

**RECOVERY PLAN FOR THE MANUMEA OR
TOOTH-BILLED PIGEON (*Didunculus strigirostris*)**



2006-2016

**Ministry of Natural Resources & Environment (MNRE)
Government of Samoa**



October 2006

Introduction to Recovery Planning

Recovery planning has been adopted internationally as a way of developing an agreed approach for the conservation of a threatened species. It provides an opportunity for all with knowledge of, or an interest in, a given species to contribute their ideas and agree on priority actions within a recovery plan.

A recovery plan provides confidence for funding agencies, and others interested in contributing time or expertise to aid a species, that all available information has been reviewed, all options for recovery considered and the best approach identified. Recovery Plans can also be used to raise public awareness about a species.

This plan will guide the Division of Environment and Conservation (DEC), of the Ministry of Natural Resources and Environment, the agency with responsibility for the conservation of Samoa's biodiversity, in its work. It also provides an opportunity for any other agency with an interest in bird conservation to identify what is needed to conserve the Manumea and work out how it can assist.

A small group drafted this plan over a 2-month period towards the end of an RNHP-funded project that also included nationwide surveys for the Manumea. A draft was presented at two national workshops (Annex 2), on Upolu on 29 September and Savaii on 3 October where support for its implementation was widely expressed. It was formally approved on ? [add date] by ? [add who approved] .

A threatened bird recovery group is proposed to review the progress of this plan, another recently completed on the Ma'oma'o (*Gymnomyza samoensis*), and any future ones to be developed in Samoa. Comments and suggestions on the conservation of the Manumea are welcomed and should be directed to this group via the MNRE.

The format of this plan is based on guidelines produced by the New Zealand Department of Conservation. It is due for review in 2016, or sooner if new information leads to the need for a change in approach.

Cover photo: Ulf Beichle

Citation: This document should be cited as: MNRE. 2006. Recovery Plan for the Manumea or Tooth-billed Pigeon (*Didunculus strigirostris*). Ministry of Natural Resources & Environment, Government of Samoa, Apia, Samoa.

Foreword

It gives me great pleasure on behalf of the Government of Samoa to endorse this Recovery Plan for the conservation of the Manumea, or Tooth-Billed pigeon, the National Bird of Samoa. This plan, along with another being prepared for the Ma'oma'o, or Mao (Samoa's large forest honeyeater), are the first species recovery plans ever prepared for any Samoan species, animal or plant.

The Manumea is a very important bird to Samoa and to Samoans. It is endemic to our islands (i.e. found nowhere else in the world), and has significant cultural and heritage value. The bird was a traditional and highly esteemed source of food, especially for the high chiefs and fine mats were often made with Manumea feathers sown into them. Importantly, the Manumea plays a vital ecological role in the Samoan rainforests by distributing the seeds of our native Samoan forest trees. The significance of the Manumea was recognized by the South Pacific Games Authority who nominated "Mana" the Manumea as the official mascot of the South Pacific Games 2007.

Of considerable concern is that our National Bird is now rare and highly threatened. The Manumea is classified as Endangered by the IUCN, or World Conservation Union. This means that unless we take urgent action, our national bird has a very high risk of going extinct in the near future. The Manumea is threatened by loss and deterioration of its native forest habitat and continued hunting despite the national bans on hunting native birds and bats that have been in place for more than 10 years.

This important document sets out a series of objectives and actions that are necessary if we are to conserve our national bird, and Samoan birds in general, for future generations to appreciate. Such objectives include managing a number of key forest areas, eliminating hunting as a threat to the birds, establishing new populations of the birds, improving our understanding of the bird through ecological research, increasing public awareness and education about the need for conservation, promoting the partnerships that are necessary to implement the plan and establishing a special bird recovery group to monitor and guide plan implementation.

This Government will do all it can to ensure that this plan is implemented. In addition, I urge all Samoans to play their part in conserving the native forest, planting native trees and refraining from hunting native birds. It is our duty to ensure that future generations of Samoans inherit from us islands that continue to be rich in healthy and functioning ecosystems, with the Manumea and other native birds continuing to play their essential role in sustaining our Samoan rainforest and delighting us with their colour and their calls.

Soifua,

Minister of MNRE

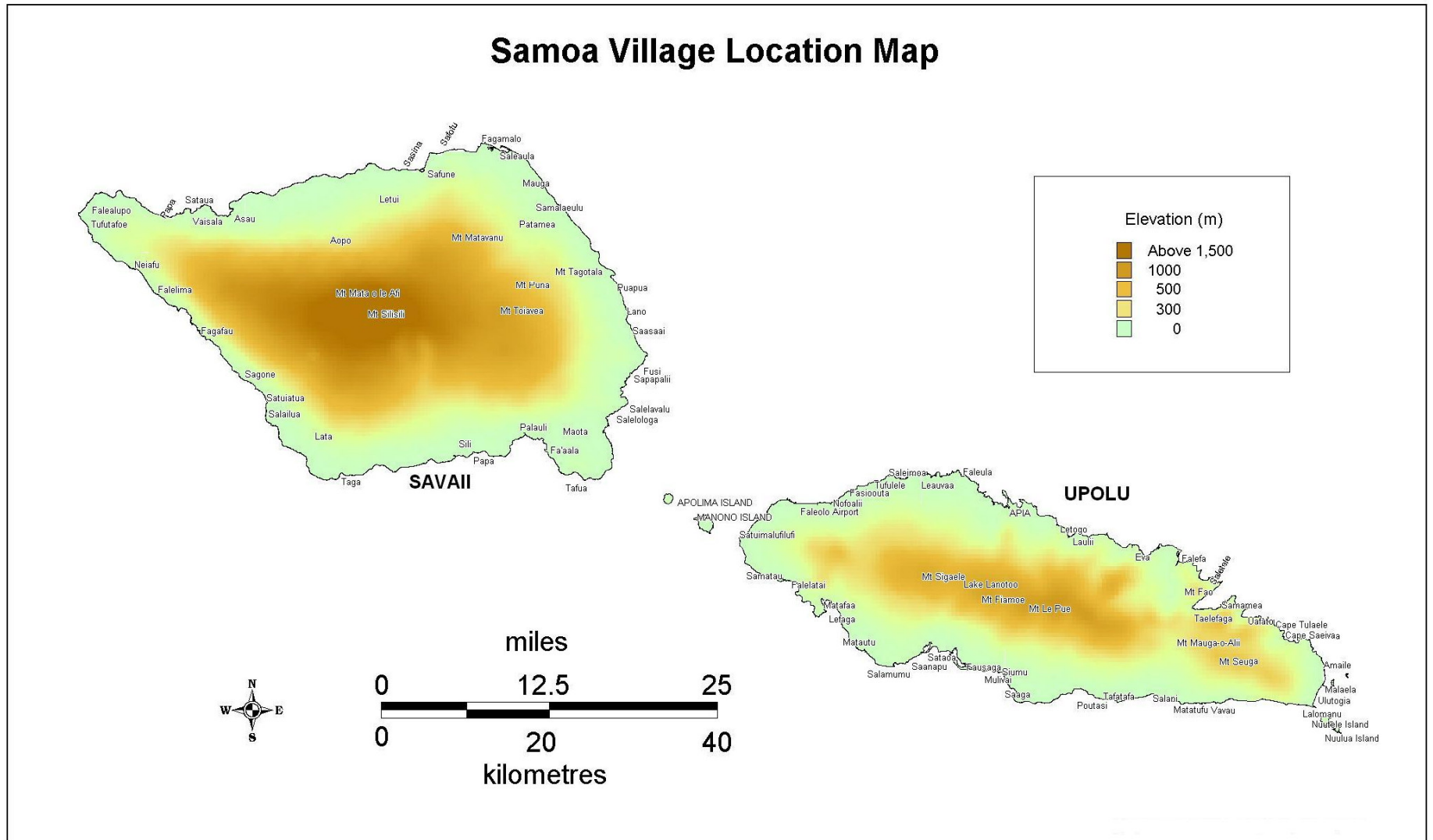


Figure 1: Map of Samoa showing Villages

EXECUTIVE SUMMARY

The Manumea or tooth-billed pigeon is an endangered bird found only in Samoa. The remarkable large beak that gives the bird its name allows it to feed on the large fruits of some *Dysoxylum* species that are too large for other pigeons.

The Manumea is of cultural significance to Samoans, used in the past as a food of high status and today as the proposed national bird and the mascot for the South Pacific Games 2007.

This pigeon only lives within and on the edges of mature native forest. Its numbers have declined dramatically, mostly through loss of habitat and hunting and it is now considered to be in danger of extinction.

An 11-month programme of surveys recorded birds at only 10 locations but some of these represented large areas of forest. Village consultations conducted at the same time showed strong interest and commitment to conserve the species. Two national workshops held to present a draft of this plan expressed support for its implementation and a need for capacity building for village communities to play a key role in this.

This Recovery Plan identifies a goal of making sure that the Manumea is no longer in danger of extinction, with secure populations on Upolu and Savaii and the bird returned to many different forest areas. It aims for most Samoans to recognise the Manumea as a key part of their natural heritage and to play their part in its conservation.

The plan has eight objectives. The first is to manage key forest areas on Upolu and Savaii which are the sites where significant populations of Manumea remain. There are five sites on Upolu including the two national parks and forests owned by Tiavea and Uafato and Matafaa and Falelatai villages, and three sites on Savaii including much of the upland forests there. The second objective is to eliminate shooting of the bird which still occurs even though it is fully protected. Two other objectives are to establish new populations on rat-free islands, new mainland sites and in captivity.

There are also still many aspects of the ecology of the Manumea that are not known, so research is proposed to learn more. One objective focuses on developing public awareness and education programmes, and two on developing the partnerships and funding and establishing a recovery group to carry out a plan of action over the next ten years.

About twenty different priority actions are listed which together will go a long way towards giving the Manumea a long-term future. This list enables anyone interested in helping with its conservation to see how they can best become involved. Note that while this plan lists the necessary actions to conserve the manumea, some of the details of the actions, including performance measures, timing and source of funds, will be defined at a later date when detailed project proposals have been prepared for donor funding.

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ACKNOWLEDGEMENTS

The development of this Recovery Plan was carried out as part of a project funded by the Government of Australia through its Regional Natural Heritage Programme (RNHP). The project was managed by the Division of Environment and Conservation (DEC) of the MNRE with the technical support of the Wildlife Conservation Society (WCS) South Pacific Program (who also managed the funds as the implementing agency) and the Conservation International Pacific Islands Program (CI-PIP).

James Atherton, Dr David Olson and Linda Farley developed the project concept. Dr Ulf Beichle supervised and participated in the field surveys. Key MNRE staff were Faumuina Pati Liu (Assistant Chief Executive officer) the head of the DEC, Faleafaga Toni Tipamaa who was project leader (field survey) and Tapa Suaesi, project leader (community survey and awareness). The following additional MNRE staff undertook the field surveys and community consultations: Susau Siolo, Suemalo Talie Foliga, Samani Tupufia, Natasha Doherty, Eti Malolo, Iosefatu Jnr Reti, Nerissa Leliua, Mikaele Teofilo, Volipolo Soaemalelai, Tommy Gale together with James Atherton (CI-PIP).

Plan compilation was undertaken by a smaller team (TS, JA, TT, TF, ST, SS, ND and Misa Konelio) with guidance from Dr David Butler who also edited the document. The following individuals provided valuable comments on a draft of this plan: Ralph Powlesland.

Thanks are also due to the villagers throughout Samoa who allowed survey work to proceed on their land and who have participated in discussions on the conservation of this bird.

BACKGROUND

1. Introduction – species description, significance & status

1.1 Species description:



Ulf Beichle photo

The Tooth-billed Pigeon (*Didunculus strigirostris*), referred to in this plan by its Samoan name, **Manumea**, is a large dark pigeon (38cm) with a short tail and distinctive bill. The head, neck and mantle are glossy blackish green; the back, rump, chest, tail and wing coverts chestnut brown; and the flight feathers are dark brown. The underparts are blackish-brown merging into chestnut under the tail. Legs are dark red. Sexes are similar though the female is duller (Watling 2001).

The distinctive bill that gives the bird its name is red at the base, then orange-yellow with black at the tip. The lower maxilla of the bill which is shorter than the upper has several notches along its cutting edge which gives the bird its English name. This powerful bill allows the Manumea to open the large, hard-coated fruits of *Dysoxylum* species, a favoured food.

The Manumea is not such a strong flier as the more common Pacific Pigeon (*Ducula pacifica*) and largely remains within the forest rather than flying above it like the latter. It spends some time feeding on the ground and when disturbed takes off noisily and clumsily with much clattering of wings.



Ulf Beichle photo

The call of the Manumea has been studied by Beichle (1991) along with that of Samoa's other 5 native pigeon species. It has a uniform territorial coo repeated every six to seven seconds between two and 87 times, usually delivered from the tops of trees.

Confusion over local name:

In 1993 a national survey was undertaken by Toni Tipama'a of the Division of Environment and Conservation, in Upolu and Savaii Islands, to research the Samoan name of the Tooth-billed pigeon. This survey was one of the activities during a project 'Marketing the Manumea' funded by RARE Centre for Tropical Conservation (RARE 1995). For there seemed to be quite widespread confusion about the name and quite a number of people called the Tooth-Billed Pigeon the 'Manuma'.

Consultations were held with several local experts including the Stunzner Family, Professor Aiono Fanaafi (Professor of Samoan Language), Muliagatele Iosefatu Reti (former director of the South Pacific Biodiversity Conservation Programme), Vaivao Tia of Asau, Tautali Falniko Ausaga of Falealupo, Ulu Faasisina of Tafua and Siaoisi Gale of Asau. All confirmed that the Tooth-billed Pigeon is the Manumea in Samoan and it seems likely that some confusion has arisen because so few people know the bird these days.

The word 'Manuma' refers correctly to the male of the Many-Coloured Fruit Dove (*Ptilinopus perousii*) as recognised in many publications including the most recent comprehensive guide (Watling 2001).

Derivation of the Samoan name:

There are several interpretations of the derivation of the Samoan name, i.e. the meaning of the different words that make up the word Manumea. 'Manu' is the word for bird. 'Mea' may simply refer to its colour, described as 'yellowish brown as sear leaves' by Appleton (1871) or a shorter version of the word 'mamea' meaning brown by (Kramer 1902-03).

However others suggest that the name reflects a particular status given to this bird. Dr Fanaafi claimed that the Manumea had similar meaning to the word Manamea. The word 'Mea' as she explained means beautiful, decorative, stands out, or bold (manaia, malosi, matautia, matagofie, ulaula, aulelei in Samoan). This fits in with a statement by Tauati Falaniko Ausage who was told by elders that the bird was called the Manumea because of its larger size than other pigeons, its distinctive beak, fiercer cry and strength (Rare 1995).

An alternative interpretation of the word 'Memea' is something that is unique, very beautiful, or fine such as the Ie o Le Malo, the fine mat that is woven using pandanus leaves into such fine strands that it can be worn like cloth. The most expensive fine mats traditionally had the feathers of the Manumea sown into them (Fanaafi pers. comm.).

1.2 Significance:

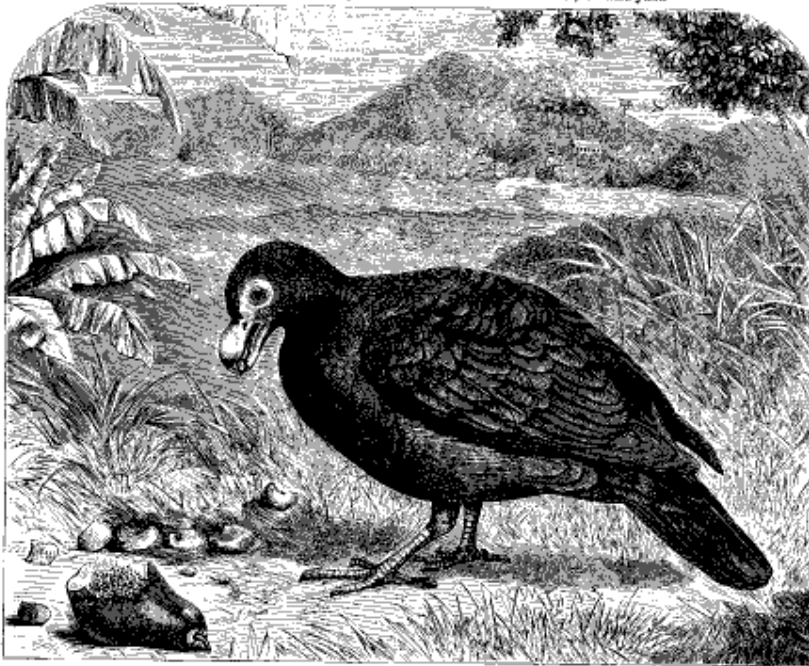
The Manumea is endemic to Samoa¹, i.e. found nowhere else. It was thought to be the only species in the genus *Didunculus*, but recently a larger, extinct species *Didunculus placopedetes* has been found as bones in caves on Eua in Tonga (Steadman 2006).

Cultural significance

The Manumea has clearly been important to the Samoans as a past source of food, though hunters today claim (questionably) that it is only shot accidentally while hunting for other pigeons that are better eating. Stair (1897) records that they were '*...once taken once for food in great numbers...*' and '*captured ...with bird lime or shot with arrows, placing soi (a yam) out for them.*'

Appleton (1871) indicates that the bird had a special status being '*...greatly esteemed as an article of food for the highest chiefs;*' '*...a travelling-party belonging to the dominant tribe, or clan, on arriving at a village of a subject tribe where they intended to spend the day, would order the chief man of the village to procure them a certain number of didunculus before night. If they failed to provide the birds, a severe cudgelling would be the consequence...*'

¹ i.e. the western islands of the Samoan Archipelago formerly known as Western Samoa. The Manumea is not found in American Samoa.



Didemnius, or Little Dodo, a rare bird from Samoa.

Illustration from Appleton (1871)

Stair (1897) also notes that the Manumea was ‘*said to frighten warriors with its noise when flying as if troops were approaching*’ and that they ‘*do not appear to have become pets with natives – as timid and restless?*’

The Manumea is a particularly significant bird to some Samoans today. At its start the ‘Marketing the Manumea’ project found that most people, 84% of questionnaire respondents, supported declaring the Manumea to be Samoa’s national bird. However by the end of the 1-year project this had risen to an overwhelming 96% (RARE 1995).

More recently ‘Mana’ the Manumea has been adopted as the official mascot for the XIIIth South Pacific Games being held in Samoa in 2007 (photo on following page). The South Pacific Games Authority recognised the bird’s endangered status, commended those working to preserve it and its habitat, and was happy to extend a helping hand in making this selection.

Ecological significance

The Manumea is the only bird capable of feeding on the large fruits of certain tree species, e.g. Maota (*Dysoxylum maota*). Thus it plays a vital role in the dispersion of certain species as well as a wide variety of other forest trees.



'Mana' the Manumea with the Chief Executive Officer, MNRE, Tu'u'u Ieti Taule'alo (seated left) and members of the project team, (standing from left) Tapa Suaesi, Faumuina Pati Liu, Faleafaga Toni Tipamaa, Natasha Docherty, Samani Tupufia, and James Atherton (seated). Vanya Taule'alo photo.

Global significance

The Manumea is the one Samoan endemic bird that is widely known outside the country, largely because early biologists described it as being closely related to the extinct flightless Dodo (*Raphus cucullatus*) based on similarities between their beaks. Indeed the Latin name *Didunculus* means 'little dodo'. It is now generally recognised that this similarity is an adaptation to feeding on large fruits that evolved separately in the two species. However DNA analyses have shown the dodo to in fact be a form of pigeon, most likely evolved from forms that flew to Mauritius from Africa.

The Manumea is the one species that many overseas birdwatchers visiting Samoa most wish to see.

1.3 Status:

The **global status** of the Manumea is currently coded by the IUCN as: EN A2bcd B1ab (ii, iii, v) C1+2a(i) (source: <http://www.redlist.org>). This breaks down as follows:

EN = Endangered

A2bcd = Reduction in population size (**A**) - based on an observed or estimated population size reduction of 50% or greater over the past 10 years or 3 generations (whichever is the longer) (**2**) based on an index of abundance (**b**), decline in area or quality of habitat (**c**) and actual or potential levels of exploitation (**d**), i.e. hunting.

B1ab (ii, iii,v) = Change in geographic range (**B**) – extent of occurrence less than 5000 km² (**1**) and habitat severely fragmented (**a**) and continuing decline in (**b**) area of occupancy (**ii**), area or quality of habitat (**iii**) and number of mature individuals (**v**)

C1 +2a(i) = Population size estimated to number fewer than 250 mature individuals (**C**) and an estimated continuing decline of at least 25% within 3 years or one generation (whichever is longer) (**1**), plus a continuing decline in numbers of mature individuals (**2**) and no subpopulation estimated to contain more than 50 individuals (**a(i)**).

This assessment of status was carried out before the 2006 survey. This suggests that the species probably numbers more than 250, given its occurrence at a wide range of sites including upland Savaii which comprises a large area of relatively intact forest. However this would not change the status of the species, for it ranks as ‘Endangered’ if any of the criteria A to E (D & E do not apply to the Manumea) are met.

2. Past and present distribution – population trends

Observers writing towards the end of the 19th Century provide evidence of a significant decrease in numbers occurring at that time. Appleton (1871) recorded in his journal that the Manumea was ‘...now so scarce that the greatest difficulty is experienced in securing a specimen’ and Stair (1897) notes that ‘...of late years their numbers have decreased rapidly.’

For the next 100 years or so there are occasional references to the continued presence of the species but no useful information. In 1977 Beichle began a study of the pigeons of Samoa including the Manumea and his periodic observations provide the best information on the changing distribution of the species up to the present day. Nationwide ecological surveys were carried out in lowland forests in 1991 and upland forests in 1996, and individual ornithologists have been more active in Samoa in the past few decades. These together provide a picture of the past distribution of the species below.

In 2006 a more comprehensive survey targeted this species and the endangered Ma’oma’o with funding from the Government of Australia through its Regional Natural Heritage Programme. This provides the assessment of its current distribution.

2.1 Past Distribution

The Manumea was once considered a bird of upland and montane forests but it is now thought that it occupied forests at all altitudes right across the islands. Clearly it declined in numbers in the 19th Century. This section summarises the distribution of known records within the period 1978 to 2000 when some detailed surveys and research were carried out. This is later compared to the present distribution (section 2.2) to identify the current trend of the population (2.3).

Figure 2 shows the locations in which the Manumea has been recorded over the period. The Manumea was observed in many locations from near sea level to the

upland parts of both main islands and on Nuutele island. The species was only recorded at 4 sites (Lake Lanotoo, Aopo Upland, Letui Upland, Vaipu Swamp Forest) during the ecological survey of ‘lowland’ forests (Park et al. 1992). However it was more widespread and abundant during the upland survey recorded at 10 sites (Vaipu, Aleipata, Solosolo, Lefaga, Tafuaupolu, Sauniatu, Aopo, Silisili, Salailua, Asau) and averaging a significant 0.42 birds per five minute count and over 1 per count at Salailua and Vaipu (Schuster et al. 1999).

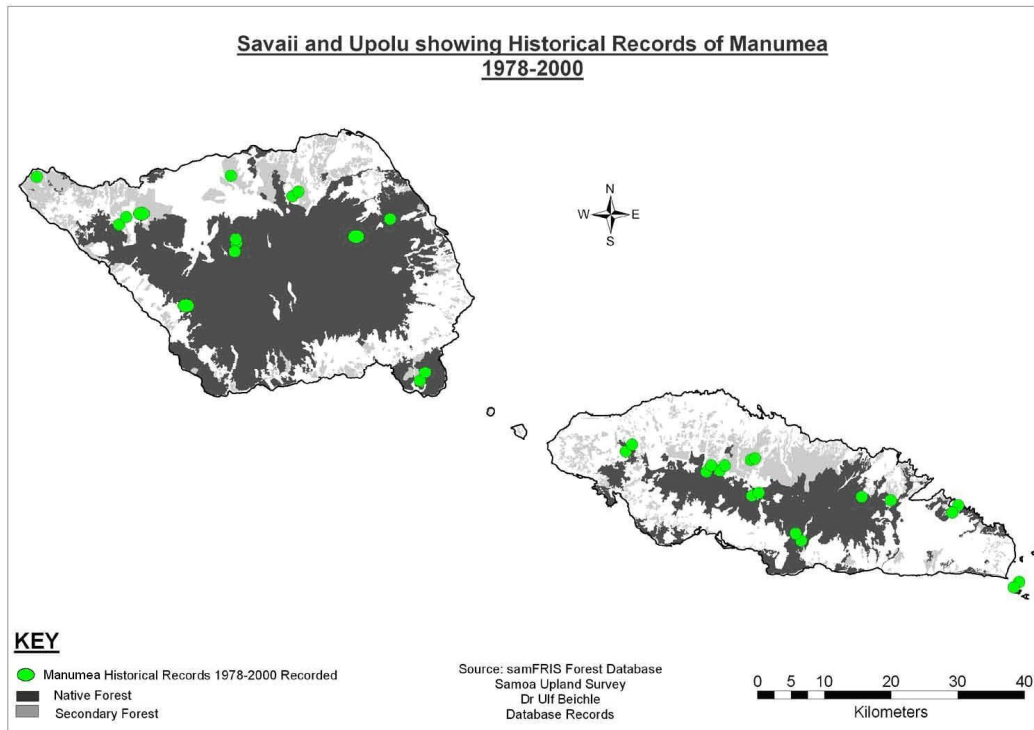


Figure 2: Historical Records of Manumea, 1978-2000.

An ornithologist living in Apia between 1994 and 1997 reported recent sightings of the Manumea on Upolu (eastern end and central) and Savaii (Aopo track to Mt Silisili) (Tarburton 2001)

2.2 Present Distribution (2001-2006)

Figure 3 shows the locations at which the Manumea was heard or seen during the recent survey and the sites visited where it was not recorded.

In addition the bird has been heard or seen during this period at Uafato and Nuutele Island where it was not recorded during the survey.

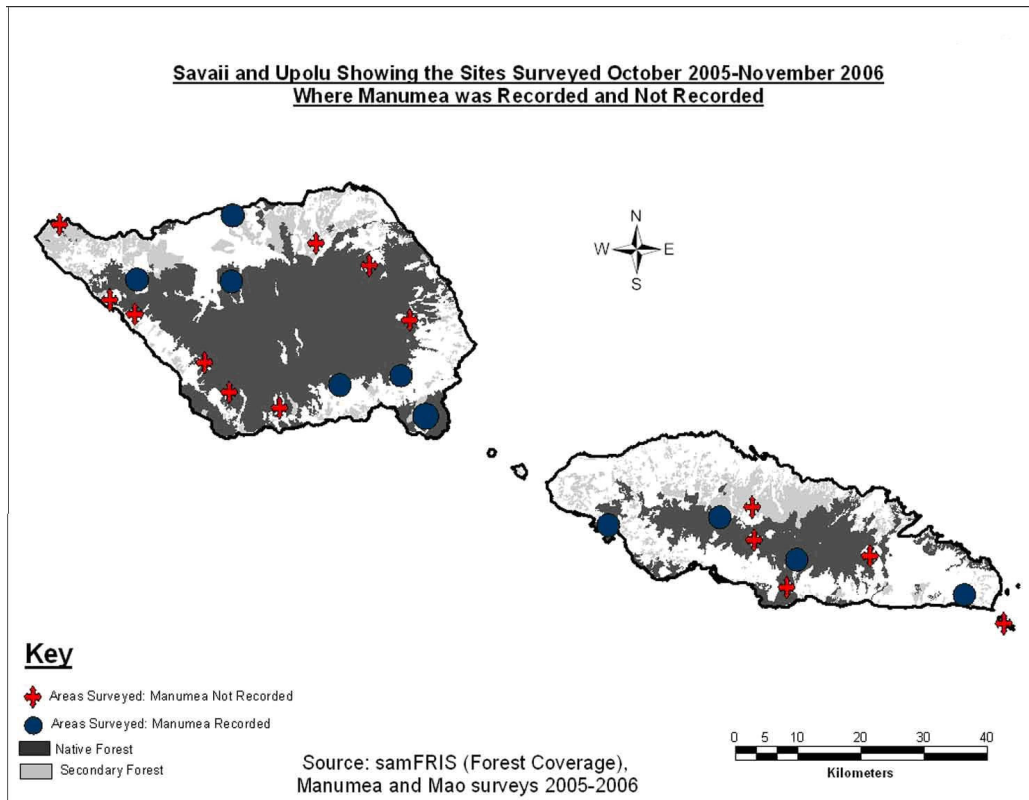


Figure 3: Sites where Manumea was recorded or not recorded during October 2005-November 2006 survey.

2.3 Population Trends

Beichle's research provides the most detailed information on past numbers. He estimated the total population as 4,800-7,200 birds in the mid-1980s – based on estimated density of 2-3 birds/km² and 800km² of suitable habitat on Upolu and 1600km² on Savaii (Beichle 1991).

In the 1990s the population was considered to suffer a drastic decline owing to the effects of Cyclones Ofa (1990) and Val (1991) and logging activity such that, in 2000, Beichle considered that fewer than 2,500 mature individuals were believed to survive. In 1999 and 2000, his surveys on Savaii showed that it had become rare with pairs scattered in suitable habitat (Beichle in prep). Very few individuals were present in areas where five or ten times the number had been recorded calling in the past. For example at Aleisa 8-10 birds had been counted on the way up to Mt Sigaele and at Le Mafa Pass five had been heard calling within a small area where none appear to remain today. Similarly, birds were present at Uafato in 1991 (Lovegrove et al. 1992) and 1997 (Beichle 1997) but not recorded there during the recent survey. Overall Beichle has estimated the Manumea population to be less than a few hundred for both Savaii and Upolu, though he identified the need for further surveys to provide more detailed figures (Beichle 2006).

The key area of uncertainty is the vast uplands of Savaii, c76,000ha of relatively intact forest that has not been well-surveyed. The fieldwork for the upland ecological survey was carried out in 1996, i.e. after Cyclones Ofa and Val, and relatively high

numbers of Manumea were recorded in the few 5-minute counts undertaken (an average of 0.42 birds per count and over 1 per count at Salailua and Vaipu) (Schuster et al. 1999). The current survey largely covered the edges of the uplands, except above Aopo where an altitude of 1592m was reached.

Incidentally, the IUCN Redlist ‘status history’ mirrors the decline discussed in this section, as the species has changed ranking from ‘Threatened’ in 1988 to ‘Vulnerable’ in 1994 and ‘Endangered’ in 2000 and 2004.

3. Cause of decline & current threats

Loss of Forest Habitat

This has been a major factor behind the decline in the Manumea which requires relatively mature native forest. Figures 4 to 6 show the significant loss of native forest cover over the period 1954 to 1999. Table 1 shows the percentage of land area under forest during the same surveys (Atherton 2004).

Table 1. Comparison of historical land area under forest in Samoa

Year	Upolu	Savaii	Total Samoa
c. 1954	65	79	74
c. 1987	43	63	55
c. 1999	46	69	60

Sources of data: 1954 (Fox and Cumberland 1962); 1987 (ANZDEC 1990); 1999 (Atherton 2004).

The 1954 and 1987 data can be directly compared as similar techniques were used and these show significant forest loss, particularly in the lowlands. The 1999 assessment was much more detailed using a higher mapping scale, including more forest types and more checking on the ground. So the apparent increase in forest between 1987 and 1999 is probably not real and it is more likely that forest cover continued to decline over this period.

In addition to loss of forest, the quality of the forest that remains has declined. The 1999 analysis identified 32% of the total forest cover as ‘open’ forest (less than 40% tree cover) and less than 0.05% as ‘closed’ forest, largely as a result of Cyclones Ofa and Val (Atherton op. cit.). Another 24% of the forest cover is classified as secondary re-growth forest. The Samoan forest is now extremely open and patchy which means that it can support fewer birds and is more vulnerable to invasive weeds.

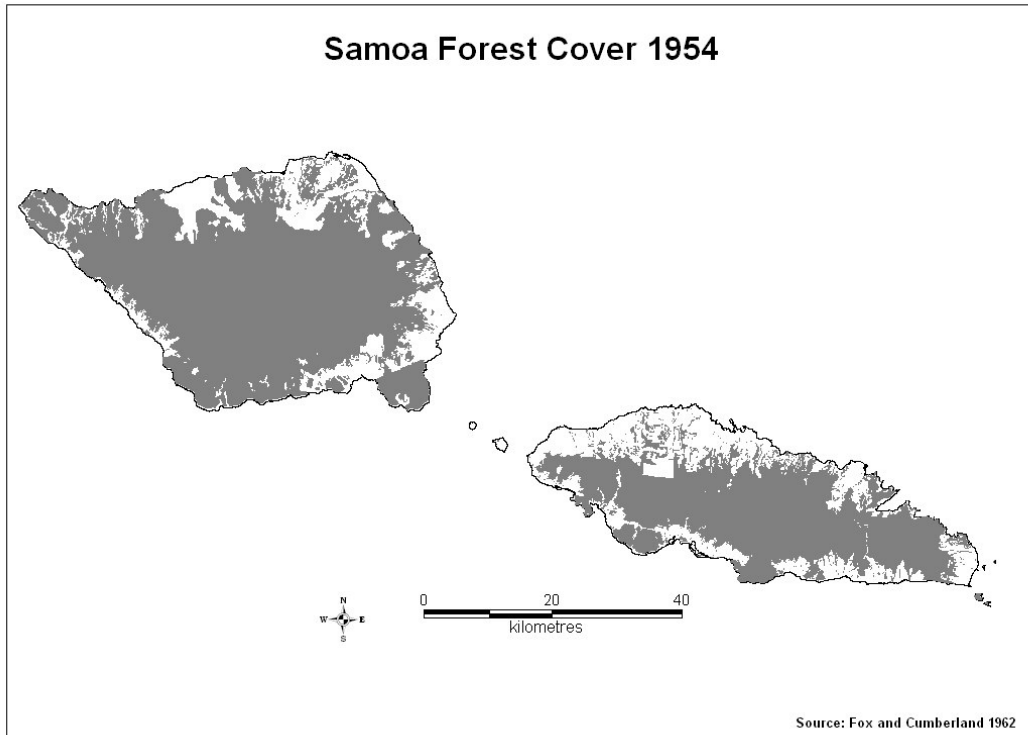


Figure 4. Samoa's Forest Cover 1954

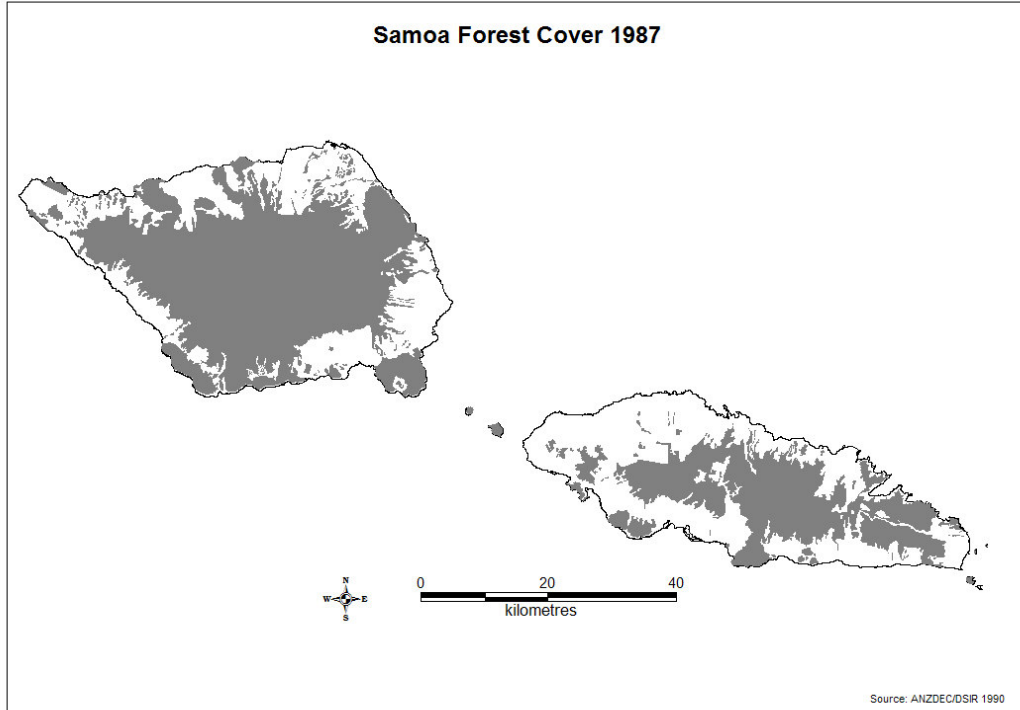


Figure 5: Samoa's Forest Cover 1987

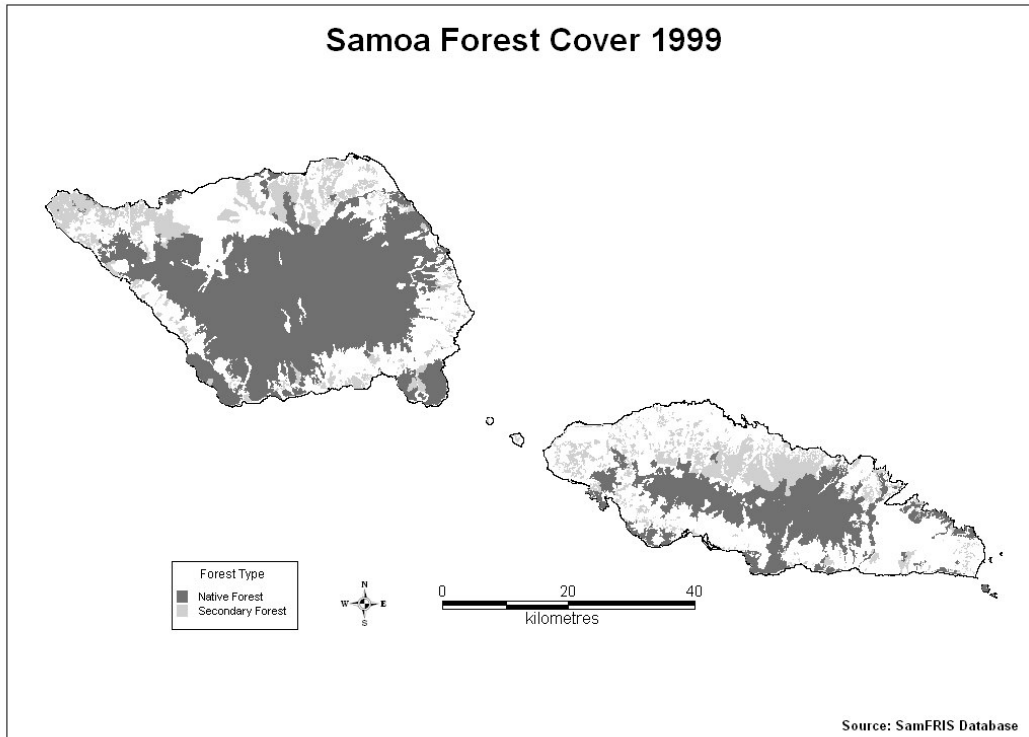


Figure 6: Samoa's Forest Cover 1999

Forest clearance remains an ongoing threat. Logging is slowing down as accessible forest has largely been removed, but it is still a problem on Savaii despite years of effort to phase it out and this being mandated in a Forests Policy developed in 1994. A deforestation policy is currently under development. Some clearance of forest for agriculture continues even on the edges of National Parks and Reserves.

Some efforts to replant trees have been made, particularly in water catchments, but historically the species used have been mostly exotics and certainly not contributed food for the Manumea.

Natural Disasters

Cyclones are clearly significant threats to the Manumea by destroying its forest habitat as well as causing individual deaths. During the two most powerful cyclones in recent years, Ofa in 1990 and Val in 1991, forest canopy cover was reduced from 100% to 27% Elmquist *et al.* (1994). An assessment of the impacts of Val on wildlife reported that 'populations of pigeons and fruit doves have been decimated' and indicated that they would take years to recover (Lovegrove *et al.* 1992). It identified the tooth-billed pigeon as one of the highest priority species for management. The most recent cyclone to hit Samoa, Cyclone Heta in 2004, was more localised in its impacts but will have further damaged areas of Manumea habitat.

Fire is a threat to forests in low rainfall areas of Samoa, such as the north-west coast of Savaii, and during times of relative drought. Part of the rainforest preserve at Falealupo was further damaged by a series of fires in the 1990s after being hit by the two cyclones.

Landslips are a minor factor but do remove areas of forest cover during periods of prolonged rain.

Hunting of the Manumea by people for food was obviously another major factor behind its decline. Collecting of birds for museum collections and zoos could also have been significant for a period. As in many other countries, traditional hunting methods like the use of bows and arrows have been replaced by new methods like shooting with shotguns which has markedly increased hunter efficiency. As of 1985, for example, an estimated 400 birds were being shot every year (Beichle & Maelzer 1985).

Hunting should no longer be a threat to the Manumea. It was given **absolute protection** within the Protection and Conservation of Wild Animals Regulations 1993. Within the same legislation there was also a five-year ban (November 1993 to November 1998) on the shooting of all pigeons to allow populations to recover from the devastation of Cyclones Ofa and Val. A further ban strictly prohibiting the hunting or harming of all pigeons, the Protection of Wildlife Regulations 2004, was introduced after Cyclone Heta (January 2004) and is still in place. So no accidental shooting of the Manumea while hunting for other pigeons should occur. However such bans are widely ignored through inadequate policing and enforcement of the regulations.

Community surveys during the current project interviewed 118 people from 8 villages in Savaii and 103 from 8 in Upolu. Over half had eaten pigeons (species not identified) mostly during special celebrations. Forty-six hunters were surveyed of whom 14 had shot pigeons in 2005/06, i.e. while a ban was in place. Two reported having shot single Manumea and one reported shooting more than 10.

Feral Cats (*Felis catus*)

19th Century observers considered that cats were having a major impact on the species. Appleton (1871) noted that the Manumea ‘...roosts on low stumps or roots of trees, and thus readily falls a victim to the wild-cats, which have become numerous in the Samoan Islands, although the cats have been comparatively recently introduced.’ Stair (1897) wrote ‘...of late years their (Manumea) numbers have decreased rapidly, since added to human enemies, the wild cats which have increased rapidly, have destroyed vast numbers. Extinction is just a matter of time’.

It seems likely that these observations relate to a time when cats were at peak numbers following their arrival in Samoa, thriving on large numbers of vulnerable prey. Today feral cats are still present in the forest but in much reduced (but unknown) numbers. Whether they still pose a significant threat is uncertain. It is possible that pressure from cats and hunters has led to a reduction in the amount of time the Manumea spends on the ground, by selecting for birds that avoid this behaviour.

Rats (*Rattus* spp.)

Samoa has three introduced rat species, Ship Rat (*R. rattus*), Norway Rat (*R. norvegicus*) and Pacific rat (*R. exulans*) all of which are considered to have arrived before 1924 (ISSG – Global Invasive Species Database). Detailed information on their numbers and distribution is not available. However experience overseas suggests that ship rats will be the dominant species in forests on the main islands and they pose the greatest threat to the Manumea being excellent climbers. The New Zealand pigeon (*Hemiphaga novaeseelandiae*) has been shown to lose almost a third of its nests to predators, mostly ship rats (and brush-tailed possums) (Clout et al., 1995) and the Manumea's nests are likely to be equally vulnerable.

Loss of Forest Quality

Where forest remains there may still be an issue of reduced quality. Much thinning has occurred during the cyclones and some areas are being invaded by weeds which may impact on the bird's food trees.

Disease and Parasites

There is no evidence that these have been major factors contributing to the Manumea's decline though they are likely to have caused individual losses. Little is known about the diseases found in wild birds in Samoa though some research is currently being conducted on avian malaria. Disease and parasites tend to become more significant when birds are under stress from other factors, e.g. shortage of food.

Random Events

As Manumea populations become smaller and more fragmented, there is an increased threat of local extinctions due to random events or chance. For example if there are only a few adult females left in a population there's a chance that they may all produce young of the same sex. If this happens for a few seasons the population will go extinct.

Climate change

Changes of climate due to the build up of greenhouse gases is likely to increase the frequency of events like severe storms and cyclones and droughts and floods.

4. Ecology & biology

Relatively little is known about the ecology and the biology of this species, as is true of many of Samoa's birds.

Habitat and food:

The Manumea occurs in native forest at all elevations as shown by the recent survey (Figures 7 & 8).

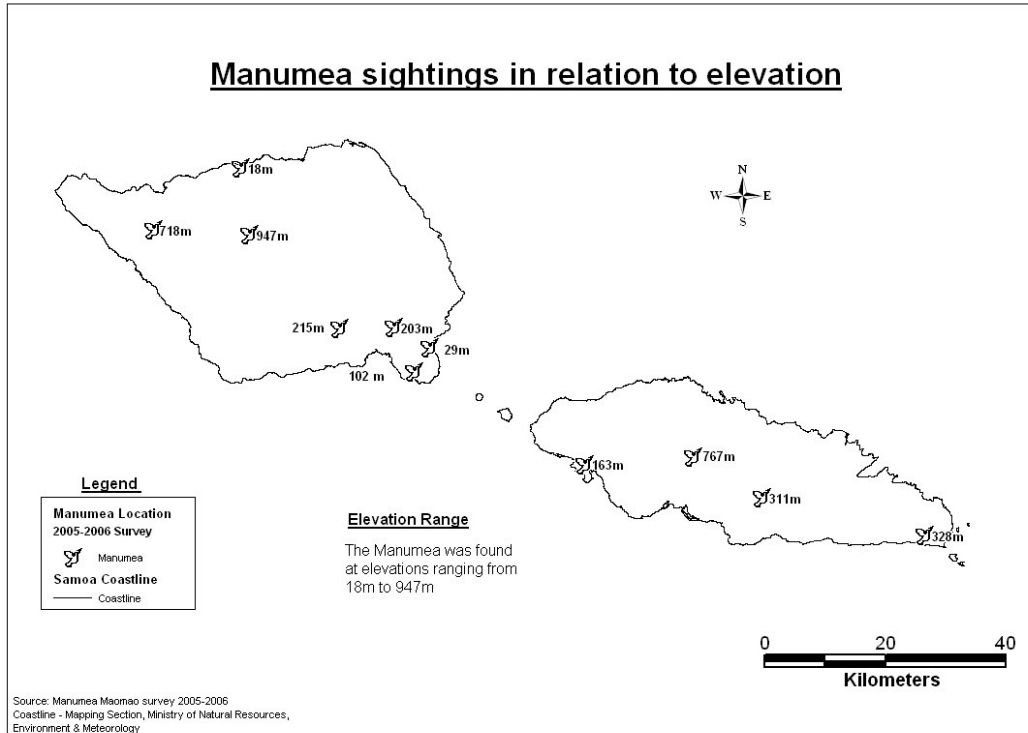


Figure 7: Manumea sightings by elevation.

Its distribution has been reported to be closely linked to three fruit-bearing trees of the *Dysoxylum* family (*Dysoxylum maoto*, *D. samoense* and *D. huntii*) which are believed to comprise the bulk of the diet (Beichle, 1991). The Manumea's unusual bill allows it to saw through the tough, fibrous coat of its fruits. A wide variety of fruits and seeds of other native trees are also taken. Specific mention has been made of the aoa (Banyan fig), wild banana and soi (wild yams *Dioscorea* sp.).

In captivity birds have been fed green banana, pawpaw, cooked taro and breadfruit (Appleton 1871) and potatoes and stale bread (Bennet 1864 in RARE 1995).

There are conflicting reports in the literature on the amount of time the Manumea spends on the ground. Beichle considered it to largely be arboreal, living mainly in the canopy 15-20 metres from the ground, but he did find gizzard stones in the stomach of one bird so these must be picked up from the ground (RARE 1995).

Breeding:

Kramer (1902-03) refers to the nest being '*not quite on the ground, yet somewhat like the fiaui² in the undergrowth, while the rest of the pigeons like the lupe³ select the tops of the tallest forest trees*'. Stair (1897) reports that both birds incubate the eggs, changing places frequently. The clutch size is probably two (Beichle, 1987).

² White-throated Pigeon (*Columba vitiensis*)

³ Pacific Pigeon (*Ducula pacifica*)

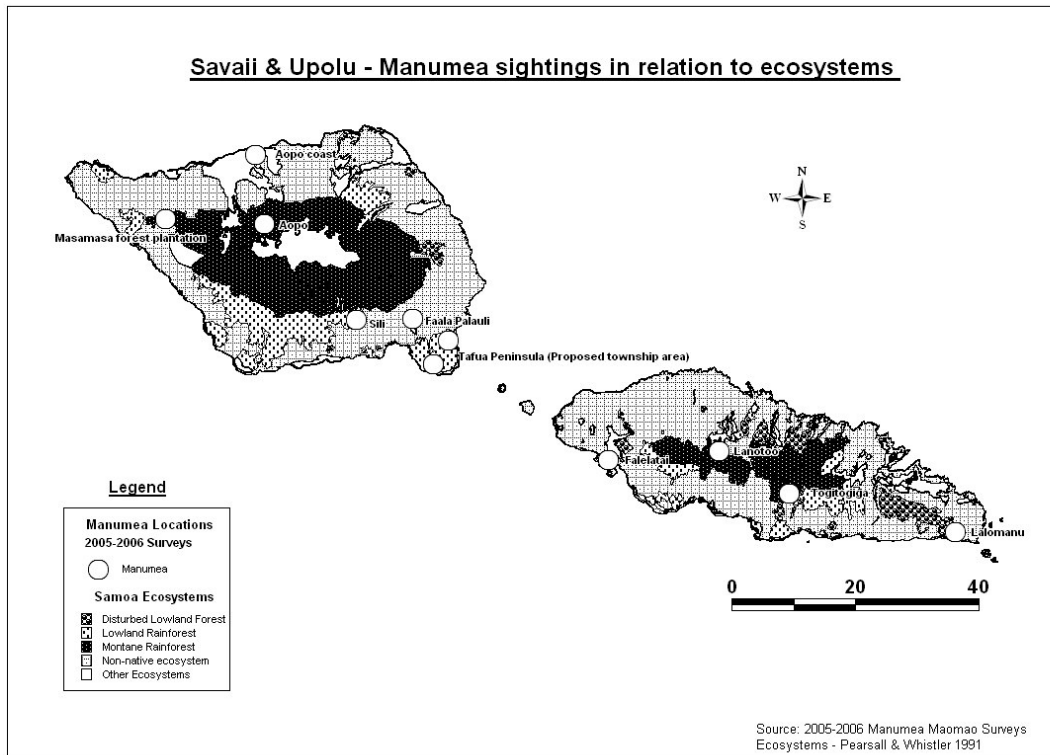


Figure 8: Manumea records by ecosystem.

Other behaviour:

Both Stair (1897) and Appleton (1871) record that it roosts quite low to the ground, in bushes, tree stumps or among tree roots.

5. Past conservation efforts

This plan has already referred to the specific one-year project carried out in 1993/4 entitled ‘Marketing the Manumea – A Conservation Education Programme for Western Samoa’ with funding assistance from the RARE Center for Tropical Conservation. More than 1500 fact sheets on the bird were distributed to schools, community groups, libraries and interested individuals, one percent of the population was surveyed in pre- and post-project surveys, 5000 posters were put up and six large billboards. A school campaign produced a puppet show and two songs and the project team spoke to more than 33,000 children in over 150 schools. This project was very successful at raising awareness about the bird and its situation and provides a foundation on which new activities can be built.

Bans on the shooting of pigeons and flying foxes after cyclones, put in place in 1993 and 2004 were aimed at assisting the recovery of a variety of hunted species and should have benefited the Manumea.

There have been a number of projects aiming to create community-based conservation areas on communally-owned land in recent years and several of these identified the Manumea as one of their target species. Rainforest Preserves have been created using

overseas funds at Tafua Peninsula, Falealupo and Aopo Cloud Forest though the current effectiveness of each is uncertain. Projects within the South Pacific Biodiversity Conservation Programme and the Biodiversity Support Programme have worked with the villages of Uafato and Saanapu/Sataoa on Upolu and Aopo/Letui/Sasina on Savaii. These have generally not fully achieved their objectives but provide a basis for further work within this recovery plan.

RECOVERY GOAL & OPTIONS

6. Long-term recovery goal – for 100 years

The Manumea is no longer in danger of extinction, with populations secured on both Upolu and Savaii, and it is being returned to many of the other forest areas that remain in its former range.

Most Samoans recognise the Manumea as a key part of their natural heritage and are playing their part in its conservation. The bird is being used as a flagship for environmental conservation in Samoa and throughout the region.

7. Options for recovery

The following list provides potential options for managing the recovery of the Manumea.

- Habitat protection – e.g. community conservation areas, community management agreements, reserves, national parks.
- Habitat restoration – e.g. re-planting, removing invasive species, linking forest patches.
- Control of predators or competitors – most species live in balance with their natural predators and competitors, but they face problems from introduced (alien) invasive species.
- Managing hunting – species threatened with extinction cannot usually cope with any take
- Translocation – moving individuals of a species from one habitat to another, e.g. birds from the mainland where they are exposed to introduced predators to a pest-free island
- Management in captivity
- Supplementing food – providing additional food to birds in the wild
- Manipulating breeding – e.g. moving eggs from nest to nest to ensure each pair has young to rear and stimulate re-laying
- Treating to prevent or manage disease and parasites
- Education – likely to be an element of all the other options to ensure sustainability
- Raising Public Awareness – likely to be an element of all the other options to encourage public support and involvement
- Legislation/Policies/By-laws – a potential element of some of the other options, e.g. conserving forest or preventing hunting.

Four overall approaches were considered:

Option 1 – Do nothing:

This option would lead to the continuing decline in the numbers and range of the species and bring it closer to extinction.

Option 2 – Focus only on conserving forest habitats:

This option would involve focussing all the effort on securing the forest areas currently occupied by the Manumea. However hunting would continue to be a threat and there would be very limited public support for addressing this issue. It is also uncertain how productive the species is currently in the face of other threats like invasive species.

Option 3 – Conserve forest habitats, manage hunting and investigate ways to increase the number of birds and populations. Develop public support:

This option addresses the current threats that we know about and investigates how to establish further populations. The more secure populations the species has in different locations the greater the chance of it surviving and recovering from localised natural disasters like cyclones.

Option 4 – As 3, but also investigate the breeding and feeding ecology of the species in detail.

It is uncertain whether the species would maintain or increase its numbers if all the measures in option 3 were put in place. For we know nothing about current breeding success and mortality and it could be that other threats like introduced predators need addressing as well.

Preferred Option:

Option 4 has been chosen for the duration of this plan.

8. Objectives for 2006-2016

(Note: Year 1 of the 10 runs from 1 July 2006 to 30 June 2007).

Objective 1: Conserve and manage key forest areas on Upolu and Savaii to secure Manumea populations on both islands

Objective 2: Reduce or eliminate hunting as a threat to Manumea

Objective 3: Establish populations on rat-free islands or new mainland sites

Objective 4: Develop a captive management programme

Objective 5: Increase the understanding of the breeding and feeding ecology of

the Manumea to aid species recovery

- Objective 6: Develop a public awareness and education programme
- Objective 7: Develop partnerships to assist in the recovery of the Manumea through provision of funds, support or expertise.
- Objective 8: Establish a Threatened Bird Recovery Group to oversee the implementation and review of this plan and those of other priority bird species.

9. Work Plan

Objective 1: Conserve and manage key forest areas on Upolu and Savaii to secure Manumea populations on both islands.

Annex I identifies the process used to identify 8 key forest areas (Table 2) (Figure 9) covering both main islands whose conservation will provide sufficient habitat for the medium-term survival of the species. Together they provide a spread of locations and landforms that should ensure that there are always refuges for the species to survive natural disasters like major cyclones.

Table 2: Key areas for Manumea conservation:

Upolu	Savaii
<ul style="list-style-type: none">• O Le Pupu Pue (Government Land - National Park)• Tiavea/Uafato (Land owned by Tiavea and Uafato villages)• Matafaa/Falelatai (Land owned by Matafaa and Falelatai villages)• Leafa/Lanotoo/Fulusou (Land owned by Lotofaga and Fulusou villages and Government-owned National Park)• Aleipata craters (Land owned by Tiavea uta, Lotofaga, Vavau, Aufaga, Lepa, Lalomanu)	<ul style="list-style-type: none">• Tafua Peninsula (Land owned by Tafua, Salelologa & Faala villages)• Uplands (Forest owned by many villages)• Aopo Lowlands (Land owned by Aopo village)

The aim will be to prevent the unsustainable removal of trees from these areas and develop agreed management regimes to address other threats like hunting. One or more of these areas are likely to be chosen as research sites to address objective 5.

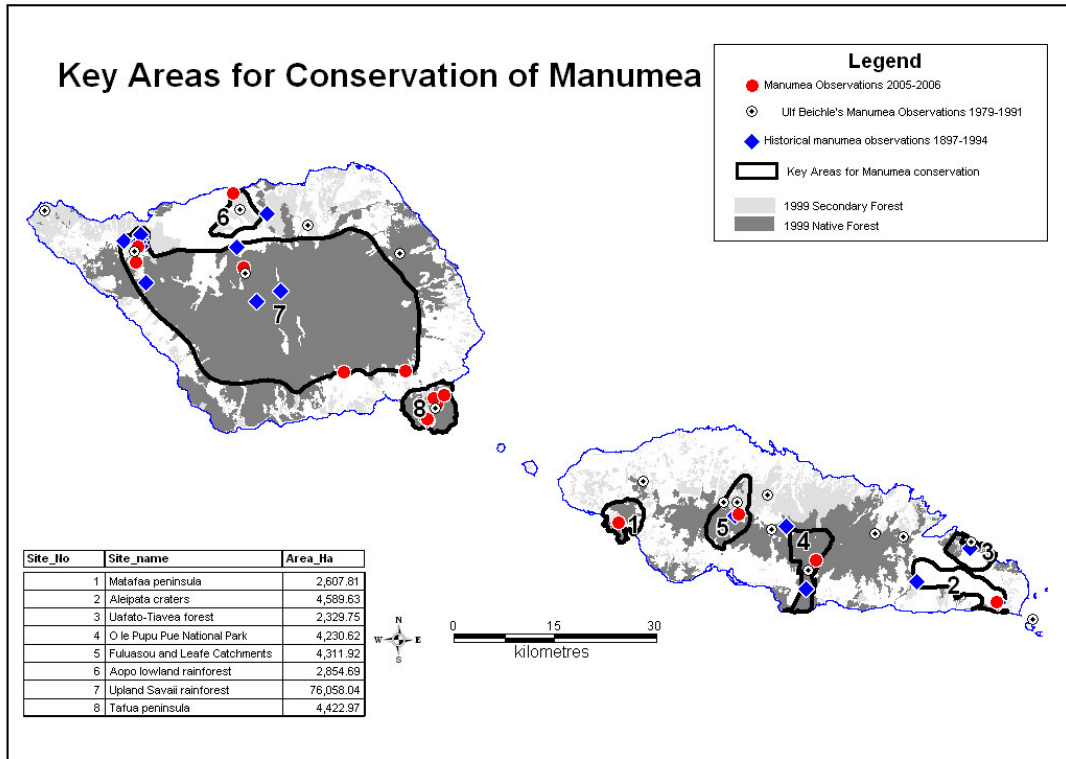


Figure 9: Key areas for conservation of Manumea.

Action 1.1 Develop detailed site and community profiles for each key area

The site profiles will expand on the information tabled in Annex 1. The community profiles should include a wide-ranging needs analysis and seek to identify income-generation opportunities for communities, particular those using the forest of the area.

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
1.1.1 Compile site information for each key area	Information in Annex 2 reviewed and added to.	MNRE (DEC)	2006/07	MNRE
1.1.2 Develop a questionnaire-based survey to use to establish community profiles	Draft questionnaire produced and piloted at one site before completion.	MNRE (DEC)	2006/07	MNRE
1.1.3 Carry out community survey in villages of all key areas	Majority of the community completed questionnaire.	MNRE (DEC)	2006/07	To be obtained

Action 1.2 Obtain community support for the conservation of each key area and define its boundaries

Follow-up workshops have been held with the following villages who have confirmed their support in principle for establishing conservation areas, or ‘Important Bird Areas’: Tafua, Aopo, Matafaa, Tiavea.

Figure 10 shows the Matafaa-Falelatai key area with a possible boundary for discussion with the villages.

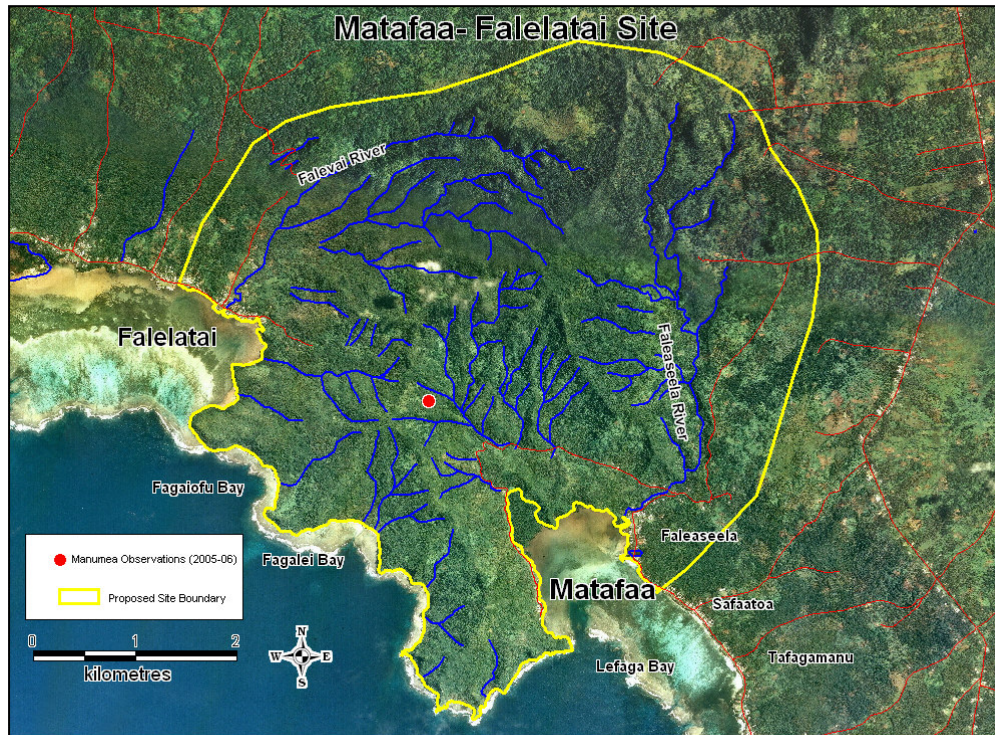


Figure 10: Matafaa Falelatai key area.

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
1.2.1 Follow-up workshops – 2 Savaii (6 villages) 2 Upolu (5 villages)	Workshops held. Villages involved declare support for conservation areas on their land	MNRE (DEC)	2006/07	MNRE
1.2.2 Present draft recovery plan in one workshop on each island	Plan summarised at well-attended workshops	MNRE (DEC)	September & October 2006	RNHP project

Action 1.3 Define necessary management regime within a community-based plan for each key area

A management plan for each site should include the following:

- Forest protection – measures to prevent further forest clearance
- Forest rehabilitation – planting of native trees

- Hunting – local rules to reinforce national bans on hunting
- Control of invasive species – weeds that threaten the forest may need controlling; cats and rats may need managing depending on the results of the research under objective 5.
- Monitoring of manumea – ideally the sites together would form a network of long-term monitoring stations across the country, all counted at the same time of year
- Monitoring of other ecosystem elements – e.g. perhaps counts of other birds; flying foxes; flowering and fruiting of trees
- Monitoring of community – attitudes to and use of the conservation area
- Community development – measures to address some of the community’s development needs
- Education and awareness – activities targeted locally for school children and other members of the community, and national to raise awareness of the project and (if desired) attract visitors.

This work will need to be prioritised. The different key areas can be placed in a priority order based on issues like the urgency of addressing current threats, the amount of interest of the community, and the importance of their Manumea population. However the priority order might change to take advantage of other opportunities; e.g. the GEF medium-sized project in Savaii may provide a chance for more progress to be made with Aopo or other villages owning parts of the uplands there.

At the same time it will be important to maintain some contact with all villages involved in a key area, so that they maintain their interest in the project. Areas involving communal land might be priorities over areas of Government land for this reason

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
1.3.1 Place key sites in a priority order for action	Sites placed in agreed priority order	MNRE	2006	MNRE
1.3.2 Draft management plans with communities – discuss, finalise and endorse	Plans developed and signed off for priority areas.	MNRE & communities	2007 onwards	To be obtained
1.3.3 Investigate options within Forestry’s Community Forestry project	Meeting held. Options identified & recorded. Forestry staff become involved.	MNRE (DEC & Forestry)	2006	MNRE
1.3.4 Develop proposals to secure funding	Proposals successful in obtaining funds	MNRE (DEC)	e.g. CEPF ⁴ early 2007?	MNRE

⁴ Critical Ecosystem Partnership Fund

Objective 2: Reduce or eliminate hunting as a threat to Manumea.

Hunting is an issue that needs to be addressed at various levels. Firstly there is the national legislation, gun licensing requirements, etc in place at any time; secondly the official enforcement of that legislation; and thirdly activities at a village level whereby local advocacy and fono⁵-enforced regulations can reduce the activity of local hunters.

Action 2.1 Work at Government level to ensure appropriate regulations and licensing regimes are in place.

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
2.1.1 Review existing legislation, licensing, and information given to gun holders	Review completed and recommendations made	MNRE Other Govt. agencies	2006/07	MNRE
2.1.2 Carry out any necessary changes or improvements.	Revised legislation enacted or material completed	MNRE Other Govt. agencies	2006/07	To be obtained

Action 2.2 Encourage compliance with the current regime through increased enforcement and public awareness

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
2.2.1 Meet with Ministry of Justice and Police to identify ways of increasing enforcement	Meeting held.	MNRE (DEC)	2006/07	MNRE
2.2.2 Develop a national campaign to raise awareness of the Manumea and the need to stop hunting of it.	Campaign carried out with monitoring to determine effectiveness.	MNRE (DEC, Capacity Building)	2007/08	To be obtained

Action 2.3 Work with communities in key areas to put local measures in place.

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
2.3.1 Incorporate measures to prevent hunting of the Manumea in area management plans	Management plans contain measures to stop hunting of Manumea	MNRE & communities	2007-	To be obtained
2.3.2 Develop the means to monitor ongoing hunting activity	Monitoring in place and good results being obtained.	MNRE & communities	2007-	To be obtained

⁵ Village council

Objective 3: Establish populations on pest-free islands or at new mainland sites.

Actions within Objective 5 should identify the role that introduced pests, particularly rats and cats, play in the dynamics of Manumea populations. A current programme to restore Nuutele Island (108ha) off the eastern coast of Upolu includes the removal of the only mammalian pests present, Pacific rats and pigs. This could provide a site for a further secure population of Manumea. Re-introductions to other sites could be considered once research identifies what management of pests and other threats is needed.

The New Zealand Department of Conservation has developed a comprehensive set of translocation guidelines which identify all the issues that need to be considered in any transfer proposal.

Action 3.1 Evaluate Nuutele as a potential site for Manumea once Pacific rats are eradicated.

Small numbers of Manumea are present on Nuutele. These may increase in number once rats and pigs are removed, or a transfer of birds from other sites may be needed. While limited in size, the island should show the breeding potential of Manumea in the absence of rats.

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
3.1.1 Monitor the numbers of Manumea on Nuutele	Counts conducted annually. Identification of the potential for the population to grow without a transfer.	MNRE (DEC)	2006-2011	MNRE
3.1.2 Evaluate the option of transferring birds (using international guidelines) if needed.	Transfer proposal developed and approved	MNRE Recovery Group	2011-2012	To be obtained
3.1.3 Carry out a transfer(s) if needed	Transfer(s) carried out and self-sustaining population established	MNRE Technical experts	2012-2016	To be obtained

Action 3.2 Evaluate other offshore islands and opportunities on Upolu and Savaii to manage new areas for Manumea.

Once we have a greater understanding of the habitat requirements and the threats to the Manumea, it would be possible to evaluate other islands as suitable sites for new populations. Both Manono (288 ha) and Apolima Islands (101 ha) are large enough to potentially support populations but probably do not have enough forest habitat and too many mammal pests.

There are two interesting issues for debate within this action, though they would not be priorities within the term of this plan. The first is the possibility of transferring Manumea to islands in American Samoa where significant areas of intact forest remain. Currently there is no evidence that it was ever found there but this may change as more studies of sub-fossil bones are made. Careful assessment would be need to determine any negative implications of introducing Manumea there, however it would increase the security of the species by providing a wider spread of sites as potential refuges from catastrophic cyclones.

A second, even more radical concept, would be introducing the Manumea to Tonga as a replacement for *Didunculus placopedetes*, the larger extinct tooth-billed pigeon once found there. Conservationists are increasingly discussing the idea of trying to fill the niches left by extinct species. It may be that *D. placopedetes* played a key role in dispersing the fruits of some of Tonga's trees and that they are reduced in number since it has become extinct. The Manumea might theoretically be able to play that role. Clearly there are many issues to be looked at before this could be suggested as a serious proposal. No discussions have been held with the Tongan authorities.

Once we know more about the factors affecting the Manumea, we may also be able to consider re-introductions to forest areas on the main islands from which it has been lost. For example, if we know the full range of trees that the Manumea depends on throughout the year we may be able to plant these. If we find that rats are a major problem we may be able to control them over quite large areas, as done successfully in Rarotonga to bring about the recovery of kakerori (*Pomarea dimidiata*) there (Robertson & Saul 2004).

One site that has a lot of appeal for a re-introduction is the Mt Vaea Scenic Reserve. This is Government land close to Apia and visited by many people who walk its trails. It might be possible to carry out a re-introduction using birds raised at a captive breeding facility that is under discussion for that area (objective 4).

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
3.2.1 Evaluate other islands for Manumea after the research in objective 5 is completed.	Evaluation completed with recommendations to transfer or not	MNRE Recovery Group	2010 onwards	<i>To be defined</i>
3.2.2 Evaluate the opportunities to re-introduce Manumea to sites on Upolu and Savaii	Evaluation completed with recommendations to transfer or not	MNRE Recovery Group	2010 onwards	<i>To be defined</i>

Action 3.3. Organise transfers of Manumea to new sites when their suitability is confirmed.

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
3.3.1 Carry out transfers and monitor their success	Transfer(s) carried out and self-sustaining population established	MNRE & Partners	2011 onwards	To be obtained

Objective 4: Develop a captive management programme.

Discussions are currently being held regarding the development of a Conservation (captive) Breeding Centre (CBC) for Samoa potentially to be located at Vailima. This could contribute to the recovery of the Manumea in several ways:

- Providing birds that people can see as part of education and public awareness programmes
- Allowing the development of husbandry and captive rearing techniques that can be used to re-habilitate birds rescued after cyclones
- Allowing the development of breeding programmes to provide birds to establish new populations.

Action 4.1

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
4.1.1 Develop a scoping paper & participate in discussions re: a CBC.	Paper written.	MNRE (DEC)	Oct-Dec 2006	MNRE
4.1.2 Draft funding proposal (e.g. CI – private US donors)	Advice provided to CI.	MNRE (DEC)	Oct-Dec 2006	MNRE

Action 4.2 Establish Manumea conservation breeding programme

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
4.2.1 Develop a captive management plan prior to bringing birds into captivity	Captive management plan using international format approved.	MNRE (DEC)	2007 onwards	To be obtained
4.2.2 Establish a captive population by collection birds or eggs from the wild	Self-sustaining population established in captivity.	MNRE (DEC)	2007 onwards	To be obtained

Objective 5: Increase the understanding of the breeding and feeding ecology of the Manumea to aid species recovery.

A recovery programme for the Manumea depends on increasing productivity or reducing mortality, or ideally both at the same time. We have identified a number of causes of mortality such as loss of habitat or shooting that we can aim to reduce, but there may be others that require managing. We know very little about productivity.

Research is proposed to find out more about the Manumea and its relationship to its forest environment. Some key questions to be answered are:

- When does it breed? Where does it nest? How many eggs does it lay?
- What is the success rate of nests?
- What are the causes of nest losses?
- How large an area of habitat does a breeding pair require? How do they use this habitat? Do they move significantly between seasons?

- What are the most important foods at different times of year?
- How long does a Manumea live on average? What are the main causes of mortality?

It is planned to involve overseas scientists in the design of this work. It could be set up as ‘research by management’, i.e. we put some management in place in one area such as rat or cat control and not in another and compare the results. This allows us to see if rats or cats are a significant threat to Manumea, and if they are it has already helped the recovery of one population by reducing their impact.

Action 5.1 Finalise a project proposal and obtain funding

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
5.1.1 Discuss and design a research programme with potential partners	Programme agreed on.	MNRE (DEC) Recovery Group	2006	MNRE
5.1.2 Complete a funding proposal	Proposal(s) submitted to potential donors.	MNRE & Partners	Oct-Dec 2006	MNRE

The following are some of the issues that need to be considered in the development of a research proposal:

- Selecting sites – more than one study site may be desirable to allow comparison and potentially carry out management on one. Sites need to be readily accessible and, if on communal land, have a supportive community who will ideally participate in the research.
- Identify priority questions (nesting success, home range, feeding, mortality)
- Identify a means of delivering the research – the team in Samoa will have much of the equipment needed, purchased through the RNHP project, but will need overseas experts to lead the fieldwork and provide training. Such experts could be sourced from national conservation agencies, universities or private organisations.

Action 5.2 Carry out the research programme

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
5.2.1 Complete a research work plan	Researchers & MNRE team agree on plan.	MNRE (DEC) & Research Partners	2007	To be obtained
5.2.2 Undertake research with annual reviews of progress	Research completed according to work plan.	MNRE (DEC) & Research Partners	2007-2012	To be obtained
5.2.3 Feed the results of the research into education and public awareness programmes, and into Manumea recovery work.	Specific awareness products produced. Results used by Recovery Group in planning.	MNRE Research Partners Recovery Group	2007-2012	To be obtained

Objective 6: Develop a public awareness and education programme.

The detailed actions required under this objective are yet to be defined by DEC. However, the following elements have been identified as important components of a national environmental awareness and education campaign:

- National workshops on strategy (Sept)
- Media work (Aug-Sept) (MTV, radio/TV/paper)
- Newsletters (Capacity Building section)
- Environment Week (Nov)
- Environment Forum
- Biodiversity Day
- South Pacific Games
- Roadshow targeting youths and adults

National campaign 2007 – national symbol – documentary – video on plane – cartoon

- Develop campaign - brainstorming
- Develop funding proposal
- Implement
 - Campaign coordination
 - Roadshow

The 1993/1994 project with the RARE Center concluded with the following recommendations:

- Continue the puppet show in schools and on television, developing it further to include shows on the conservation of other key species. Use the Manumea as a symbol and a spearhead of these further developments
- Mobilise a group of artists to develop a roadshow using a variety of media including displays, drama, musical numbers and concerts addressing key environment and conservation concerns
- Develop TV and radio ‘spots’ to promote environmentally friendly practices using the Manumea.
- Extend Environmental Education Workshops into rural villages in the form of short training courses.

The following activities have been identified:

- School visits (Complete)
- School quiz on radio (August)
- Visit all schools in country (obtain funding)
- Manumea learning kit for schools

Objective 7: Develop partnerships to assist in the recovery of the Manumea through provision of funds, support or expertise.

The recovery programme outlined in the earlier objectives requires significant expertise and funding, beyond that which is currently available in agencies within Samoa. Thus partnerships need to be built with other organisations outside the country.

The following is a non-exhaustive list of possible partners:

- Global Environment Facility (GEF) – there may be opportunity for Small Grants for village Communities to develop conservation areas for the Manumea. Also a GEF/UNDP Medium-sized Project is close to being approved for forest conservation on Savaii which could play a major role in conserving populations on that island
- Critical Ecosystem Partnership Fund (CEPF) – the Manumea has been identified as a priority species within the Micronesia/Polynesia Hotspot and thus actions to conserve it will be eligible for funding when the CEPF is launched (early 2007 probably)
- JICA – Enhancing management capacity of MNRE staff for National Parks & National Reserves of Samoa.
- Birdlife International – a leading bird conservation agency that works with in-country partners. The NGO O Le Siosiomaga Society is its partner in Samoa.
- Division of Marine & Wildlife Resources, American Samoa (DMWR) – DMWR scientists conduct research on the ecology of the same forest habitats found in Samoa though Manumea are not found in American Samoa.
- SPREP Avifauna Programme – An Islands Biodiversity Officer is shortly to be appointed to take responsibility for this programme which lists the Manumea as a priority species.
- SPREP Education and Awareness Programmes.
- Conservation International (CI) – CI is in the early stages of discussion on the setting up of a Samoa programme
- RARE Center for Tropical Conservation – RARE funded an earlier 1-year conservation education programme on the Manumea
- Living Archipelagos – a programme being developed by the Bishop Museum, Hawaii which aims to identify and help protect a select group of priority sites of high ecological value.
- Pacific-Asia Biodiversity Transect (PABITRA) - a collaborative program for investigating the function of biodiversity and the health of ecosystems in the tropical Pacific Islands using mountain to sea transects.
- Global Conservation Fund – a CI fund that finances the creation, expansion and long-term management of protected areas in the world’s biodiversity hotspots.
- National Conservation Agencies, Universities and Zoos – such organisations are likely to be involved in research and captive breeding programmes.

Action 7.1 Establish contact with potential partners for different plan objectives as appropriate.

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
7.1.1 Meeting with project partners to define roles	Meeting held and roles agreed.	MNRE (DEC)	Oct-Dec 2006	MNRE

Objective 8: Establish a Threatened Bird Recovery Group to oversee the implementation and review of this plan and those of other priority bird species.

Species Recovery Plans are typically developed and supported by a Recovery Group which brings together those directly involved in the conservation of the species, other stakeholders and outside experts. It has been suggested that Samoa does not have the resources to develop groups for each individual threatened species. Thus a Threatened Bird Recovery Group is proposed. The initial focus of this group will be on the Manumea, the Ma'oma'o for which a plan is being produced in parallel with this one with RNHP funding, and the Tuameo or Friendly Ground Dove (*Gallicolumba stairi*) which is the subject of current surveys and DNA analyses.

Recovery Groups are advisory and do not control any funds or assign individuals to tasks. The person/position in Samoa to be advised by the Group needs to be identified, probably either the CEO or the Assistant Director (Environment) of MNRE.

Action 8.1 Identify the members of the Recovery Group and its reporting process.

TASKS	PERFORMANCE MEASURE	RESPONSIBLE	TIMING	FUNDING
8.1.1 Identify the members of the recovery group and define its modus operandi	Membership and methodology agreed.	MNRE (DEC)	Oct-Dec 2006	MNRE
8.2.2. Form recovery group	Group formed and resourced.	MNRE (DEC)	2006/07	To be obtained.

10. Other Research

A few other research priorities are listed here in addition to studies of the bird's ecology and behaviour under Objective 5.

- Avian Malaria and other wildlife diseases. (The Department of Marine & Wildlife Resources, American Samoa, have done some preliminary surveys for avian malaria).
- Methods for developing community-owned conservation areas (including forest valuation).

11. Review Date

The Threatened Bird Recovery Group aims to meet annually to review progress of the plan and advise on the programme for the next year. A brief review of the Plan is proposed after 5 years (2011) to check whether it is on track or whether new information requires some changes in objectives. A full review will take place in 2016 leading to the development of a new plan for a further period.

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ANNEX 1: SELECTING KEY SITES FOR THE CONSERVATION OF THE MANUMEA

The following criteria were used in selecting the key areas:

- Sites must include all areas where the Manumea was recorded in recent surveys 2005-2006
- Sites should include as many of the sites recorded for the Manumea from historical surveys as possible (pre 2005)
- Sites should include forest blocks from the latest Samoa forest cover map (1999) (Figure 6)
- Wherever possible sites should follow watershed boundaries to the lower edge of the forest
- As far as possible the site should include within its boundary existing Conservation Area (CA) or Protected Area boundaries
- Sites should follow boundaries of proposed CAs (such as those from lowland ecological survey, upland ecological survey and Pearsall and Whistler (1991) survey)

The following table summarises information on the eight key sites chosen using these criteria.

Site	Tafua Peninsula	Upland Savaii Rainforest	Lowland Aopo forest	O Le Pupu Pue National Park	Upper Fuluasou & upper Leafe Catchments (includes L. Lanoto'o National Park)	Tiavea - Uafato forest	Aleipata craters	Matafaa - Peninsula
Location	South-east Savaii	Central Savaii	North coast Savaii	South coast to central Upolu	Central Upolu	North coast Upolu	Central eastern Upolu	South-west Upolu
Villages that have land tenure over site	Faala, Tafua, Salelologa	Aopo, Letui, Manase, Patamea, Vaipouli, Puapua, Vaiaata, Vaiola, Maota, Palauli, Sili, Taga, Salailua,	Aopo and Letui	Saaga and Saleilua	Lotofaga, Afiamalu, Tapatapao, Tanumapua	Tiavea and Uafato	Tiavea uta, Lotofaga, Vavau, Aufaga, Lepa, Lalomanu	Matafaa, Faleaseela, Falelatai

Site	Tafua Peninsula	Upland Savaii Rainforest	Lowland Aopo forest	O Le Pupu Pue National Park	Upper Fuluasou & upper Leafe Catchments (includes L. Lanoto'o National Park)	Tiavea - Uafato forest	Aleipata craters	Matafaa - Peninsula
		Fogasavaii, Fagafau, Vaisala, Asau						
Approx village population (2001 census)	Approx 4000? (3300 Salelologa and 700 for Tafua and Faala)	38,000	676	1089	1509	936	4643	1837
Area of Site (ha)	4,406	76,000	2,855	4230	4312	2330	4590	2608
Size of Forest Habitat	3716ha	69042ha	1624ha	4005ha (to be extended)	3658ha (L.Lanoto'o N.P. 200ha)	1077ha	239ha	1696ha
Land Ownership	Customary	State & Customary	Customary	State & Customary	State & Customary (small area of freehold)	Customary	Customary	Customary
Altitudinal Range (m)	0-60m	160-1800m	0-220m	0-1158m	160-750	0-740m	0-545m	0-450m
Community Support	Yes – though only some of the villages were followed up	Yes – though only some of the villages were followed up	To be determined	Largely not applicable	To be determined	Yes – Tiavea followed-up	To be determined	Yes – Matafaa followed-up on 28/7/06
Forest	Good quality,	Generally good	Medium	Low quality,	Medium (low in	Generally good	Generally low	Medium

Site	Tafua Peninsula	Upland Savaii Rainforest	Lowland Aopo forest	O Le Pupu Pue National Park	Upper Fuluasou & upper Leafe Catchments (includes L. Lanoto'o National Park)	Tiavea - Uafato forest	Aleipata craters	Matafaa - Peninsula
Condition and Quality	dominated by Tava	quality	quality, many secondary species present	severely damaged by cyclone winds	exposed places, high in sheltered valleys and gullies)	quality	quality, severely damaged by cyclone winds except inside volcanic craters	quality, damaged by cyclone winds
Native Ecosystems Present	Lowland Rainforest	Lowland, montane and cloud forest	Secondary forest and volcanic scrub	Littoral scrub, lowland and montane rainforest	Secondary forest and montane rainforest	Ridge rainforest	Disturbed lowland forest and scrub	Disturbed ridge rainforest and secondary forest
Other Conservation Efforts	History of conservation as Rainforest Preserve (SNF & OLSS) – 1990. Some recent discussion on a National Park – not happening.	Part protected as Aopo Cloud Forest Preserve. 1-year conservation project (USAID for Aopo, Letui & Sasina. GEF Medium-sized grant project close to finalisation	1-year conservation project (USAID for Aopo, Letui & Sasina.	National Park since 1978. Various facility development projects.	L. Lanotoo National Park formed in 2003 & RAMSAR site	SPBCP Conservation Area project at Uafato since 1993 (OLSSI)	None?	Mangrove conservation project – GEF Small Grant.
Density of Invasive Species present	Low	Low	High	High (espec <i>Merremia</i> in south)	High (espec tamaligi spp- <i>Albizzia</i>)	Low	High	High

Site	Tafua Peninsula	Upland Savaii Rainforest	Lowland Aopo forest	O Le Pupu Pue National Park	Upper Fuluasou & upper Leafe Catchments (includes L. Lanoto'o National Park)	Tiavea - Uafato forest	Aleipata craters	Matafaa - Peninsula
Other Threats	Township development	Logging	Logging?		Agriculture		Agriculture	Agriculture
Other Redlisted Threatened Species	Tuaimo, Niu vao, maomao, pea vao	Niu vao, maomao, pea vao, <i>Drymophloeus samoensis</i>	To be determined	Niu vao, maomao, pea vao	Niu vao, maomao, pea vao	Niu vao, pea vao	Niu vao, pea vao	Niu vao, maomao, pea vao
Accessibility	High. Accessible to roads, the Salelologa wharf and to the Maota airport	Low. Accessible by road from Aopo and by walking track from most villages	Low. Accessible by walking track from Aopo and Letui	Medium. Not accessible except by walking track	Medium. Accessible by road from Afiamalu and Lotofaga and walking track from Tapatapao	Low. Not accessible except by walking track from both villages	Low. Accessible by walking track	Medium. Accessible by road from Avele and Magiagi

ANNEX 2: NATIONAL WORKSHOPS – SUMMARIES

INTRODUCTION

1. Two workshops were held in Upolu and Savaii with representatives of selected ministries, non-governmental organisations, and village communities on the recovery plans of the manumea and ma'oma'o. Table 1 below lists the stakeholders invited to the workshops and their potential relevant stakes to the recovery plans for the manumea and ma'oma'o.
2. The workshop participants were requested to provide their perspectives, ideas and comments in relation to their respective organisations mandates on key issues of the manumea and ma'oma'o recovery plans. The key issues or questions are in the workshop information paper in Appendix 1 of this report.

NAME OF ORGANISATION	TYPE	RELEVANT ROLES IN THE RECOVER PLANS FOR THE MANUMEA & MA'OMA'O
1. Ministry of Natural Resources & Environment	Governmental	Monitor and regulate the conservation and protection the manumea and ma'oma'o and their forest habitats
2. Ministry of Agriculture & Fisheries	Governmental	Monitor and regulate agricultural developments to ensure it enhances the conservation of the manumea and ma'oma'o
3. Ministry of Education, Sports & Culture	Governmental	Incorporate knowledge and skills related to the conservation of the manumea and ma'oma'o in the school curriculum and teacher training
4. Ministry of Women, Community & Social Development	Governmental	Incorporate national measures for the conservation and protection of the manumea and ma'oma'o into programs for the strengthening of village governing structures & processes
5. Ministry of Works, Transport & Infrastructures	Governmental	Incorporate national measures for the conservation and protection of the manumea and ma'oma'o into public infrastructure development projects
6. Ministry of Health	Governmental	Incorporate national measures for the conservation and protection of the manumea and ma'oma'o into relevant public health programs
7. Electric Power Corporation	Governmental	Incorporate national measures for the conservation and protection of the manumea and ma'oma'o into power supply infrastructure development projects
8. Samoa Water Authority	Governmental	Incorporate national measures for the conservation and protection of the manumea and ma'oma'o into water supply infrastructure development projects
9. Samoa Tourism Authority	Governmental	Incorporate national measures for the conservation and protection of the manumea and ma'oma'o into tourism infrastructure developments and other relevant tourism developments
10. National University of Samoa	Governmental	Incorporate national measures for the conservation and protection of the manumea and ma'oma'o into relevant university graduate and post-graduate courses and training
11. O le Siosiomaga Society Inc.	Non Governmental Organisation	Assist the awareness, education and capacity building programs in villages for the conservation and protection of the manumea and ma'oma'o
12. Matua i le Oo Environment Trust Inc.	Non Governmental Organisation	Assist the awareness, education and capacity building programs in villages for the conservation and protection of the manumea and ma'oma'o
13. Lalomanu	Village	Landowners of key forest habitats of the manumea and ma'oma'o
14. Ti'avea	Village	Landowners of key forest habitats of the manumea and ma'oma'o
15. Saleilua	Village	Landowners of key forest habitats of the manumea and ma'oma'o
16. Matafa'a	Village	Landowners of key forest habitats of the manumea and ma'oma'o
17. Falese'ela	Village	Landowners of key forest habitats of the manumea and ma'oma'o
18. Tafua	Village	Landowners of key forest habitats of the manumea and ma'oma'o
19. Fa'ala	Village	Landowners of key forest habitats of the manumea and ma'oma'o
20. Salelologa	Village	Landowners of key forest habitats of the manumea and ma'oma'o
21. Asau	Village	Landowners of key forest habitats of the manumea and ma'oma'o
22. Aopo	Village	Landowners of key forest habitats of the manumea and ma'oma'o
23. Letui	Village	Landowners of key forest habitats of the manumea and ma'oma'o
24. SPREP	Intergovernmental Organisation	Facilitate the mobilization of regional and international financial and expertise resources to support programs for the conservation and protection of the manumea and ma'oma'o
25. UNDP	Intergovernmental Organisation	Facilitate the mobilization of regional and international financial and expertise resources to support programs for the conservation and protection of the manumea and ma'oma'o
26. FAO	Intergovernmental Organisation	Facilitate the mobilization of regional and international financial and expertise resources to support programs for the conservation and protection of the manumea and ma'oma'o

3. An important emphasis in the workshop was to ensure their deliberations would recognize the needs and aspirations of people and communities who own the key selected areas for the conservation of these bird species. Representatives of these communities were present in the workshop.

Table 2: List of Workshops Participants:					
UPOLU FAO Conference Room, Apia, 29 September 2006			SAVAII Evaeva Club, Salelologa, 3 October 2006		
NO	NAME	ORGANISATION / VILLAGE	NO	NAME	ORGANISATION / VILLAGE
1	Penina Motusaga	Saleilua	1	Samaga Lemi	Aopo
2	Umufaiesea Ueli	Saleilua	2	Peka Matofai	Aopo
3	Sapi Elu	Saleilua	3	Agai Ailama	Aopo
4	Aitu Misi	Saleilua	4	Faiga Selau	Asau
5	Pau Elu	Saleilua	5	Tufi Selau	Asau
6	Seuava Mataese	Ti'avea	6	Vaai Reupoamo	Asau
7	Ianeta Seuava	Ti'avea	7	Faleata Taufaga	Asau
8	Sefo Seumalu	Ti'avea	8	Iaulualo Toetau	Fa'ala
9	Seuava Atonio	Ti'avea	9	Lafai Aloese	Fa'ala
10	Laasia Pisa	Ti'avea	10	Lesina Luamanu	Salelologa
11	Mefi Tautiaga	Ti'avea	11	Faua Laauli	Salelologa
12	Ava Toa	APS	12	Galumalemana Veve	Salelologa
13	Faataualofa Mata'i	MAF (Quarantine)	13	Luamanuvae Fereti	Salelologa
14	Tumema Tia'i	MAF(Livestocks)	14	Etevisa Tiotala	Salelologa
15	Mafutaga Tinifu	MAF(Crops)	15	Luamanuvae Ene	Salelologa
16	Ulrike Hertel	MESC(Culture)	16	Poulava Foaimaua	Tafua
17	Fiaiu' u Faletoese	METI	17	Fagaomanu Situ'a	Tafua
18	Frances Brown	MNRE	18	Valu Uiese	Tafua
19	Mutaaga Isara	MNRE	19	Poloefa Sios	Tafua
20	Mary James	MWCSD	20	Lemaota Sione	Tafua
21	Meia Su'a	MWCSD	21	Namulauulu Keneti	Fogapoa
22	Seuiasomalua Hakai	MOJ	22	Fou Toetu	MAF(Crops)
23	Ana Tira'a	SPREP	23	Tali Suafo'a	MAF(Crops)
24	James Atherton	CI	24	Luileomanu Evagelia	MWTI
25	David Butler	SPREP/MNRE	25	Tolutasi Faiga	MWTI
26	Falefaga Toni Tipakma'a	MNRE	26	Silafaga Aiolupotea	MAF (Crops)
27	Susau Siolo	MNRE	27	Susau Siolo	MNRE
28	Natasha Doherty	MNRE	28	Falefaga Toni Tipama'a	MNRE
29	Talie Foliga	MNRE	29	Faumuina Sailimalo Pati Liu	MNRE
30	Malaefono Maua	MNRE	30	Tepa Suaesi	MNRE
31	Tepa Suaesi	MNRE	31		
32	Faumuina Sailimalo Pati Liu	MNRE	32		
33	Tuiolo Schuster	MNRE			
34	Ieru Solomon	MNRE			

II. WORKSHOP RESULTS

- Table 2 above lists the participants of the two workshops: For Upolu fifteen (15) came from government ministries; two (2) from national non-governmental organisations; three (3) from regional organisations and eleven (11) from the village communities. For Savaii; ten (10) came from government organisations and twenty two (22) from the village communities. There were sixty (60) people in the workshops, 70% represent the civil society and village communities and 30% represent government organisations. The participants from village communities were composed of high chiefs, women and youth representatives.
- Table 3 below lists the participants responses to key issues of the recovery plans for the manumea and ma'oma'o. The workshop discussed the key issues in groups of areas selected for the conservation of the two target birds: For Upolu the two groups are Ti'avea and Aleipata area and Saleilua and Falealili area including the O le Pupu Pu'e National Park. For Savaii, the two groups are the Asau-Aopo-Letui area and the Salelologa-Tafua-Fa'ala area – or the Tafua peninsula.
- A powerpoint presentation on the 'Saving the Manumea and Ma'oma'o' project was presented at the start of each workshop and an discussion paper (all in Samoan) on the key issues of the two recovery plans was also disseminated to the participants before the workshop discussion groups.

III. CONCLUSIONS

7. The participants of both workshops have all expressed their respective organisations and villages full support for the implementation of the recovery plans and have emphasized as in the results of their deliberations on key issues the critical importance of implementing these plans at the village level in locations of forests where the manumea and ma'oma'o are found.
8. In general, the participants' comments strongly recommend capacity building for village communities as the most appropriate way forward in ensuring the sustainability of efforts that will effectively preserve and improve the populations and the targeted bird species and their native forest habitats.

Key issues	Ti'avea Group	Saleilua Group (views different from Ti'avea)	Salelologa–Tafua–Fa'ala Group (views different from Ti'avea & Saleilua)	Asau – Aopo – Letui Group (views different from Ti'avea, Saleilua & Salelologa-Tafua-Fa'ala)
1. What are appropriate measures to address the following threats? (a) hunting;	<i>Register all firearms legally Village Councils make and enforce bans on the hunting of birds and support the enforcement of the central government regulations Govt. to make special laws banning the hunting of the manumea and the ma'oma'o like the ban on pigeon hunting Enforce permits on the sales of bullets by stores</i>	<i>Village Councils to Implement processes for the prosecution and punishment of illegal hunters of pigeons and doves</i>	<i>Ban all native forest use unless specifically allowed by the Village Councils</i>	<i>Establish sustainable levels for hunting of pigeons, doves and bats as its impossible stop people from hunting but we can educate them on those sustainable levels to maintain good numbers of these resources. These measures should be strongly monitor and enforced by the Village Councils.</i>
(b) forest clearance for agriculture;	<i>Landowners must demarcate areas for logging and areas for protection of their remaining forests Landowners make plans for appropriate use of selected areas of their forests s/a for logging</i>	<i>Government and villages to carry out forest replanting programs in all open forest areas</i>	<i>Establish appropriate and sustainable forest clearance policies and measures for agriculture</i>	<i>Forest clearance for agriculture must be properly planned and carry out to minimize impacts on birds needs, however large scale logging and sawmilling must now be banned completely</i>
(c) forest logging;	<i>Village Councils must now ban sawmilling activities especially villages which have not experience forest logging, unless they are offered millions of dollars for logging, i.e. increase the costs to make it uneconomical to log remaining forests Review legislations on the environmental impacts of logging activities</i>	<i>Government to ban logging of remaining native forests and the logging of forests on watershed areas</i>	<i>Establish appropriate and sustainable forest clearance policies and measures for logging practices</i>	
(d) forest clearance for utility development: roading, water, electricity, etc;	<i>Institute national measures to control forest clearance in utility developments</i>	<i>Establish strong inter-ministerial consultations/communication for incorporating conservation of forests and birds measures in public utility developments</i>	<i>Establish appropriate and sustainable forest clearance policies and measures for utility developments</i>	
(e) invasive species	<i>Eradicate invasive animals such as the myna birds and red vented bulbuls MAF to cooperate in the management of invasive species MAF and MNRE to provide incentives/rewards for the eradication of invasive animals</i>	<i>Promote awareness and education of village communities on the management of invasive species of plants and animals</i>	<i>Use chemical poisoning to eradicate and control invasive species of plants and animals</i>	
2. How appropriate and acceptable is the zoning approach in village development and if not appropriate what is an alternative approach?	<i>The framework of zoning village lands into different uses – protection zone, buffer zone and development zone – is a most welcomed and very appropriate management system to implement in Ti'avea</i>	<i>Agree as an appropriate approach but a program of awareness and education on this framework must be conducted for village communities</i>	<i>Agree with the approach but must be left to each village and their Council to determine its application in their own setting</i>	<i>Agree with the approach but we should establish an effective pilot site to model it for the benefit of the whole country – perhaps start at Aopo as a pilot site</i>
3. What are key areas of skills and knowledge to include in awareness and education programs?	<i>Use real-life samples or models of the manumea and ma'oma'o in school and community awareness campaigns Build a captivity centre/zoo of for public appreciation of the target birds Resolve people's reference to the manumea as the manuma Produce promotional stamps of the manumea and ma'oma'o</i>	<i>Knowledge of the manumea and ma'oma'o – their habits, sources of feed, and their conservation needs Training for village communities, youth and tourist operators on skills for monitoring and rehabilitating these birds and their habitats Benefits for village communities from the conservation of these birds</i>	<i>Provide special trainers and establish a training centre for training villagers on the conservation and rehabilitation of native birds and native forests</i>	<i>Education and awareness must be based in the villages whose forest the birds are found as ultimately it there where the birds should be conserved not with the public. A core group of individuals in each village should be trained to monitor and carry out necessary recovery activities for the birds and their habitats</i>
4. What are problems / issues to address in the management of forests? What are solutions for improving the	<i>Resolve these problems at the level of the Village Councils Refer the daily management of forests to the village women committees to handle Encourage the Samoa Tourism Authority to</i>	<i>Key problems are the: Continuing decrease in remaining native forests Village capacities for forest replanting and regeneration</i>	<i>The problem is the lack of guidance – the Government must provide effective guidelines and guidance to village communities on the management and use of forest resources.</i>	<i>The solution is to stop any further logging or clearance of remaining native rainforests at the village and individual levels</i>

Table 3: Workshop Groups Responses to Keys Issues of the Recovery Plans for the Manumea and Ma'oma'o.				
Key issues	Ti'avea Group	Saleilua Group (views different from Ti'avea)	Salelologa–Tafua–Fa'ala Group (views different from Ti'avea & Saleilua)	Asau – Aopo – Letui Group (views different from Ti'avea, Saleilua & Salelologa-Tafua-Fa'ala)
management of forests?	<i>promote the conservation of forests through eco-tourism</i>			
5. Please clarify roles of each of the following key players in the conservation of the manumea and ma'oma'o: (a) Council of Chiefs	<i>Make rules for the protection of the birds; oversee and collaborate with village mayors in the implementation of conservation activities for the manumea and ma'oma'o</i>	<i>Correspondence and liaison with government ministries on assistance for village developments and conservation programs Provide examples of genuine conservation and effective resource management for the whole village</i>		<i>Council of Chiefs should establish a definite framework for the protection of the environment and the conservation of nature within their village lands – a framework that should consists of rules and regulations to enforce it</i>
(b) Young men	<i>Implement on the ground decisions by the Village Council</i>			
(c) Women & Girls	<i>Provide advice and lead the education and awareness raising programs in the village</i>			
(d) Hunters	<i>Must wait for any sanctions and enforce rules by the Village Council</i>			<i>Hunters should have as a policy the protection (non-hunting) of the manumea and ma'oma'o</i>
(e) Schools	<i>Implement education of children on knowledge of the two birds and their habitats</i>			<i>Establish a definite framework for banning any further logging of remaining native forests</i>
(f) Loggers/Sawmillers	<i>Provide proper management of forest logging Must wait for sanction and abide by Village Council rules and regulations</i>		<i>Implement forest regeneration and forest replanting programs</i>	<i>Special subjects should be held in schools on the conservation of the manumea and ma'oma'o</i>
(g) Farmers	<i>Recognize and enforce policies for the sustainable use of lands to minimize impacts and maintain sustainability of remaining forests</i>	<i>Support the replanting of native forests</i>	<i>Ban the slash and burn practices by farmers to clear land for plantation</i>	<i>Farmers should have as a policy the protection of the manumea and ma'oma'o</i>
(h) Churches	<i>Promote spiritual responsibilities for the conservation and protection of the manumea and ma'oma'o in their sermons and educational programs</i>			<i>Include in theological training of priests and pastors subjects for the preservation of nature</i>
(i) Private Businesses	<i>Promote knowledge and conservation of the manumea and ma'oma'o through their customers and through sponsorships of media awareness programs</i>			<i>The business community should recognize and support village conservation programs</i>
6. What determined the successes and failures of the following initiatives? How can we achieve and maintain success in each of these initiatives? (a) Eco-tour trails, birdwatching camps, etc.	<i>Level of support and ownership by the village community State of the forest and biodiversity enrichment of those forests Level of forest use – on how sustainable those development practices are and their impacts on eco-tour activities Level of benefits to the community</i>	<i>Success – good management, reaping of real benefits, unity, and good land use practices Failure – continuing hunting & forest clearance, lack of capacity, disunity and non-existence of definite plans</i>		<i>In general the successes, failures and sustainability of village projects depends on the leadership quality and management style of the Village Council and as well as the degree of support and commitment of the Village Community</i>
(b) Replanting of forests for timber in opened forest areas	<i>Level of management of the replanting programs Level of forest regeneration by forest users such as forest loggings to go have forest replanting programs at the same time Level of effectiveness of monitoring by the Village Council Level of village capacities for addressing severe land degradations – soil erosion, land slides and flood plains</i>	<i>Success – good management, reaping of real benefits, unity, and good land use practices Failure – continuing hunting & forest clearance, lack of capacity, disunity and non-existence of definite plans</i>		
(c) Improvement of current agriculture and initiation	<i>Keep livestock and plantations in properly fenced areas to reduce or eliminate their</i>	<i>Success – good management, reaping of real benefits, unity, and good land use practices</i>		<i>Successes and failures depend on the level of clarity and coherence of and farmers commitment to policies</i>

Table 3: Workshop Groups Responses to Keys Issues of the Recovery Plans for the Manumea and Ma'oma'o.				
Key issues	Ti'avea Group	Saleilua Group (views different from Ti'avea)	Salelologa–Tafua–Fa'ala Group (views different from Ti'avea & Saleilua)	Asau – Aopo – Letui Group (views different from Ti'avea, Saleilua & Salelologa-Tafua-Fa'ala)
of new potential agricultural developments that are environmentally sound and sustainable	<i>impacts on protected areas Address land degradations from agriculture development Ban the use of agricultural chemicals</i>	<i>Failure – continuing hunting & forest clearance, lack of capacity, disunity and non-existence of definite plans</i>		<i>and principles for good farming practices</i>
7. What are existing programs of the following key ministries and organizations which have relevant actions for the conservation of forests and birds such as the manumea and ma'oma'o in Samoa? (a) MAF-Livestock	<i>MAF-Livestock monitor and address introduction of invasive animals</i>	<i>Sustainable livestock programs</i>		<i>Promote the zoning of landuse to definitely select appropriate uses of different available lands already cleared of forests and lands for reforestation and conservation of remaining native forests</i>
(b) MAF-Crops	<i>MAF-Crops monitor and research solutions to control and eradicate invasive plants and animals</i>	<i>Promotion of organic farming</i>		<i>Start research also for control of invasive species affective native forests</i>
(c) MAF – Quarantine	<i>MAF-Quarantine enforce legislations which bar the introduction of new invasive species into the country</i>			
(d) MAF – Information	<i>MAF-Information promotes knowledge of sustainable agriculture which compliment conservation programs</i>			<i>Incorporate in their program the dissemination of information on the conservation of birds and forests</i>
(e) MESCS	<i>Production of study guides, teacher training and teaching aids on the target birds for use in the relevant school curriculum</i>			
(f) MWCS D	<i>Development of village community and individual roles for the conservation of birds and forests</i>		<i>Program for the revival of the art of weaving the original traditional fine mat which utilizes feathers of the manumea and other pigeons and doves</i>	<i>Program to support the formulation and implementation of village planning frameworks for conservation and sustainable development of natural resources</i>
(g) MWTI	<i>(no representative)</i>		<i>(no representative)</i>	
(h) SWA	<i>(no representative)</i>		<i>(no representative)</i>	
(i) EPC	<i>(no representative)</i>		<i>(no representative)</i>	
(j) METI	<i>(no representative)</i>	<i>Promotion of organic farming</i>	<i>(no representative)</i>	
(k) OLSSI	<i>(no representative)</i>		<i>(no representative)</i>	
(l) SPREP	<i>Sharing of information, lessons learned and good practices of bird recovery plans from across the region, e.g. the Kakerori Recovery Plan in the Cook Islands</i>			
(m) UNDP	<i>(no representative)</i>			
(n) FAO	<i>(no representative)</i>			
8. What are other relevant issues that should be included in these Plans?	<i>Effective communication between the ministries (MNRE, MAF, etc.) and village communities Identification and mobilization of financial resources for the recovery plans Improving the local management of financial assistance provided for development and conservation projects</i>		<i>Build a bird captivity facility to both rehabilitate the birds and educate the public on their values and conservation needs.</i>	<i>Program of periodic national stakeholder consultations or meetings to assess the state of the environment and the conservation of nature</i>