Current status of the endangered Tuamotu Sandpiper or Titi *Prosobonia cancellata* and recommended actions for its recovery

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The Tuamotu Sandpiper or Titi is the only surviving member of the Tribe Prosoboniini and is confined to eastern Polynesia. Formerly distributed throughout the Tuamotu Archipelago, it has been decimated by mammalian predators which now occur on nearly all atolls of the archipelago. Isolated sandpiper populations are currently known from only four uninhabited atolls in the Tuamotu. Only two of these are currently free of mammalian predators, such as cats and rats, and the risks of rat invasion on them are high. This paper outlines tasks necessary in the short term (within five years) to secure the species, together with longer term actions needed for its recovery. Short-term actions include increasing the security of existing populations, surveying for other potential populations, eradicating mammalian predators on key atolls, monitoring key populations, and preparing a recovery plan for the species. Longer term actions necessary for recovery include reintroductions, advocacy and research programmes.

INTRODUCTION

The Tuamotu Sandpiper or Titi *Prosobonia cancellata* is a little-known shorebird endemic to the Tuamotu Archipelago. It is unique amongst sandpipers in that it is largely a sedentary bird of tropical coral atolls where it frequents forest and shrubland habitats. It has no close affinities with other living species and is placed in its own tribe, the Prosoboniini, within the subfamily Tringinae or shanks (Zusi & Jehl 1970, Piersma *et al.* 1996). All other species of prosoboniids, including flightless species, have become extinct during the past 1,000 years (Wragg & Weisler 1994, Steadman 1995, Steadman & Rollet 1996).

Formerly widespread throughout the archipelago, the Tuamotu Sandpiper is now confined to a small number of islands in the Tuamotu, and is considered an endangered species (Birdlife International 2000). Results of recent surveys suggest a total population of little more than 1,000 individuals (Blanvillain *et al.* 2002, Pierce *et al.* 2003). There are no recent data on population trends.

This paper summarises the distribution, abundance and ecology of the Tuamotu Sandpiper as completely as is currently known, assesses the threats to its continued survival, and outlines actions needed for its recovery.

FORMER DISTRIBUTION OF PROSOBONIIDS

The genus *Prosobonia* contains one extant and many extinct taxa restricted to eastern Polynesia. The taxonomy of prosoboniids is not straightforward and some workers consider the Tuamotu Sandpiper *P. cancellata* (*parvirostris*) to be distinct from the type specimen which is thought to have been collected at Kiritimati in the Line Islands in 1778 (see Walters 1993 for discussion). Table 1 summarises existing taxonomic information on the genus *Prosobonia*.

The Kiritimati birds (*Prosobonia cancellata*, type locality), as well as *P. leucoptera of* Tahiti and *P. ellisi* of Moorea were last seen alive in the 18th century and probably died out then or soon after (Piersma *et al.* 1996). The Henderson island birds died out between 1200 AD and the 18th century (Wragg & Weisler 1994). It is likely that the Marquesan taxon also died out early in the settlement of those islands.

Table 1. Extinct and living prosoboniid taxa.

Taxon	Distribution	Status	Reference
P. cancellata (type specimen)	Considered to have been collected from Kiritimati (Line Islands) in 1778.	Extinct *c.*18th century	Walters 1993
P. cancellata (parvirostris) (Tuamotu Sandpiper)	Tuamotu Archipelago	Confined to a small number of atolls	Walters 1993, Piersma *et al.* 1996
P. leucoptera (Tahitian Sandpiper)	Tahiti	Extinct *c.*18th century	Piersma *et al.* 1996
P. ellisi (white-winged sandpiper)	Moorea	Extinct *c.*18th century	Walters 1991
P. new species	Henderson Island, Pitcairn Group	Subfossil, extinct	Wragg & Weisler 1994
P. new species	Marquesas Islands	Subfossil, extinct	Steadman & Rollet 1996
P. new species	Mangaia, Cook Islands	Subfossil, extinct	Steadman 1995

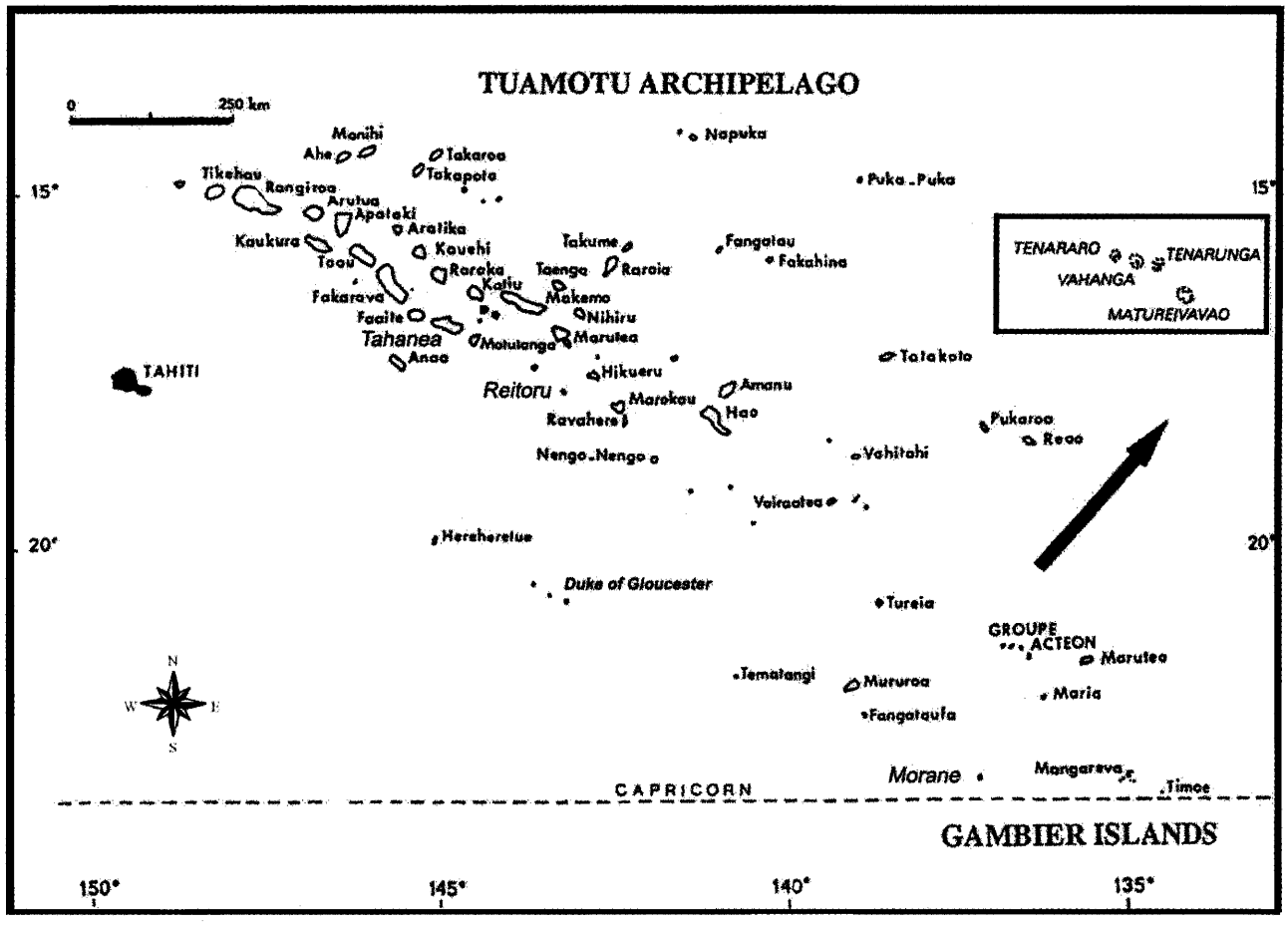

Fig. 1. Map of the Tuamotu Archipelago (modified from Blanvillain *et al.* (2002)).

FORMER DISTRIBUTION OF TUAMOTU SANDPIPER

Although all other prosoboniids were extinct by the end of the 19th century, the Tuamotu Sandpiper was still widespread in the Tuamotu Archipelago with records extending from Tepoto (north-west of Napuka) in the north (14°S) to the Gambiers and Morane (about 23°S) in the south (Fig. 1). In the 1920s, Tuamotu Sandpipers were present and breeding in the Raevski Group (between Tahanea and Hao) and they were common or abundant on four of the five atolls in the Acteon Group centred on 21°S (Beck & Quayle in Holyoak & Thibault 1984). The Acteon Group atolls were Tenarunga (only one half of the island frequented), Tenararo, Matureivavao and Maria Islands in 1922, but on the fifth island in the group, Vahanga, they were rare with only four birds being seen. Presumably they were also common at this time on Morane (where 150–200 birds were recorded in 1990) and possibly on some other southern Tuamotu atolls, including Marutea Sud where they were considered moderately abundant in 1965 (Birdlife International 2000), and on some central Tuamotu atolls, e.g. Tahanea, Fakarava and Anuanararo where birds were reported in the 1980s and 1990s.

By the 1990s, Morane and Tenararo were the only localities where Tuamotu Sandpipers were known to be present in good numbers, and they had virtually disappeared from all of the Acteon Group where they had been common in the 1920s (Blanvillain *et al.* 2002). Thus, in 1999, only one bird was seen during a long stay on Tenarunga, two birds during a brief visit to Vahanga, none during a brief visit to Matureivavao, but many hundreds were present on Tenararo. Maria was not visited during this trip, but local people reported seeing none in 1986 (Blainvillain *et al.* 2002). If the Tuamotu Sandpiper has disappeared from Matureivavao, it has done so in recent years only, as the species was considered quite common in 1966 (Lacan & Mougin 1974) and they were also present in 1970 and 1982 (Birdlife International 2000). Morane supported 150–200 birds in 1990 (Birdlife International 2000).

Elsewhere in the Tuamotu Archipelago, only small numbers of birds were reported in the 1980s and 1990s, mainly from islands in the central and northern Tuamotu. These included single birds on Rangiroa and neighbouring atolls, and small to moderate numbers on Tahanea, Fakarava, and Anuanararo in the Duke of Gloucester Islands. There have also been an increasing numbers of nil returns, such as from the Raevski Group in 1999 where it was reported to be present in the 1980s (Blanvillain *et al.* 2002). Details of all Tuamotu Sandpiper reports for 1900–2003 are set out in the Appendix.

CURRENT DISTRIBUTION OF THE TUAMOTU SANDPIPER

A survey of 10 atolls in the Tuamotu and Austral Groups in 2003 found that Morane was a stronghold for Tuamotu Sand-

Fig. 2. Tuamotu Sandpiper on the shrub *Messerschmidtia*.

pipers and smaller populations were also found on Reitoru and Tahanea in the central and northern Tuamotu (Pierce *et al.* 2003). Thus in 2003 the following populations were known:

- Tenararo: 500+ in November 2000 and July 2001 (C. Blanvillain & R. Pierce pers. obs.)
- Morane: 530+ in March 2003 (Pierce *et al.* 2003)
- Reitoru: 57 in March 2003 (Pierce *et al.* 2003)
- Tahanea: 185 in March 2003 (Pierce *et al.* 2003).

It is possible that small populations of the Tuamotu Sandpipers could persist on isolated motu (islets separated from the main atoll) at Marutea Sud where they were considered moderately abundant in 1965 (Birdlife International 2000) and on other islands, e.g. in the Duke of Gloucester Group and possibly other atolls.

ECOLOGY OF THE TUAMOTU SANDPIPER

Habitat

The atolls of the Tuamotu typically comprise an outer reef behind which rock-pools give way to a beach of coral rubble and sand, followed by a vegetated zone extending for a few hundred metres inland to the lagoon. The vegetation is quite simple, reflecting the poor soil and isolation of the archipelago from large landmasses. It usually comprises a small number of species of each of grasses, shrubs, vines and trees, with the outer zone dominated by hardy plants such as the prostrate shrub *Scaevola taccada*. The interior is more diverse with shrubs and small trees of several species including *Messerschmidtia (Tournefortia) argentea, Guettarda speciosa, Boerhavia tretrandra* and *Pandanus tectorius*. On many islands, coconuts *Cocos nucifera* have colonised or been deliberately planted, and this species has begun to dominate the canopy, and in places the undergrowth, of many atolls. Another introduced plant of ecological significance is lantana *Lantana camara* which is now established on some islands. In places there are marine passages (known locally as 'hoa') that separate the sea from the lagoon. Many of these passages are only partially open to the sea, or completely closed except during storms.

Unlike the three most common migratory shorebirds of the Tuamotu (Bristle-thighed Curlew *Numenius tahitiensis*, Wandering Tattler *Heteroscelus incanus*, and Pacific Golden Plover *Pluvialis fulva*) which frequent the reefs and lagoon-edges of atolls, the Tuamotu Sandpiper is seldom seen in these habitats. Instead, it is more a bird of the upper beaches of coral rubble and sand amongst dwarf shrubs and scattered tall shrubs, as well as the adjacent areas of shrubland and interior of the forest (Figs 2 and 3). During surveys of Tenararo in November 2000 and July 2001, the sandpipers were distributed throughout the forest and especially the forest edges. On Morane, Reitoru and Tahanea in March 2003, the preferred habitat was open forest and particularly shrubland dominated by *Scaevola, Messerschmidtia* and *Guettarda*. Dense stands of *Pandanus* were common on Morane and these were largely avoided by Tuamotu Sandpipers. Elsewhere, observers have reported Tuamotu Sandpipers frequenting atoll shorelines and lagoon edges (Jutglar 1996, Birdlife international 2000). During our surveys, shorelines were rarely frequented by the sandpipers, except when they were attracted out of curiosity to the observers (Pierce *et al.* 2003).

Food

No detailed feeding studies have been carried out on the Tuamotu Sandpiper and most of the information presented below was obtained during population surveys by the authors.

Food is taken from a variety of situations, the key ones being from the surface of the ground, from litter of *Pandanus, Messerschmidtia* and other trees, from the undersurface of leaves on low shrubs, from bark of trees and from the branches, leaves and flowers of shrubs and trees (Fig. 3). Food comprises mainly invertebrates, but also a significant amount of plant material. On Tenararo and Vahanga in October 2000 and July 2001, invertebrate food observed included ants (at least two species), cockroaches (at least 3 species), sandflies and centipedes. On all atolls, birds were

Fig. 3. Tuamotu Sandpiper on a tree trunk.

Fig. 4. Dwarf *Scaevola* plants comprise one of the preferred feeding areas of Tuamotu Sandpipers.

frequently seen taking nectar and/or water from flowers of *Scaevola* (Fig. 4), and unspecified seeds were also taken (R. Pierce pers. obs.). Stomach contents have contained ants (four species), leafhoppers and a wasp (Juglar 1996).

Breeding

The breeding of the Tuamotu Sandpiper is poorly known. Nests and/or chicks have been found in March (Pierce *et al.* 2003) and from May to October (Juglar 1996, C. Blanvillain, R. Pierce pers. obs.), suggesting a prolonged breeding season. Nests have been found in the partially vegetated supralittoral zone and in shrubland areas. They are constructed from small shell fragments, coral debris and plant material and one nest contained two eggs (Juglar 1996). One nest was 9 cm in diameter and 2–3 cm deep in fine granules of coral sand (C. Blanvillain pers. obs.).

THREATS TO THE TUAMOTU SANDPIPER

Mammalian predators

The largest surviving populations of Tuamotu Sandpiper occur on two small (<200 ha), uninhabited and mammal-free atolls, Morane and Tenararo. The third largest population occurs on the large atoll of Tahanea (Fig. 5) where it is only common on the few very small motu of that atoll that lack predatory mammals, and none or very few were found on *c.*20 motu that supported cats *Felis catus* and/or rats (Pierce *et al.* 2003). The fourth largest population known is on the small atoll of Reitoru where the sandpipers occur at low densities on all three forested motu. All three Reitoru motu also supported Pacific rats or kiore *Rattus exulans* at moderate to low densities in March 2003.

Fig. 5. Forest and shrubland habitat utilised by Tuamotu Sandpipers at Tahanea.

Tuamotu Sandpipers have disappeared from many islands that contain combinations of black (ship) rats *Rattus rattus*, Norway rats *R. norvegicus* and Pacific rats (Blanvillain *et al.* 2002, Pierce *et al.* 2003). Combinations of rodents and/or cats as well as pigs *Sus scrofa* and other mammals occur on many other islands throughout Tuamotu Archipelago and Gambier Islands and within the former range of the Tuamotu Sandpiper (Seitre & Seitre 1992, Rosair 1995, Thibault & Bretagnole 1998, Blanvillain *et al.* 2003, Pierce *et al.* 2003). However, data are often lacking on precise species composition, their timing of arrival and whether colonisation of all motu of an island was rapid (Holyoak & Thibault 1984, Blanvillain *et al.* 2002).

The ecology and behaviour of Tuamotu Sandpipers suggests that they would be vulnerable to predation from cats and all species of rats. Their inquisitive and confiding behaviour would make adults particularly susceptible to cats. However, the main mechanism of decline throughout the archipelago has probably been predation of eggs and young initially by Pacific rats and later by European rats.

Pacific rats were the first rat species introduced to the Tuamotu Archipelago and they have colonised all but a very few atolls. Their presence appears to be sufficient to cause the local extinction of Tuamotu Sandpipers and prevent successful breeding of recolonising birds from other islands, as is the case on Vahanga (Fig. 6) in the Acteon Group (see below under Habitat modification). Pacific rats are also likely to be responsible for the extinction of the Henderson Island *Prosobonia* and several other birds (Wragg & Weisler 1994). The subsequent arrival and spread of Norway rats, black rats, feral and house-based cats and possibly further kiore throughout the Tuamotu, has placed the Tuamotu Sandpiper in grave danger of extinction.

Habitat modification and risk of rat invasion

Habitat modification may have contributed to Tuamotu Sandpiper population declines to varying degrees, but possibly more as an indirect mechanism through facilitating the proliferation of rats in coconut plantations (Pierce *et al.* 2003). The two largest sandpiper populations occur in rather different habitats: on Morane they are in little-modified native forest, but on Tenararo they occupy a mature coconut plantation that was planted in the 1970s and has grown up through the forest. The proliferation of coconuts (and suppression of indigenous vegetation) could represent a significant threat to the habitat of Tuamotu Sandpiper and other bird species on Tenararo, but currently the sandpipers are still common there. However, the common practise on other atolls of clearing native undergrowth beneath mature coconuts would also degrade Tuamotu Sandpiper habitat.

Vahanga, which is close to Tenararo, was also planted with coconuts in the 1970s and has very similar habitat to Tenararo, but it has no resident Tuamotu Sandpipers (Fig. 6). The one significant ecological difference between the two islands is the presence of high densities of Pacific rats on Vahanga, which appear to have contributed to the loss of not only the Tuamotu Sandpiper, but also two pigeons – the Polynesian Ground-dove *Gallicolumba erythroptera* and the Atoll Fruit Dove *Ptilinopus coralensis*. All three threatened species visit Vahanga in small numbers from Tenararo, but have not become established there. Coconut planting or other direct human activity cannot be implicated in the virtual absence of Tuamotu Sandpipers from Vahanga, because

Tuamotu Sandpipers were also very rare there in the 1920s, 50 years before coconuts were planted (Beck & Quayle in Holyoak & Thibault 1984).

Clearly a huge concern is that rats or cats could be introduced to the few remaining predator-free islands. This is more likely to occur on atolls on which coprah is being harvested or could be harvested in the future, i.e. on three of the four known islands that support Tuamotu sandpipers (Table 2). For example, Tenararo has two neighbouring atolls, Vahanga where there is coprah and Pacific rats, and Tenarunga where there is coprah, Pacific rats, black rats and cats. Therefore, if harvesting proceeds on Tenararo there is a high risk of rats colonising this stronghold of the Tuamotu Sandpiper during human visits from the neighbouring atolls. The smaller sandpiper populations on Tahanea and Reitoru are also threatened by combinations of coprah and predators (Table 2).

The arrival of rats would see any of these islands, and particularly ones containing coprah plantations, become saturated with extremely high densities of rats within a few years. There would be very little, if any, productivity after the rat invasion and the Tuamotu Sandpiper population would almost certainly go into rapid decline. The arrival of cats would see high adult mortality as well as loss of eggs and chicks.

Stochastic events

The now greatly constricted range of Tuamotu Sandpipers also presents a risk from other chance events, such as cyclones, tsunamis and disease. Tropical cyclones can be devastating to atoll habitat and bird populations (Thibault & Guyot 1987, Birdlife International 2000). In the past, any populations of Tuamotu Sandpipers that were decimated by cyclones or other events would have recovered through a combination of local recruitment and immigration of birds from neighbouring atolls. The loss of the latter capability means that a particularly severe cyclone affecting Tuamotu Sandpiper populations could spell disaster for the survival of the species. The same concerns apply in relation to disease, which without backup populations, could also be devastating for the species. There are also concerns regarding the increased genetic bottleneck that Tuamotu Sandpiper populations may currently be in and the associated risk of increased mutational load (A. Baker, T. Piersma pers. comm.).

RECOMMENDED ACTIONS FOR THE RECOVERY OF THE TUAMOTU SANDPIPER

In the short term (<5 years) the goal must be to ensure the species does not become extinct. In the long-term (5–20+ years) the goal could include the reintroduction of populations of *Prosobonia* across its former broad geographic range. Both of these goals are dependent on the availability and maintenance of predator-free islands with suitable habitat throughout the natural range of *Prosobonia.*

Fig. 6. Shrubland habitat at the edge of a channel on Vahanga.

The short-term goal of preventing the species from going extinct could be achieved through the maintenance of four or more widely separated and viable populations. This would ensure that one-off localised disasters have less chance of impacting on the entire population. For example, if viable populations could be maintained on the Acteon Group (Tenararo), Morane, Reitoru and Tahanea (which span *c.*1200 km of the archipelago), the potential impact of local disasters on the species as a whole would be lessened.

Our recommendations for actions needed to secure the Tuamotu Sandpiper in the short term (2005–2010) and long term (from 2010) are set out below.

Short term conservation actions (2005–2010)

1. Develop a recovery plan for the Tuamotu Sandpiper

A formal recovery plan should be prepared urgently in order to guide the recovery effort in the short term and long term. The plan should identify specific tasks to be undertaken, timeframes and persons or agencies responsible. These tasks should include legal aspects (e.g. formal protection of birds and islands) as well as tasks 2–10 below.

2. Maintain the pest-free status of existing Tuamotu Sandpiper islands

Currently there are only two islands (Morane and Tenararo) on which Tuamotu Sandpipers are known to be abundant and mammalian predators are absent. It is vital for Tuamotu Sandpiper survival that these remain predator free. It is important, therefore, that security measures are put in place urgently to ensure that there is minimal risk of mammalian pests or other pests invading. Measures could include:

- restrict island entry to permit holders (permits from owners and/or local authorities)

Table 2. Summary of threats to populations of Tuamotu Sandpipers.

Atoll	Habitat used by Tuamotu Sandpipers	Main threats
Morane	Indigenous vegetation	Invasion of rat species during illegal landings
Tenararo	Indigenous vegetation and widespread coconuts	Invasion of Pacific rats during coprah harvesting; habitat modification as young coconuts grow, and habitat clearing
Reitoru	Indigenous vegetation and local coconuts	Pacific rats, which are currently present throughout the atoll
Tahanea	Indigenous vegetation and widespread coconuts	Invasion of rat species during coprah harvesting and other visits

- limit visits for approved purposes only, e.g. management and research on island ecology and pests
- implement and maintain pest monitoring
- make the value of islands and landing procedures known to shipping companies, local communities and immigration authorities
- vessels and equipment of visiting parties need to be scrutinised for the presence of mammalian pests (e.g. rats) and invertebrate pests (e.g. non-native ants)
- maintain a register of visiting vessels and require a report from each visiting party
- if other islands are shown to be important for Tuamotu Sandpipers (see 3 below) ensure that they also have a strict quarantine routine as above
- implement appropriate reserve status for the atolls, e.g. nature reserve for Morane (Pierce *et al.* 2003) and potentially incorporating terrestrial and marine values.

3. Survey selected islands for the presence of Tuamotu Sandpipers and mamalian predators

Several atolls have recently been surveyed for Tuamotu Sandpipers, mammalian predators and land-use status. Some are known to have supported Tuamotu sandpipers in the past, but have not been visited for many years. These include the following priority islands:

- Marutea Sud (Acteon Group) – Tuamotu Sandpipers were recorded as moderately abundant in 1965, but they may have disappeared from the main motu since then
- Maria (Acteon Group) – although locals visiting the island in 1986 reported no sandpipers, but "many rats on the ground", this situation needs confirming
- Anuanararo (Duke of Gloucester Islands) – this island contained small numbers of sandpipers in the 1980–90s. Other islands in the vicinity should also be surveyed.

4. Eradicate predators on additional islands in strategic locations, reintroduce Tuamotu Sandpipers if required, and maintain their predator-free status

Following the outcome of the recent surveys (Action 3 above) islands should be strategically selected for pest eradication. Key questions and considerations include:

- geographic location – does the site contribute towards the security of another metapopulation of Tuamotu Sandpipers, i.e. a new cluster of islands?
- does it improve the security of an existing metapopulation of Tuamotu Sandpipers?
- does the island contain sufficient habitat to support a viable population of Tuamotu Sandpipers or does it require supporting islands and if so what is their status, habitat quality and future prospects for sustaining Tuamotu Sandpipers?
- is the future of the island and its habitats and biota secure?
- would the island in a pest-free state contribute significantly towards the conservation of other biota, e.g. Polynesian Ground-dove and other threatened birds?
- Are there prospects for involving the local community in Tuamotu Sandpiper conservation and perhaps economic ventures, e.g. ecotourism?

Potential candidates for pest eradication and reintroduction of Tuamotu Sandpipers currently include other members of the Acteon Group and Reitoru, on which the birds would probably recolonise naturally from Tenararo. Several other atolls and high islands in the Gambier Islands, including outlying Temoe, and atolls in the northern Tuamotu, e.g., some motu at Rangiroa, may also be suitable.

5. Implement monitoring of the Tuamotu Sandpiper populations and rodent status on key islands and carry out targeted research

It is important to monitor populations on key islands to determine whether they are healthy or not. This should include regular indexing of key populations, e.g. at Tenararo and Morane and surveying for rodents.

Research is also needed to help determine key aspects of the life cycle that impact on population size (i.e. survival and recruitment) such as the breeding season, nest sites, clutch size and dispersal.

Long-term conservation actions (from 2010, although some could be started earlier as opportunities arise)

6. Determine minimum viable population sizes for Tuamotu Sandpiper

All Tuamotu Sandpiper populations are in comparative bottleneck situations and could therefore be experiencing an increase in negative mutational load. Their genetics should be examined to assist with determining minimum viable population sizes and therefore the selection of appropriate island clusters for species recovery. Interim recovery actions (especially Recommended action 4 above) should aim at restoring sites that provide for large populations.

7. Involve local communities in the conservation of Tuamotu Sandpipers and other biota and the opportunities that stem from that

Rats are regarded as a pest throughout the Tuamotu because of the high densities that they are reported to reach and their consequent impacts on lifestyle and economic values. This includes impacts on food-stores and particularly coprah production. There are clear opportunities to work with the Department of Agriculture and/or local communities in collaborative rat eradication initiatives that will achieve objectives across a spectrum of economic and environmental programmes. Potential benefits of collaborative work include:

- economic benefits to the community, for example in increased copra production
- economic benefits to the community through ecotourism opportunities
- shared costs of pest eradication and bio-security programmes
- increased community commitment in Tuamotu Sandpiper recovery and other conservation initiatives

8. Advocate for the security of Tuamotu Sandpiper populations

The isolation of the Tuamotu Islands and the infrequent visits of conservationists, means that it is very important to achieve

local understanding of the ecological issues on the islands and that responsible management and safeguards are implemented. Considerable advances have been made over the last few years in raising the profile of the Tuamotu Sandpiper and other threatened biota locally in the Tuamotu (Blanvillain *et al.* 2002, Pierce *et al.* 2003, Father J. Améran pers. comm.). However, there is a long way to go before the security of high value islands can be ensured.

Some additional courses of action could include:

- talks and discussions with key communities where island visitors (mainly coprah harvesters, fisherman, pearl-shell divers, etc.) are domiciled e.g. Mangareva, Raeo, Tenarunga, building on work that has already been done
- open days and field trips at key conservation sites when opportunities arise
- pamphlets and/or documentary videos highlighting the plight of threatened species and ways in which people can assist
- use of the media and cultural occasions to promote conservation of Tuamotu Sandpipers and other island biota.

9. Introduce Tuamotu Sandpipers to islands from which predators have been eradicated

Several islands and atolls outside the Tuamotu have been cleared of rats, including some atolls in the Pitcairn Group where a prosoboniid once occurred. The ability of birds to disperse across long-distances is unknown, but the lack of recent records from Mangareva in the Gambiers suggests that the *c.*200 km between Morane and the Mangareva may be a barrier to dispersal. Internationally, considerable knowledge of wader translocations has been built up through species recovery programmes which will invaluable.

10. Evaluate the phylogenetic affinities of the Tuamotu Sandpiper

In order to fully understand the needs of the Tuamotu Sandpiper and establish its true conservation status, further studies are required to clarify its place in shorebird phylogeny. Considering the radiation of *Prosobonia* in Polynesia, it is quite possible that the species represents an entire family within Charadriiformes, enhancing its unique biological and conservation value.

CONCLUSION

Urgent action is needed to secure and recover the Tuamotu Sandpiper and significant international assistance will be needed by French Polynesia in order to achieve this. Much practical assistance can be sourced from the Pacific region and involve different organisations and groups, including the partners of the Pacific Programme of the Cooperative Islands Initiative. Funding, however, remains the greatest need. Subject to funding, immediate actions for 2005 and 2006 include the survey of additional islands (Recommended action 3) and the eradication of rats from key atolls (Recommended action 4).

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APPENDIX

Reports of Tuamotu Sandpipers during 1900–2003

Island	Year	Number/observations	Source
Northern Tuamotu			
Mataiva	2003	1 on 17 April	Cam Keppler in *Te Manu* No. 44, September 2003
Rangiroa	1972	1	Holyoak 1973
	1990s	1	Birdlife International 2000
Niau	1990s	1	Birdlife International 2000
Kauehi	1923	1 in March, 4 collected in May	Beck in Holyoak & Thibault 1984
Fakarava	1923	Collected	Beck & Quayle, in Holyoak & Thibault 1984
	1980s	Reported present by fishermen	Birdlife International 2000
	2003	1 in March	Pierce *et al.* 2003
Tahanea	1923	Collected	Quayle in Holyoak & Thibault 1984
	1989	12–15	Birdlife International 2000
	1997	3 on Toreatai Motu in March	P. Agnew pers. comm.
	2003	185 in March mainly on motu of south-western chain	Pierce *et al.* 2003
Katiu	1923	Collected	Quayle in Holyoak & Thibault 1984
Tuanake	1923	Collected	Beck in Holyoak & Thibault 1984
	1980s	Reported present by fishermen	Birdlife International 2000
	1999	None	Blainvillain *et al.* 2002
Hiti	1921	7 in October	Quayle in Holyoak & Thibault 1984
	1923	Two eggs collected	Holyoak & Thibault 1984
	1980s	Reported present by fishermen	Birdlife International 2000
	1999	None	Blainvillain *et al.* 2002
Tepoto	1923	Several collected	Beck in Holyoak & Thibault 1984
	1999	None	Blainvillain *et al.* in press
Central Tuamotus			
Anuanuraro	1990	30–40	Birdlife International 2000
Nukutavake	1981	Present	Birdlife International 2000
Vanavana	1922	Collected	Holyoak & Thibault 1984
Reitoru	2003	57 in March	Pierce *et al.* 2003
Acteon Group			
Tenararo	1922	Abundant in June	Beck & Quayle in Holyoak & Thibault 1984
	1999	500+	Blanvillain *et al.* 2002
Vahanga	1922	4	Quayle in Holyoak & Thibault 1984
	1999–2001	Up to 3	C. Blanvillain & R Pierce pers. obs.
Tenarunga	1922	Large numbers, but mainly restricted to one side of the atoll	Beck & Quayle in Holyoak & Thibault 1984
	1999	Rare visitor, 1 seen during 18 days	C. Blanvillain
Maturei Vaovao	1922	Hundreds	Beck & Quayle in Holyoak & Thibault 1984
	1966	Quite common bur sometimes killed by local people	Lacan & Mougin 1974
	1982	Present	Birdlife International 2000
	1999	None seen during one day visit in October	C. Blanvillain
	2002	2 in October	C. Serra pers. comm.
Maria	1922	Very common	Beck & Quayle in Holyoak & Thibault 1984
	1986	Absent according to local people	C. Blanvillain
Marutea Sud	1922	Common on Motu Kaveka only: present on a second motu	Beck & Quayle in Holyoak & Thibault 1984
	1965	Less abundant	Lacan & Mougin 1974
	1997–1998	A few on an isolated motu	V. Bretagnole, per G. Wragg
Gambier-Morane			
Gambier Islands	1922	Small numbers on the islands Makaroa, Manui, Kamaka and Motu Teiku	Holyoak & Thibault 1984
	2000	None	R.J.Pierce, C. Blanvillain & G. Wragg pers. obs.
Morane	1990	150–200	Birdlife International 2000
	2003	530+	Pierce *et al.* 2003