

4. Past Conservation Efforts

4.1 IMPLEMENTATION OF MANAGEMENT

In 1983/84 the New Zealand Wildlife Service initiated protection of New Zealand fairy terns at Mangawhai and Papakanui Spit. A major population turnaround, from decline to growth, subsequently followed. This may be attributable to the introduction of fencing of nest sites and the use of wardens. A warden was first employed at Waipu in 1984/85. Protection has continued (under the Department since 1987/88) until the present. The level of protection in the early years was erratic, particularly in monitoring nesting success. The wardens had large areas and many access points to cover, and they also had to monitor large numbers of New Zealand dotterels, variable oystercatchers, Caspian terns (*Sterna caspia*), white-fronted terns (*Sterna striata*) etc. In spite of these difficulties the number of breeding pairs of New Zealand fairy tern rose to 9 in 1993/94. However, only five pairs attempted to breed in 1995/96, and four pairs in 1996/97. Additional funding in recent years has allowed for greater protection and monitoring.

4.2 TECHNIQUES OF MANAGEMENT

Several management techniques have been utilised for the protection of fairy tern. Wardens have been employed full-time during the breeding season (Oct-Feb). For the past two years one warden has been employed exclusively for each of the three breeding sites (Waipu, Mangawhai, Papakanui). The wardens have been based on site to allow quick and efficient management of emergency situations. Protection and monitoring occurs at each site for approximately five days per week. The duties of the wardens include; monitoring breeding attempts, maintaining fences around nesting sites, carrying out nest protection (translocation, sand-bagging), undertaking egg and chick manipulation, educating and involving the public, and undertaking compliance and law enforcement.

Manipulations of eggs and chicks were carried out in the 1986/87 season at Papakanui Spit and Waipu. These manipulations were not pre-planned, but were carried out because high tides were washing over the nests. One chick was removed from Waipu and translocated to Papakanui Spit. This chick was found dead the next day. An egg from the nest at Papakanui Spit was incubated in captivity where it hatched. It was subsequently given to a breeding pair at Waipu who raised the chick to fledging. Two eggs from this pair were incubated at Auckland Zoo. Both hatched and one chick was raised through to almost fledging size in captivity when it died. In 1992/93, two eggs from Papakanui Spit were transferred to a breeding pair at Mangawhai who had been incubating infertile eggs for 42 days. This pair successfully hatched the eggs and raised both chicks. In 1996/97 one egg was removed from a nest at Waipu due to the threat of high tides during Cyclone Fergus. This egg was hatched in

captivity and translocated to a nest at Mangawhai which contained a non-viable egg. The chick appeared to be accepted by the parents but disappeared overnight a few hours prior to the arrival of another cyclone.

Limited predator control has been carried out at the three breeding sites in the past. During the 1996/97 breeding season an intensive predator control programme was implemented at Mangawhai. Trapping and poisoning of mammalian predators occurred for five months (mid-August - mid January), and the eggs of most southern black-backed gulls nesting within the Refuge were made non-viable through injection with formalin. The predator control programme was considered to be successful as; a large number of mammalian predators were removed from the area, few black-backed gull chicks fledged, and there was no suspected loss of fairy tern eggs or chicks to predation.

4.3 MANAGEMENT FORECAST

Wardens will continue to be employed full-time at the three separate sites for the duration of the breeding season. They will carry out the duties undertaken by previous wardens. In addition, video surveillance will be carried out at Mangawhai and Papakanui to try to determine which species are responsible for the predation of fairy tern eggs and chicks.

A predator control programme will be instigated during mid-August at each of the breeding sites (Waipu, Mangawhai, Papakanui).

5. Species Biology and Ecology

5.1 REPRODUCTION

In recent years all fairy tern nests have been located on low-lying areas of sand and shell, devoid of vegetation except for pioneer seedlings of pingao (*Desmoschoenus spiralis*) and spinifex (*Spinifex sericea*). These areas are all subject to flooding from the combined effects of spring tides and waves generated by strong onshore winds or passing cyclones.

Fairy terns breed between November and February. Eggs are laid from mid November onwards with second clutches (following the loss of a first clutch) being recorded up to 12 January. The most common clutch size is 2 (mean is 1.77). The second egg is usually laid the following day but can be up to 3 days later. The nest is a simple scrape in bare sand, usually within an area of bleached and coloured shells (Figure 3). Oliver (1955) quotes Guthrie-Smith who noted that a New Zealand fairy tern nest was surrounded by coloured shells brought by the birds to match the colour of their eggs. Little tern may also decorate the nest site (Smith 1990). It is likely that fairy terns use shells to camouflage their nest site so eggs and chicks will not be obvious to predators.

The incubation and fledging periods are approx. 22 - 23 days each (Figures 4 and 5). Both hatching and fledging are asynchronous. Parents vigorously defend the nest and chicks against intruders i.e. humans, predators, and conspecifics.

Sinclair (1992) observed one breeding pair incubating their non-viable eggs for 37 days before waves washed the eggs away. In 1992/93 a pair sat on infertile eggs for 42 days then incubated eggs that had been translocated to them for a further 13 days (Graham 1993, Parrish & Pulham 1995a). Little terns have been recorded incubating infertile eggs for up to 45 days (Smith 1990).

Analysis of the results from the sightings of banded chicks revealed that five birds commenced breeding in their second year, while three were not found breeding until their third year.

5.2 LONGEVITY

Little is known about the life expectancy of the New Zealand fairy tern. All juveniles banded between 1990-94 were subsequently sighted on the Kaipara Harbour. However, three chicks banded since 1994, have either not been sighted at all, or for some time. One bird colour banded as a chick in 1978 was re-sighted in 1989 aged 11.5 years. Another bird banded as an adult in November 1977 was re-sighted at Mangawhai in March 1990 (G Pulham pers comm.). Rogers (in Higgins & Davies 1996) cites a record of *S. n. nereis* banded in Western Australia and sighted > 17 years later.

5.3 POST BREEDING FLOCKING MOVEMENTS

Between 1971-81 flocks of 5-13 fairy terns were recorded on seven occasions at Whangarei Harbour, Waipu and Mangawhai (Munro 1971, 1974, Lovegrove 1973, Reed 1974, Crockett 1976, Kearns 1982). Only one of these (Munro 1971) contains a record of the presence of an immature bird. All of these flocks were observed between December and March.

Flocks of 8-18 have been recorded on several occasions at Tapora, Kaipara Harbour between 1978-97 (Goffin 1978, Chamberlin and Dowding 1985, Parrish & Pulham 1995b, pers. obs.). On 30/3/93 a flock of 12, including immatures, was observed at Mangawhai (F Crawford pers. comm.) and on 18/3/95 a flock of 11 birds, including immatures, was seen at Te Arai (pers. obs.). All of these flocks were sighted between February and June.

These data suggest that following completion of the breeding season adults and juveniles from the east coast form flocks (December-February/March) and migrate to the Kaipara Harbour from February June. From late June onwards the flocks break up and birds start returning to the breeding sites. It is thought that immature birds remain on the Kaipara Harbour during the breeding season.

On several occasions up to six or seven birds have been observed at Papakanui Spit at the same time that flocks of 13-18 were seen at Waikiri Creek. It is not known how often these two flocks mingle. However, one banded bird from Papakanui Spit has been seen at Waikiri Creek on a number of occasions, and some east coast birds which roost at Waikiri Creek have been seen at Papakanui (G. Pulham, pers. comm.)

5.4 NUTRITION

Hitchcock (1959) lists the food items of *Sterna n. nereis* as mainly small fish with some gastropods, crustaceans and plant matter. Parrish & Pulham (1995a) identified goby, eel and flounder, and tentatively identified spotties, triplefin, gudgeon, yellow-eyed mullet, smelt and whitebait as prey species of fairy tern. Anchovies have also been recorded in the diet of fairy terns (Moon 1988). Fairy terns are most often observed hunting over shallow estuaries, along outer beaches, and just beyond the surf zone. Fluttering flight and frequent hovering is followed by a plunge dive. Fairy tern chicks have been observed taking small animals (amphipods or insects) from seaweed (Parrish & Pulham 1995a).

6. Fairy Tern Recovery Strategy: Goals and Objectives

6.1 LONG TERM GOAL

The Department of Conservation's vision of the Fairy Tern Recovery Programme is:

"To increase the population of fairy tern, improve their conservation status from Category A (endangered) to Category B (threatened), and expand their breeding range back into parts of their former range"

The short-term goals for the next five years are -

- *To prevent the extinction of the New Zealand subspecies*
- *To increase the breeding population by 25% by 2002*

6.2 NATIONAL CONSERVATION GOALS AND OBJECTIVES

Objective: 1. To protect all known breeding pairs and nesting areas, including individuals found at new sites.

Objective: 2. Maximise chick productivity by manipulation

Objective: 3. Measure the population parameters and monitor the population dynamics of fairy tern

Objective: 4. Review and improve the legal status of the breeding and flocking habitat of fairy tern, and protect all known and potential habitat from development

Objective: 5. Raise public awareness of the need for conservation of fairy tern.

Objective: 6. Formalise a Fairy Tern Recovery Group

7. Recovery Strategy: Work Plan

7.1 RECOVERY PLAN OBJECTIVES

Objective 1. Protect all known breeding pairs and nesting areas, including individuals found at new sites

Explanation

In recent years wardens have been employed to protect nesting fairy terns at Waipu, Mangawhai and Papakanui Spit. They are also responsible for the protection and monitoring of all other shorebirds at these sites. Paid wardens will continue to be employed at each nesting site for the duration of the breeding season. If fairy terns recolonise or expand to other areas then wardens will also be needed for these sites. One supervisor will be responsible for providing information, advice and support to all three wardens. A Shorebird Protection Manual will be produced to detail the duties of the wardens and provide guidance in the field. The duties of the wardens include:

- Fencing around nest sites, and patrolling the area to ensure no vehicles, motorbikes, horses, dogs or people approach the nest sites.
- Monitoring egg laying, hatching, and fledging. Assist with banding of chicks.
- Recording the details of egg and chick failures.
- Monitoring high tide levels and weather conditions.
- Implementing protection measures i.e. sand-bagging, nest relocation, holding in captivity.
- Manipulation of eggs and chicks.
- Recording notable fairy tern behaviour i.e. interaction between conspecifics and other species.
- Assisting with the control of predators prior to, and during, the breeding season.
- Monitoring all actual or potential predator incidents, and the presence of predator sign i.e. tracks, scats.
- Operating video surveillance equipment.
- Educating and involving the general public visiting the areas, and liaison with local residents.
- Undertaking compliance and law enforcement.

Continued protection of Waipu, Mangawhai and Papakanui Spit is also recommended in the Recovery Plan for New Zealand dotterel (Dowding 1992).

Predation seriously limits the productivity of fairy terns. Of the 65 eggs and chicks lost since 1992/93 32% were attributed to suspected predation (see Table 1). The predators involved need to be identified so that predator control can be targeted in the most effective direction. Video surveillance of nests was carried out at Mangawhai in 1995/96 and 1996/97 and will be instigated at Papakanui in 1997/98.

An intensive predator control programme was carried out at Mangawhai prior to, and during, the 1996/97 breeding season. The programme will be continued at Mangawhai in the future and will be instigated at Waipu and Papakanui in 1997/98. Consultation with predator ecologists will occur to determine the most effective design of the predator control programme at each site.

Action: Northland and Auckland Conservancies.
Whangarei and Warkworth Field Centres.

Objective 2. Maximise breeding productivity by manipulation

Explanation

The manipulation of eggs and chicks has been carried out in previous years (1986/87, 1992/93, 1996/97). This involved translocating viable eggs threatened by flooding to breeding pairs who had laid infertile eggs. In three instances chicks have been cross-fostered, once successfully, twice unsuccessfully (Jowett 1987, Honnor 1997).

The following procedure will be carried out for all fairy tern eggs and chicks:

1. All eggs will be candled at the earliest possible stage to determine viability.
2. Eggs will be moved between nests, subject to timing, to ensure that all breeding pairs are incubating at least one fertile egg. Each time the eggs are handled they will be weighed.
3. If eggs are threatened by flooding/tides an attempt will be made to protect the nest by sandbagging or progressively moving it to a more elevated site. If this is unsuccessful the eggs will be removed and held until the threat has passed (minimum time possible). Dummy eggs may be placed in the nest as a substitute. Once the threat has passed the eggs will be returned to the nest. This procedure should be repeated when necessary.
4. If 0-3 day old chicks are threatened by flooding/tides an attempt will be made to protect the nest by sandbagging or progressively moving it to a more elevated site. If this is unsuccessful the chick(s) will be removed and held until the threat has passed. Once the threat has passed the chicks will be returned to the nest. This procedure should be repeated when necessary.
5. Mobile chicks which have left the nest will remain with their parents. If they are threatened by flooding/tides/wind they will be moved progressively to a safer more elevated site, or provided with some form of shelter i.e. drift wood.
6. If a fairy tern egg/chick is abandoned or orphaned it will be fostered into the nest of another fairy tern.
7. Fostering of eggs/chicks to white-fronted terns will be considered if the above action (5) cannot be achieved. Raising fairy terns in captivity will be considered as a last option.

Action: Northland and Auckland Conservancies
Whangarei and Warkworth Field Centres

Objective 3. Measure the population parameters and monitor the population dynamics of fairy tern

Explanation

Knowledge on the ecology of New Zealand fairy terns is limited. Since 1990/91 most fairy tern chicks from Waipu and Mangawhai have been colour banded. This has provided information on the movements of chicks and will provide data on age of first breeding, natal site fidelity, population dynamics, post breeding movements and flocking behaviour. Banding will continue and be extended to include chicks from all breeding sites. An attempt will be made to band those adults in the population which are currently unbanded.

Regular monitoring by the wardens will involve recording the numbers of pairs attempting to breed each year and monitoring their outcome. A database will be established for New Zealand fairy tern. It will contain data on breeding attempts of fairy tern and individuals sightings and flock composition (band combinations and age class)

A biannual census will be conducted every year. In late December a breeding census will be conducted. All current, former, and potential breeding sites around the Northland Peninsula and the Kaipara Harbour will be visited to determine whether any birds are present and if they are attempting to breed.

A post-breeding census will be carried out in late April at all current, former, and potential flocking sites. Surveys of known wintering sites will be carried out from late March to May every year. Counts will be conducted within two hours of high tide.

**Action: Northland and Auckland Conservancies
Whangarei and Warkworth Field Centres**

Objective 4. Review and improve the legal status of the breeding and flocking habitat of fairy tern, and protect all known and potential habitat from development

Explanation

Our current knowledge of fairy terns and the threats they face suggests that breeding and flocking sites are the most important habitat to protect. Habitat protection will include a wide range of practical and/or legal actions and will aid in the protection of other species. The three known breeding sites are all designated Wildlife Refuges under either the Reserves Act 1977 or the Wildlife Act 1953. However, the boundaries of the Refuge and the Stewardship Area at Papakanui are unclear and, the situation is, at present, unmanageable. Difficulties have also been experienced at Mangawhai regarding the jurisdiction of the area below mean high water. The legal status of all three sites will be reviewed and steps taken to make changes if appropriate.

Of the known flocking sites, three (Tapora Sand Island, Papakanui Spit and Whangarei Harbour) are designated either Wildlife Refuges or Wildlife Management Reserves under the Wildlife Act 1953 and are managed by the Department. Another site (Waikiri Creek) is within the Okahakura Stewardship Area. This offers the site a limited degree of protection. It should be given

increased legal protection, preferably Wildlife Refuge status, in the immediate future.

All known and potential nesting and flocking sites should be protected from any adverse impacts of development. Jowett (1987) attributed the loss of fairy terns from Pakiri - Te Arai beaches to increased residential development and a subsequent increase in the number of day visitors. The Wildlife Service and the Department have successfully protected fairy tern habitat from the effects of development on a number of occasions i.e. Waipu Wildlife Refuge. Consultation with planning authorities will occur to inform them of the location of fairy tern sites and habitat protection requirements. The Department will object to planning applications which will affect known and potential breeding and flocking sites, and consider legal action to halt unauthorised modification of habitat. New dog control legislation will be used to make flocking and nesting areas 'no dog' zones and advocacy measures will be used at every opportunity.

**Action: Northland and Auckland Conservancies
Whangarei and Warkworth Field Centres**

Objective 5. Raise public awareness of the need for conservation of fairy tern

Explanation

Due to past efforts of the Department and the media, most local residents at Mangawhai and Waipu have some knowledge of fairy terns and the threats they face. However, there is a need for further advocacy, targeted at both local people and visitors. This advocacy should address the estuarine/coastal ecosystem with emphasis on fairy terns, New Zealand dotterel and other shorebirds.

The following actions are required:

1. Continue media releases on the results of fairy tern breeding attempts and their population dynamics.
2. Write articles on the New Zealand fairy tern.
3. Produce a pamphlet for New Zealand fairy tern.
4. Erect further signage at Papakanui Spit and Waikiri Creek.
5. Involve local people and give public presentations.
6. Instigate and support the production of a Fact Sheet for New Zealand fairy tern.
7. Investigate possible sponsorship of fairy tern recovery.

Action **Northland and Auckland Conservancies
Whangarei and Warkworth Field Centre
Public Awareness Unit**

Objective 6. Formalise a Fairy Tern Recovery Group

Explanation

A Fairy Tern Recovery Group will be formalised. Its members will meet on a regular basis to discuss and monitor the progress of the recovery programme

toward meeting the goals and objectives of the Recovery Plan. Regular meetings will allow improved communication and the diffusion of knowledge/experience. The Recovery Group will assess the Recovery Plan at regular intervals to measure the effectiveness of the programme in terms of money spent. Regular assessment will allow for changes to be made to the Plan in the best interests of the conservation of fairy tern.

Action: Recovery Group Leader

7.2 RESEARCH

The following research is required to assist the Recovery Group and the Department in making long-term management decisions. Research will involve co-ordination between Northland and Auckland Conservancies, Science & Research Division, Universities, Polytechnics, Auckland Zoo, Ornithological Society of New Zealand, and other researchers.

Priority A

(i) Sexing of fairy terns

At the 1997 Fairy Tern Recovery Group meeting a bias in the sex ratio was discussed as a potential explanation for why so few pairs have attempted to breed at each site during the past two seasons. At least two birds of the same sex (female) have been keeping company in recent years. Therefore, it is possible that there may be a sex bias in the fairy tern population. The sex ratio of the population is extremely important as one of the main thrusts of fairy tern recovery is to increase the number of breeding pairs. Moreover, knowledge of the sex of individuals would enable better management decisions to be made for nesting pairs i.e. egg and chick manipulation.

A blood sample will be taken from each chick prior to fledging and an attempt will be made to blood sample adult birds at the flocking sites during autumn. The sex of individuals will be determined through analysis of blood samples.

**Action: Recovery Group Leader
Conservancy Advisory Scientist
Massey University**

(ii) Nest relocation

The failure of 40% of all eggs and chicks lost since 1992/93 has been attributed to extreme environmental events (Table 1). One option for nest protection during flooding and high tides is to move the nests to a more elevated location.

This has been attempted three times for fairy terns. In the mid 1950's a two-egg nest was moved, in stages, approx. 8 feet up the beach away from the high tide near the Pakiri River estuary. The parents subsequently incubated the eggs. The eggs are presumed to have hatched as a second observer reported children playing with a chick at Christmas (G. Moon, pers. comm.). A nest at Te Arai beach was successfully moved, in stages, approx. 15 feet as it was close to the eastern seaboard and waves had almost reached the nest. The relocation

was successful and two chicks were fledged from this nest (G. Moon, pers. comm.). In 1995/96 a two-egg nest was moved one metre up a slope away from the high tide at Mangawhai Spit (Wickes, 1996). The manipulation was captured on video. The parents continued to incubate the eggs but they moved the nest back to its original position over the course of 2-3 days. Both eggs hatched successfully.

Nest relocation has the potential to be an important management tool for fairy terns. However, it needs to be trialed further so that an appropriate procedure can be developed. Trials could be conducted using white-fronted terns. Factors to be considered are; how far can a nest be moved at any one time, how frequently can they be moved, at what stage can they be moved, and what is the response of the parent birds. Ethics approval will be required.

Action Recovery Group Leader

(iii) Cause of predation

Predation seriously limits the productivity of fairy terns. The failure of approximately one third of all eggs and chicks lost since 1992/93 has been attributed to suspected predation (Table 1). However, the predators responsible have not been identified.

Video surveillance will be undertaken to determine which species are responsible for the loss of eggs and chicks. Monitoring of actual predator events and predator sign i.e. tracks and scats, will also occur at each breeding site.

Information on which species are preying upon the eggs and chicks of fairy terns will enable predator control to be targeted in the right direction.

Action: Recovery Group Leader

**Shorebird Protection Officers
Predator Control Officer**

Priority B

(i) Taxonomic status of New Zealand fairy tern

The Recovery Plan is based on the subspecific status given to the New Zealand fairy tern in the 1990 Checklist of the Birds of New Zealand (Turbott, 1990). This status is based on morphological differences (Section 2.0). Although Harrison (1983) speculates that the New Zealand subspecies may migrate to Australia, none of the birds banded in the 1970s or between 1990-97 have been recorded outside New Zealand.

Research is needed to clarify the subspecific status of the New Zealand fairy tern. A taxon based on genetic work would support the priority ranking and funding currently given to the recovery programme. Analysis of fairy tern DNA will also allow the relatedness of individuals to be determined, and monitoring of the evolution of the subspecies.

Action: Recovery Group Leader

**Conservancy Advisory Scientist
Victoria University**

(ii) *Life Expectancy*

Information on the life expectancy of fairy terns is limited. Data on; recruitment, natal site fidelity, age of first breeding, productivity, and mortality in different age classes would aid management decisions.

Attempts to band all fairy tern chicks prior to fledging will continue, and an attempt will be made to band those adults in the population which are currently unbanded. A biannual census will be conducted each year. A breeding census will be carried out in December and a post-breeding census will be conducted in April at all known and potential breeding and flocking sites around the Northland peninsula and the Kaipara Harbour. Regular post-breeding flocking counts will be conducted between March and May. An electronic data-base will be established to incorporate all existing information.

Action: Recovery Group Leader

**Conservancy Advisory Scientist
Shorebird Protection Officers
OSNZ Northland and Auckland**

(iii) *Movement and migration*

Knowledge on the movement and migration of fairy terns is limited. Post-breeding flocking counts for fairy terns have been conducted on a regular basis, between March and May, for a number of years. Analysis of the data reveals that some birds known to be alive are not observed on a regular basis during flock site counts, and that on numerous occasions very few birds are present at the known flocking sites. Therefore it seems likely that there are sites which fairy terns use for post-breeding flocking which are currently unknown.

An attempt will be made to attach transmitters to chicks prior to fledging and to some of those adults which are captured at flocking sites for banding and blood sampling. The movements of these individuals will be determined.

Information on the movement and migration of fairy terns would allow the appropriate degree of protection to be assigned to flocking sites, and allow data to be collected on post-fledging mortality and the degree of mixing between the east coast and west coast birds.

Action: Recovery Group Leader

**Conservancy Advisory Scientist
OSNZ Northland and Auckland**

(iv) *Parent-chick recognition and parental care*

We do not know at what stage parent-chick recognition occurs in fairy terns, or the scope of parental care i.e. post-fledging. If we are going to manipulate chicks as well as eggs, for both protection measures and to maximise productivity, we have to be aware of the stage at which parent-chick recognition occurs and the scope of parental care.

A literature review of parent-chick recognition and parental care in other tern species needs to be carried out. Trials on parent-chick recognition could be conducted using white-fronted terns. Factors to be considered are; stage of acceptance of eggs and chicks, the effect of the presence of a sibling in the

nest, feeding behaviour, and the response of the parents. Ethics approval will be required.

Action: Recovery Group Leader

Conservancy Advisory Scientist

(v) *Hatching and rearing of tern chicks in captivity.*

In the worst case scenario, if fairy tern numbers do not increase, eggs may have to be incubated in captivity and chicks raised there, possibly until fledging. Any chicks raised in captivity would be released at flocking sites after fledging.

Research into the incubation of eggs and rearing of tern chicks in captivity should be undertaken. Standard procedures need to be developed that can be applied to fairy terns should the need arise. Trials could be undertaken using white-fronted terns. A literature review of fish-eating nidifugous species, particularly terns, herons and shags, should be undertaken to provide additional information. Ethics approval will be required.

Action: Recovery Group Leader

Auckland Zoo

(vi) *Nest protection cages*

At the 1997 Fairy Tern Recovery Group Meeting, nest-protection cages were proposed as a management tool to be used in the defence of nesting fairy terns from ground and aerial predators, horses and vehicles. Fairy terns are likely to accept nest protection cages as they tolerate video surveillance equipment and photographers hides. However, there was concern that an adult bird may be scared off the nest during incubation and into the mesh of the cage in fright or panic, or that the cages may focus the attention of predators on fairy tern nests. The nest scrapes of fairy terns are usually situated in low-lying areas of sand and shell which provide excellent camouflage for eggs, chicks and incubating adults (Parrish & Pulham 1995a).

While nest protection cages have the potential to be a useful management tool for fairy terns, research is required to determine their effectiveness. Trials could be conducted using white-fronted terns. The main factors to be considered are; construction of the cages, timing of deployment, response of the parent birds, and response of predators to the cage.

Action: Recovery Group Leader

Priority C

(i) *Assessing plumage of fairy terns*

The Eastern little tern, which visits New Zealand every summer, is very similar to the fairy tern in non-breeding plumage, and it can be difficult to distinguish between the two. Immature birds of the two species are almost indistinguishable in the field.

Information on the plumage of fairy terns will continue to be gathered and incorporated into the electronic database, and used to refine the skills of workers in the identification of fairy terns in the field.

Action: Recovery Group Leader

Conservancy Advisory Scientist

(ii) *Habitat requirements*

Although Parrish & Pulham (1995a) and Rogers (cited in Higgins & Davies 1996) give details of habitat utilised by fairy terns in New Zealand and Australia, further research on habitat utilization is required. The New Zealand birds are currently confined to three breeding sites but in the past have bred at several other sites in Northland and Auckland Conservancies. It is not known if the present sites provide enough habitat for expansion of the population or if suitable habitat exists at sites previously used for breeding.

All breeding pairs of fairy tern will be monitored each season. Observers will collect data on habitat requirements and indications of habitat problems i.e. location and percentage of shell component of nest sites, egg and chick development.

Action: Shorebird Protection Officers

OSNZ Northland and Auckland

8. Acknowledgements

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Appendix 1: Published Recovery Plans

RECOVERY PLAN	#	COST	YEAR APPROVED
Fairy tern	23	(\$15)	Approved 1997
Blue duck	22	(\$15)	Approved 1997
Kakapo	21	(\$15)	Approved 1996
Stitchbird	20	(\$15)	Approved 1996
Brown teal	19	(\$15)	Approved 1996
Native frogs	18	(\$15)	Approved 1996
New Zealand (Hooker's) Sea Lion)	17	(\$15)	Approved 1995
<i>Dactylanthus taylorii</i>	16	(\$15)	Approved 1995
Bat (Peka peka)	15	(\$15)	Approved 1995
Otago and grand skinks	14	(\$15)	Approved 1995
Giant land snail	13	(\$15)	Approved 1995
Takahe	12	(\$15)	Approved 1994
South Island saddleback	11	(\$15)	Approved 1994
New Zealand Dotterel	10	(\$15)	Approved 1993
Tuatara	9	(\$15)	Approved 1993
Kowhai ngutukaka	8	(\$15)	Approved 1993
Subantarctic teal	7	(\$15)	Approved 1993
Mohua (yellowhead)	6	(\$15)	Approved 1993
Chevron skink	5	(\$15)	Approved 1993
Black stilt	4	(\$15)	Approved 1993
Whitaker's and robust skinks	3	(\$15)	Approved 1992
Kiwi	2	(\$15)	Approved 1991
North Island kokako	1	(\$15)	Approved 1991
Yellow-eyed penguin	-	*	Approved 1991
Kakapo	-	Out of print	Approved 1989

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