy for Stewart Island-Rakiura. Invercargill, New Zealand.
- Flack, J. 1979. Biology and ecology of the South Island robin. In Hunt, D.; Gill, B. (Editors). *Ecology of Kowhai Bush, Kaikoura*, pp 22-26. Mauri Ora Special Publication 2. The Biological Society, University of Canterbury, New Zealand.
- Greer, L. 2000. (unpublished) *Stewart Island Robin (Petroica australis rakiura) past and present. Are they caught in a corner by predators?* Postgraduate Diploma in Wildlife Management report, University of Otago, Dunedin, New Zealand.
- Griffith, B.; Scott, I.; Carpenter, J.; Reed, C. 1989. Translocation as a species conservation tool: status and strategy. *Science* 245: 477-480.
- Halfmoon Bay Habitat Restoration Project. Site accessed 23<sup>rd</sup> November, 2005. <http://www.glowingsky.co.nz>.
- Harper, G. 2004. Feral cats on Stewart Island/Rakiura: population regulation, home range size and habitat use. DOC Science Internal Series 174. Department of Conservation, Wellington, New Zealand. 35p.
- Heather, B.; Robertson, H. 1996. *The Field Guide to the Birds of New Zealand*. Viking, Auckland, New Zealand.

- Hitchmough, R. 2002. *New Zealand threat classification system lists 2002*. Threatened species occasional publication 23. Biodiversity Recovery Unit, Department of Conservation, Wellington, New Zealand.
- Meurk, C.; Wilson, H. 1989. Stewart Island Biological Survey of Reserves Series 18. Department of Conservation, Wellington, New Zealand.
- Oppel, S.; B. Beaven. 2002. Stewart Island robins (*Petroica australis rakiura*) fly home after transfer to Ulva Island. *Notornis* 49: 180-181.
- Oppel, S.; B. Beaven. 2004. Juvenile Stewart robins (*Petroica australis rakiura*) disperse up to 16km. *Notornis* 51: 55-56.
- Powlesland, R. 1997. Protocols for monitoring New Zealand robins (*Petroica australis*). Department of Conservation Technical Series 13. Department of Conservation. Wellington, New Zealand.
- Powlesland, R.; Knegtman, J.; Marshall, I. 2000. Breeding biology of North Island robins (*Petroica australis longipes*) in Pureora Forest Park. *Notornis* 47 (2): 97-105.
- Simberloff, D. 1990. Reconstructing the ambiguous: Can island ecosystems be restored? In Towns, D.; Daugherty, C.; Atkinson, I. *Ecological Restoration of New Zealand Islands*, pp 37-51. Conservation Sciences Publications 2. Department of Conservation, Wellington, New Zealand.
- Steffens, K. 2003. (unpublished) *Habitat Selection by South Island saddlebacks and Stewart Island robins on Ulva Island*. M.Sc. thesis, University of Otago, Dunedin, New Zealand.
- Steffens, K.; Seddon, P.; Mathieu, R.; Jamieson, I. 2005. Habitat selection by South Island saddlebacks and Stewart Island robins reintroduced to Ulva Island. *New Zealand Journal of Ecology* 29(2): 1-9.
- Sullivan, W. 2005. Re-introduction of saddleback to Boundary Stream Mainland Island, New Zealand- returning a predator vulnerable species to the mainland. *Re-introduction NEWS* 24: 36-38.
- Taylor, S.; Jamieson, I.; Armstrong, D. 2005. Successful island reintroductions of New Zealand robins and saddlebacks with small numbers of founders. *Animal Conservation* 8: 415-420.