

CEPF FINAL PROJECT COMPLETION REPORT

Organization Legal Name:	David Butler Associates Ltd
Project Title:	Leading the Recovery of Two of Samoa's Most Threatened Bird Species, the Tooth-Billed Pigeon (Manumea) and the Mao (Ma'oma'o), through Ecological Research to Identify Current Threats
Date of Report:	February 2013
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CEPF Region: Polynesia-Micronesia

Strategic Direction: 3. Safeguard and restore threatened species

Grant Amount: \$176,653

Project Dates: Oct 1, 2009-Dec 31, 2012



Mati'u Fogavai of Magiagi Village with the first Ma'oma'o caught (Butler photo)

Implementation Partners for this Project:

David Butler Associates Ltd – Project Management and provision of expert support.

Ministry of Natural Resources & Environment, Government of Samoa – Significant in kind-support in the form of staff time to assist with community liaison, coordination of fieldwork, participation in fieldwork, provision of office and logistical support, and liaison within Government.

New Zealand Department of Conservation – In-kind support providing the time of several staff to provide expert assistance in the field in Samoa and technical assistance including the development of remote nest cameras.

Massey University, New Zealand – In kind-support providing the time of two lecturers to supervise work of Rebecca Stirnemann to undertake PhD research on Ma'oma'o including assistance in the field in Samoa and participation in species recovery meetings. Administrative support for Stirnemann who was the key contributor on the Ma'oma'o aspect of the project.

Magiagi Village, Samoa – Village approved the use of their land for field research, provide occasional field assistants and participated in workshops and meetings to discuss the conservation of Ma'oma'o.

Secretariat for the Pacific Regional Environment Programme (SPREP), Samoa – provision of library support to PhD student.

A large number of other international agencies contributed by providing time for their staff to participate in discussions about the conservation of the Manumea in particular and in some cases they supported travel to meetings in Samoa.

Conservation Impacts

1.0 Summary and link to CEPF Investment Strategy

The Manumea or tooth-billed pigeon (*Didunculus strigirostris*) and Ma'oma'o or mao (*Gymnomyza sameonsis*) were listed as two priority species for CEPF investment in this hotspot and link to the opportunity identified to 'improve the conservation of threatened terrestrial species, especially those that are most endangered, require species-focused action and are taxonomically distinctive'. Both are listed as endangered by IUCN, both are endemic to Samoa and the Manumea is the only surviving member of its genus.

While the Manumea had been the subject of some research in the 1980's, the Ma'oma'o had not been studied before this project. The project concentrated on the latter, in part due to the limited resources available and in part to the difficulties of finding a study population for the former. We now have a much clearer understanding of the ecology of the Ma'oma'o and the threats to its survival and are confident that it is not in imminent danger of extinction. There are options for some species-focused actions for Ma'oma'o including translocations, but its long-term recovery will depend on the management of large areas of suitable habitat.

The Manumea on the other hand is now considered closer to extinction than previously thought and it is recommended that its status is changed to 'critical'. This study carried out limited surveys and CEPF also funded a full biodiversity survey of upland Savaii, previously considered a potential stronghold of the species, and together they paint a bleak picture of very few birds encountered. Focused action on this species is a very high priority for future work.

CEPF identified its 'niche' as catalyzing action by civil society to counteract threats to biodiversity. The project has successfully engaged the community of Magiagi in the Ma'oma'o study and they continue discussions with the Government on the management of their key site which is also a water catchment. The student who undertook the research on the Ma'oma'o, Rebecca

Stirnemann has also played a role in the formation of a new NGO in Samoa provisionally named the Samoa Conservation Society.

2.0 Background

The Manumea and Ma'oma'o are the first two of Samoa's endangered birds to have recovery plans published following a programme of surveys and community consultations in 2005/06, supported by the World Conservation Society and the Government of Australia through its Regional Natural Heritage Programme. Both species were 'upgraded' from 'vulnerable' in 1994 to 'endangered' in 2000 (IUCN Redlist) and were considered in ongoing decline and in need of urgent attention. While loss of forest habitat was a key threat in the past, what was impacting on remaining populations was less clear, so both required 'species-focused' action. Hunting might be a factor for the Manumea and predation and shortages of food could be issues for both. This project was designed to identify the current threats to the two species by detailed ecological research using an 'adaptive' approach and to engage the community in this research and subsequent management of their populations.

3.0 Project Approach

The project is focused on Recovery Plan Objectives 5 for Manumea and 3 for Ma'oma'o which are both entitled 'Increase the understanding of the breeding and feeding ecology of (the species) to aid species recovery.' This is seen as a necessary first step before management regimes can be designed for each species within community-based or national park management plans. The conservation of both species would involve their management in areas under the traditional ownership of local communities. So the project was been designed in a way to involve them from the outset.

The initial research was planned to involve the application of the most recent field techniques including capture in high-rigged mistnets, radio-tracking and remote photography at nests. The most cost-effective approach was identified as utilizing one to two students to undertake PhD's supported by local assistants and technical advisers. The two students might each work on a different species, or on a different aspect (e.g. feeding and ranging, or breeding) of both species. It was also proposed to create at least one MSc, working through University of the South Pacific or National University of Samoa, to undertake a specific project in year 2 or 3 which would be defined after the first year's field study. In the event, the funds allocated together with significant exchange rate fluctuations only allowed one PhD student to be recruited.

Studies were to be concentrated on a small number of study areas based on the 'key areas' for the conservation identified for each species in their recovery plans. There were 8 areas listed for the Manumea, five on Upolu which were logistically simpler and thus the priority for assessment. The first area listed is O Le Pupu Pue National Park where a bird survey was planned to be undertaken shortly within a Japanese International Cooperation Agency (JICA) project so this will assist this assessment. Six areas were listed for the Ma'oma'o, 5 on Upolu. One of these areas the Vaisigano River catchment was seen as a very likely study site for 4-6 territories were identified there in 2008 by a team including Dr Butler and individual birds readily observed.

Local people from Samoan agencies and village communities whose land is chosen as study areas were to assist with the research in the field and thus develop their own skills. Provision will be made for them to obtain additional training as appropriate.

Raising public awareness about the species and steps required to conserve them would be the subject of specific activities, aimed first at community leaders responsible for the management of customary land of the study areas and other key sites for the species, then at the wider public.

4.0 Results - Manumea



Adult manumea in captivity (Ulf Beichle photo)

Surveys

In November 2009 a team of David Butler and two staff from the New Zealand Department of Conservation, Ralph Powlesland and Les Moran, visited Samoa primarily to trial high-net capture techniques for the Ma'oma'o. They visited two of the eight key areas identified in the recovery plan, Uafato and Matafa'a (one day each), along with Division of Environment and Conservation staff and were guided in the forest by local villagers. No sightings or recent records of manumea were obtained though Matafa'a people indicated that manumea were still present.

That same month Butler led a Forestry Division team on a five-day survey of another key area, O Le Pupu Pue National Park, funded by the Japanese International Cooperation Agency. Again no manumea were detected.



Map of Matalafa'a key site (source: Manumea Recovery Plan)

In May 2012 a bird survey was carried out of a fourth key area, the uplands of Savaii, within another CEPF-funded project managed by SPREP. Two four-person teams visited a variety of sites over a 2-week period and obtained only a single uncorroborated sighting of a manumea by one individual. No calls that could definitely be assigned to this species were heard. One of the teams also spent a day in a fifth area, Aopo Lowlands with no result. Information was also forthcoming that the species can no longer be regularly observed at a sixth site, Tafua Peninsula.

The Savaii uplands were considered a possible stronghold for the manumea following a 1996 survey in which birds were heard during almost every five-minute count in transects at several sites. It was concluded that this was no longer the case, though whether there had been a significant decline over 6 years or whether there were problems of misidentification in the earlier survey was uncertain. Automatic sound recorders were used at intervals during the Savaii survey and analysing their records may yield further information on the manumea in the next few months.

On the positive side, Stirnemann has seen manumea on 10 occasions during her two and a half years of field work on Ma'oma'o – each observation of a single adult within or near the water catchments above Apia.

While all these surveys represent snapshots, not a sustained effort at different times of year, they indicate that manumea are now very rare and apparently in small numbers and scattered in patches of intact forest.

Further surveys are now planned, following up on the recent sightings and going back to Matalafa'a and other key areas on Upolu. The priority is clearly to find birds but at the same time consideration needs to be given to how easy it would be to research and manage them. The Matalafa'a key area (see above) is an example of a workable study area if sufficient birds persist there as it has reasonable road access and walking tracks through it. By contrast the Uafato key area would be difficult as it takes 1+ hours of walking to access it.

Cyclone Evan struck Samoa right at the end of the project in mid-December 2012. It had a significant impact on the forests of Upolu (see section 6) and will have further threatened the Manumea but there is currently limited information available. It has increased the need for a thorough survey as soon as possible.

Management discussions and international support

Butler prepared two discussion papers on the manumea in December 2010 and August 2012. The second was circulated to a distribution list of over 30 people who had expressed an interest in contributing to the conservation of the manumea through the provision of advice, resources or field support. This included representatives of the following overseas organisations: Birdlife Pacific, Captive Breeding Specialist Group of IUCN, Conservation International, Durrell Wildlife Conservation Trust, German Zoological Society for the Conservation of Species & Populations, Healesville Sanctuary, Island Conservation, Louisville Zoo, Massey University, Newquay Zoo, Pacific Bird Conservation, Secretariat for the Pacific Regional Environment Programme, and University of Kent.

A workshop was held in Samoa in November 2012 as one of the concluding activities of the project, bringing together several of these people and staff of MNRE to discuss the future management of the manumea (Butler 2012). It developed plans for future surveys and recognised that a combined programme of field and captive management was necessary to tackle the recovery of the species. Planning and seeking resources for such a programme is the next major step.

References

Butler, D.J. 2012. Samoa Threatened Bird Meeting 13-14th November 2012. Unpubl. Meeting notes. 17pp.

MNRE. 2006. Recovery Plan for the Manumea or Tooth-billed Pigeon (*Didunculus strigirostris*). Ministry of Natural Resources & Environment, Samoa. 41pp.

Steadman, D.W. 2006. An extinct species of tooth-billed pigeon (*Didunculus*) from the Kingdom of Tonga, and the concept of endemism in insular landbirds. *J. of Zoology* 268 (3): 233.

5.0 Results – Ma'oma'o

This section was largely based on information supplied by Rebecca Stirnemann for the 'Lessons Learned' publication. Rebecca is currently writing up all her results in detail to submit these in a thesis for a PhD.



Adult Ma'oma'o colour banded and fitted with transmitter (Rebecca Stirnemann photo)

Conservation status

The Ma'oma'o was once distributed through the forests of both American Samoa and Samoa. It is now presumed to be extinct in American Samoa and surveys from 2005-2006 suggest population numbers continue to decline in Samoa. The Ma'oma'o is currently classified as 'endangered' (IUCN Redlist). The population is considered to be in ongoing decline and in need of urgent attention. In 2006 the Government of Samoa developed a recovery plan for the Ma'oma'o. The recovery plan (2006) identifies a goal of securing the Ma'oma'o, maintaining its existing populations on Upolu and Savaii, and re-establishing populations at former sites. Ma'oma'o habitat has been significantly reduced over the last few decades and introduced predators, particularly rats have been considered another likely factor behind the decline of the species.

Study areas

The Ma'oma'o population was intensively monitored at two study sites. The first site is located 3 km from Magiagi village in the Vaisigano water catchment (Upolu Island, S13°54.5, W171°44.3). It encompasses steep ridges and steep slopes (average slope 18°) up to 300 m a.s.l., as well as a large flat area at the base of the valley and reaches dissected by many creeks. The high flat elevation area has been planted with banana and taro crops but large trees still remain that are utilised by Ma'oma'o.



Les Moran setting up mist net in Magiagi study area (David Butler photo)

The second study site was located near Lake Lanotoo at $S13^{\circ}90.817, W171^{\circ}80.645$ at approximately an elevation of 700m. This site encompasses steep ridges and steep slopes which still retain dense forest and a large flat valley where some clearing of the understory for agriculture has occurred but where large native trees still remain.

Methods

High and low canopy mist-netting techniques were used to capture birds using playback of their calls as a lure over June 2010- January 2013. In the territories of known pairs 'cold' searching techniques are used to locate nests. Following detection some Ma'oma'o nests were protected from rat predation by fitting a 30 cm high metal ring around the trunk of the nest tree. Active nests were monitored regularly every 1–4 days using visual checks, and by observing parental behaviour from a distance. When possible, a nest camera was placed above active nests for continuous monitoring.



Rebecca Stirnemann (r) & Fialelei Enoka (l) extracting bird from mist-net

All newly fledged chicks were observed for up to 1 hour one to two times per week (with at least 3 days between observation periods) until the fledgling was no longer present on the natal territory. Adults with chicks were located by eliciting a response from the parents to a playback call or listening for the begging calls of a chick.

Standard morphometric data was collected from each captured individual and they were banded with coloured split rings and metal bands (NZ banding scheme). Radio tags were fitted with a back-pack body loops and a break point breast strap.

Ma'oma'o were monitored from mid-June 2010 – November 2012 at regular intervals (minimum of twice fortnightly) during all months except January and February.

Description

The following characteristics were identified:

- Male Ma'oma'o- larger than female, blue eyes
- Female Ma'oma'o- Smaller than male, brown eyes
- Male and Female calls vary and can be used to differentiate sex
- Juvenile- shorter beak, brown eyes initially changing colour until approximately 2+ months post-fledging, makes loud continual begging calls

Breeding

Ma'oma'o pairs have a prolonged reproductive season though there appears to be a peak in breeding in June-October.

Fifteen Ma'oma'o nests were located. All nests were similar in structure and composition and were constructed of young branches from various trees and contained little lining. All nests were oval in shape, 14 ± 1.8 cm across the longest side, and 8 ± 1.5 cm wide at the widest point. At no time did any of the intensively monitored pairs (12 in 2011 and 17 in 2012) produce more than one chick in a year. Ma'oma'o pairs are territorial and territory defence was observed. The nest site appeared to be the focus of the territory during the breeding season.



Ma'oma'o chick in nest fitted with remote camera (Rebecca Stirnemann photo)

Observations from nests that fledged young suggest the egg takes +19 days until hatching, and chicks fledge approximately 21-22 days later. So the period in the nest is approximately 40+ days from hatching to fledging. A juvenile is dependent on the adult for an additional 2-2.5 months post-fledging during which it remains in the adult birds' territory.

Only the female was observed incubating the egg. Feeding of chicks both in the nest and post fledging also appears to be almost exclusively performed by the female. However, on three occasions the male was observed feeding the female a grub which she in turn feed to the chick. Both the male and the female were observed performing nest defence, driving other birds away from the nest.

The chick flew poorly for the first 2-9 days after fledging and spent some time on the ground. Once away from the nest, the chick was highly vocal in soliciting food. Feeding rates at this stage were as high as 23 times per hour. After 3-4 weeks the fledgling was observed trying to forage independently but the majority of the food at this stage was still accepted from the female.

Nest predation

The predation of one Ma'oma'o nest was recorded by nest camera during the night at 00.41 am on the 29/11/2010. This took approximately seven seconds in total and occurred whilst the female Ma'oma'o sat on the nest incubating an egg. A rat identified as the black or ship rat (*Rattus rattus*) jumped onto the incubating female's back from the branch above, driving her off the nest. She flew down and out of the nest. At later sightings she did not appear to be injured though she did lose a number of feathers in the attack. The rat removed the egg whole from the nest and carried it off in its mouth leaving no evidence of egg fragments or destruction of the nest. In the days (+15 days) following the event the adult birds remained in the territory.

Life history

The Mao has a slow life history and an extended breeding season increasing its vulnerability to predation. In summary:

- 1 egg is produced per clutch
- Long period of dependency: 2-2.5 months post fledging.
- Full breeding period takes 3.5-4 months per chick.

- The female does all incubating and chick feeding, male is present and defends chick and nest from other birds
- Ma'oma'o re-nest if they fail during the breeding season
- Ma'oma'o do not appear to re-nest if they are successful in producing a chick
- The species is territorial with high site fidelity
- Breeding season May-Feb. Peak in June-Oct coinciding with bud burst (July) and increased insect abundance and in Sept-Nov an increase in flower production.

Ecological requirements

Habitat

The Ma'oma'o only occurs in areas with a canopy layer of trees. It does not occur in logged areas with no large tree canopy cover. But Ma'oma'o are present in modified habitat such as areas with plantations where large trees still remain.

Most of the time this species is in the high canopy layer but it also spends considerable time foraging on the trunks of trees and also feeds on nectar on the ground (ginger) and in low bushes (i.e. *Heliconia*). The female also spends some time foraging under dead leaves on the ground to feed the fledgling.

Ma'oma'o appear to select territories with high tree species diversity and with appropriate nectar sources and a large singing tree for the male. Trees near a commonly used territory singing tree are selected for nesting. No particular tree species is used for nest building but all nests are higher than 5 meters from the ground.

Diet

In the early dry season Ma'oma'o primarily forage for invertebrates (and potentially reptiles like geckos and skinks) by probing dead material and searching through mossy areas in trees. From June/July following leaf budburst more invertebrates are gained by gleaning. Nectar is likely to be an important energy source during the breeding season. Nectar from native and non-native species are used: *Heliconia*, coral tree, ginger flowers, some orchid flowers, mistletoe, African tulip, etc. A Ma'oma'o pair will defend nectar sources from other species, in particular other honeyeaters.

Distribution

Ma'oma'o have a very patchy distribution with small numbers located at a few sites with large amounts of unoccupied forest habitat between them. Territories in the two study areas tended to have diverse vegetation including mature native forest on steep valley or crater sides, and modified areas including plantations with large emergent trees many of which were not native. The survey of the Savaii uplands found a similar pattern with pairs around craters and areas of transitional vegetation, but large areas of intact forest that were not apparently occupied. These patterns are thought to reflect both dietary requirements and differing abundances of introduced rats (see next section).

Reproductive success

The average annual reproductive success of Ma'oma'o was 0.33 (n=29) chicks surviving through to the post-fledging period per adult female per year. However in areas near plantations annual reproductive success is lower at 0.125 (n=8) chicks per adult female. The maximum reproductive success if pairs do not re-nest is 1 chick per female per year. If a female does re-nest maximum reproductive success is still no more than 2 chicks per female per year.

Nest survival appeared to be lower in populations breeding near plantations (which also appeared to have higher rat numbers) but sample sizes of Ma'oma'o breeding pairs in plantations were too small to verify this statistically. Therefore we used artificial nests as a proxy to determine which factors influenced nest predation. Results showed that nests within 50 meters of a plantation were significantly more likely to be predated than nests in forested areas and nests near plantations were 40% more likely to be predated. Local scale effects such as nest height or local site vegetation did not significantly affect predation rates.

Survival

Nest predators: We captured footage of one nest predation by the black rat and observed a rat running out towards a branch at towards a nest at two other periods. The female was on the nest at the time and did not attempt to protect the nest. Other potential predators are the barn owl, wattled honeyeater (however the adults can potentially drive these species away from the nests) and Pacific boa (in low numbers) but these are considered likely to have little effect on reproductive success of the Ma'oma'o.

Juvenile survival: During the first 2 weeks after fledging most chicks were poor fliers and spent some time on the ground and on low vegetation. During this period they are likely to be at risk from cats.

Adult survival: 2 adult females disappeared during the breeding season. Females are potentially predated on the nest. The Ma'oma'o population is potentially biased towards males. There was no evidence that invasive myna birds have any major impact on Ma'oma'o survival.

Future monitoring of species

This study suggests the presence of adult birds does not indicate that birds are successfully producing chicks. Therefore it is critical to monitor reproductive success to understand what factors are affecting the reproductive success of the population. However even with intensive fieldwork insufficient nests will be found to provide a meaningful long-term measure of breeding success. The alternative approach to measuring breeding success is to monitor territories for fledglings, which can be detected by their conspicuous call and which due to their prolonged parental requirements will remain in the territory for extended periods of time. Systematic visits to territories every month may be an effective method in detecting successful breeding attempts (i.e. the presence of fledglings), although unsuccessful nesting attempts would go undetected.

Causes of decline

With a decrease in native forest cover there has been an expansion of plantations. This pattern is likely to continue and has had two important consequences 1) loss of habitat for Ma'oma'o and 2) changes in non-native rat abundance. Increased rat abundance increases nest predation rates. Bird species with slow island life history strategies (one chick, long dependence period, low maximum reproduction) are more sensitive to increased nest predation than other species. The additional probable nest predation of adult females on nest is also likely to be contributing to the decline of the species. Upolu's forest has become increasingly fragmented over time. However Savaii retains a large area of upland forest that could be a potential refuge/source for the species if rats are in lower numbers or absent. It is now critical to determine if the uplands of Savaii are a refuge from rats and thus providing an important source of young Ma'oma'o.

The future

A workshop was held in Samoa in November 2012 as one of the concluding activities of the project, bringing together several experts and staff of MNRE to discuss the future management of the Ma'oma'o. Plans were developed for future surveys and research and reintroduction to American Samoa should be investigated (Butler 2012). Planning and seeking resources for such a programme is the next major step.

6.0 Cyclone Evan

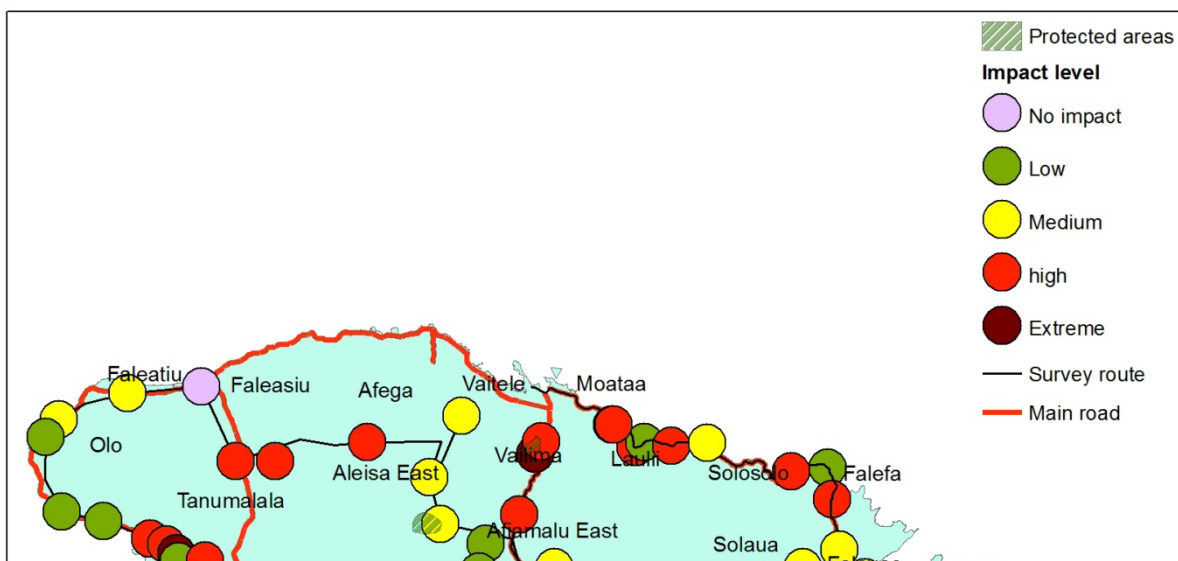
Severe Tropical Cyclone Evan struck Samoa on 12 December 2012 causing widespread damage and flash flooding, particularly on Upolu, leaving 12 people dead and destroying almost 700 homes and power and water supplies. With winds up to 201km/h this was the most devastating cyclone to hit Samoa since Cyclone Val in 1991.

A team led by MNRE conducted a brief assessment of its impacts on forest and terrestrial biodiversity on the 18th visiting 59 sites (see map below). It noted that vegetation on the coastal plains and other mid-elevation areas had been highly impacted compared to many high elevation forest areas that were still intact and unaffected. (Rapid Disaster Team. Unpubl. Report for Disaster Advisory Council, 20 December 2012. 9pp.).

Some key observations were as follows:

- The severest forest damage observed was on the southern coast of Upolu from the Matafaa area (Lefaga district) to Falealili District. Mt Vaea in north central Upolu was also severely impacted perhaps because of its exposed aspect.
- The strongest cyclonic winds on Upolu appeared to be from the south and south west with greatest impacts on south and south west facing slopes
- Greater damage appeared to be in the lowland than the upland areas of Upolu
- Forest damage appeared greatest in secondary forest areas dominated by introduced species such as *Albizia* spp (Tamaligi) and *Spathodea* (Faapasi or African tulip)
- Patches of native forest remain in mangrove areas, sheltered valleys and within craters- these are important refugia for native biodiversity and every effort should be made to protect these sites
- Native wildlife (flying foxes, pacific pigeons and doves etc) are easily seen because of the defoliated forest and therefore potentially hunted more easily
- Approximately 80 -90% of all Reserves and National Parks in Upolu have been highly devastated.

The report's immediate recommendations focused on the conservation of remaining wildlife habitats and highlighting the ban on hunting native birds in the aftermath of the cyclone. The Manumea and Ma'oma'o were identified as two species of particular risk. Detailed follow-up is needed to assess the impacts on the two species in detail. Indications are that secondary forests were more seriously affected which is likely to have led to losses of Ma'oma'o. Areas of primary forest, the habitat of the manumea, may have been less affected but defoliation will have made surviving birds very vulnerable to hunting. Reviewing the map it looks like 3 out of the 5 key areas identified for Manumea and Ma'oma'o in their recovery plans had high levels of damage including the Matafa'a one shown earlier in the report.



Map of Cyclone Evan's Impact (Source: report of Rapid Disaster Team)

Planned Long-term Impacts - 3+ years (as stated in the approved proposal):

Programmes are in place at sufficient sites to improve the status of the Manumea and the Ma'oma'o so that they are under no immediate threat of extinction. Several key habitats for each species are protected from logging, and communities and Government agencies are actively involved in their management. Projects have been started to address all the objectives specified in the two recovery plans. Lessons learned from research on these species have been applied to the management of others both in Samoa and elsewhere in the region.

Actual Progress towards Long-term Impacts at Completion:

A workshop held in November 2012 as one of the project's final activities reviewed the recovery plans for the two species and noted limited activity outside of this project and none of the recovery plan objectives had been addressed in detail. This reflects the reality of limited resources within Government and the lack of a strong bird-orientated NGO in Samoa. The Government and Magiagi village are now more aware of the values of the upper Vaisigano River catchment and discussing its management.

Planned Short-term Impacts - 1 to 3 years (as stated in the approved proposal):

Detailed information has been gained on the breeding and mortality of the Manumea and Ma'oma'o. This has led to the identification of the key threats to the two species and efforts have begun to address these. One or more local communities are actively engaged in the conservation of these species through the management of their lands. Government staff have taken their field conservation skills and experience to a new level.

Actual Progress towards Short-term Impacts at Completion:

Detailed information has been obtained on one species, the Ma'oma'o, and there is discussion of translocations of birds to new sites. Other species-specific management to address threats does not seem to be needed urgently and the shorter focus should be on conserving and enhancing forest habitats for a range of species including the Manumea and Ma'oma'o. Work on the

Manumea found no significant population that could be the subject of work to identify threats so further survey work has become an urgent priority. Magiagi village landowners have agreed not to cut areas of forest within a key site for ma'oma'o. Ministry of Natural Resources and Environment staff have been closely involved in fieldwork on the ground and gained experience of a wide variety of bird research techniques including high netting, banding, radio telemetry, nest finding and the use of cameras to monitor breeding.

Please provide the following information where relevant:

Hectares Protected: N/A
Species Conserved: One (Ma'oma'o)
Corridors Created: N/A

Describe the success or challenges of the project toward achieving its short-term and long-term impact objectives.

Short-term objectives have been largely achieved for one species, the Ma'oma'o. Exposing Government staff and community members to detailed research on this species has raised awareness and increased field expertise that should contribute to long-term objectives. The project has also developed significant international support for the conservation of Manumea that should help ensure that concerted action is taken to prevent its extinction.

Were there any unexpected impacts (positive or negative)?

No.

Project Components

Component 1 Planned:

A field research programme is developed for the Manumea (tooth-billed pigeon) to provide sufficient understanding of its breeding and feeding ecology to trial approaches to manage its recovery.

Component 1 Actual at Completion:

No research programme has yet been developed. Initial surveys located no areas where there were sufficient manumea to facilitate study so research concentrated on the Ma'oma'o. There only proved to be sufficient resources for detailed work on the one species though information was also gained on manumea during the course of this.

Component 2 Planned:

A field research programme is developed for the Ma'oma'o (mao) to provide sufficient understanding of its breeding and feeding ecology to trial approaches to manage its recovery.

Component 2 Actual at Completion:

An extensive research programme was developed based on a student Rebecca Stirnemann enrolled for a PhD at Massey University, New Zealand supported by a range of experts, Ministry staff and community assistants. This has generated detailed information on nesting, revealing the significance of rats as a predator, and on feeding and diet so that we now have a good idea of its requirements. We are thus potentially able to manage a site to increase Ma'oma'o numbers by controlling predators and planting food trees if there is a deficiency in this respect.

Component 3 Planned:

One or more local communities are supportive of and engaged in the research programmes and developing the means to assist in the conservation of the two species.

Component 3 Actual at Completion:

The Magiagi community who own the land for a key site for Ma'oma'o in the Vaisigano catchment have been involved in the project through village workshops, meetings and the involvement of villagers in the field. They are supportive of efforts to conserve the site and cease any further clearance of it for agriculture.

Component 4 Planned:

The programmes have increased interest in the two species and led to further activities taking place to address recovery plan objectives.

Component 4 Actual at Completion:

The Ma'oma'o research programme has increased national interest in this species through various awareness activities lead by Stirnemann. The project, together with the outcomes of a recent CEPF-funded survey of upland Savaii, has raised awareness of the plight of the Manumea and there are now around 10 overseas organisations who have expressed some commitment to its conservation.

Were any components unrealized? If so, how has this affected the overall impact of the project?

Component 1 was largely unrealized as designed. As a result we are not in a position to recommend how to manage the Manumea in detail. However the project has demonstrated how rare it is, which in turn has led to a strong consensus at a meeting in November 2012 on the immediate actions needed including surveys and management in the wild and captivity.

Please describe and submit (electronically if possible) any tools, products, or methodologies that resulted from this project or contributed to the results.

The key methodologies used in the field research were largely based on procedures developed in New Zealand and elsewhere: High-rig mist netting, radio tracking, use of remote video cameras at nests, using artificial nests to measure predation rates and wax tags to monitor rats. Automatic sound recorders developed by the New Zealand Department of Conservation were used in the latter stages of the project.

Lessons Learned**Project Design Process:**

The project set out to undertake detailed research on two threatened bird species, for which recovery plans had been developed by the Government and international partners in 2006, and submitted an initial budget accordingly. CEPF approved a contribution of US\$176,653 about half the requested sum of \$353,013 giving a total project budget including support from partners of \$341.473 compared to \$601,893 originally proposed.

The obvious response to a budget of around half that originally sought would have been to reduce the scope to just work on one of the species. However it was decided to continue to try to work with both. Resources were initially directed towards the Ma'oma'o as a suitable study area had already been identified and a student was recruited to undertake a PhD through Massey University, NZ to carry out the field study. There had been a hope that a student could acquire a scholarship allowing the budget to recruit a second to work on a PhD or MSc on the manumea, and that the same area might hold significant populations of both species. Neither of these eventuated and the budget provided was also seriously eroded by currency fluctuations, so work on the manumea was quite limited. The progress made has largely depended on the principal of the grantee organisation putting in much of his own time.

The lesson here is that principal donors and grantees need to have a robust discussion when the funding offered falls well short of that requested. There's an obvious tendency for grantees and their partners (particularly the Government agency in this case) to be committed to the conservation work proposed and to aim to do 'more with less'. This needs to be countered by hard questioning by the principal donor to end up with a realistic programme. One of the end results of an un-realistic programme is that everyone has to spend time unproductively re-formulating work plans and modifying targets.

Having discussed this lesson, if one of the species had been dropped it would probably have been the Manumea given the difficulties finding a study population. This report will show that useful progress has been made on the Manumea and that we now know that it is the more endangered of the two. There has also been no tangible progress on other objectives within the recovery plan on this species. So it has proved important that it was not dropped. Though the project did not achieve what it set out to do for Manumea if it had not proceeded almost nothing at all would have happened for this bird.

Project Implementation:

Recruiting a research student to undertake the key role

The research on the Ma'oma'o was based on providing a 3-year scholarship to a student towards a PhD (c.US\$71,000 or US\$23,750 a year). This is considered to have been a very cost-effective approach to support someone with sufficient experience (from undergraduate and MSc work) in the field for long enough to collect the necessary data on a rare bird. However such a student needs considerable support, particularly when working in a developing country, and this has been provided within this project by the involvement of six experienced scientists making short visits (particularly at the start), Government field staff and local villagers assisting on an almost daily basis, and periodic international volunteers.

Another advantage of this approach is that it should ensure that the project's findings reach multiple audiences, through the donor's usual reporting and the student's work towards a thesis, scientific papers and presentations to conferences. In this case the student also secured additional funds (National Geographic) so that the results will reach a popular audience.

Having an individual working in the field over a long period (2.5 years) helped to build trust

with the local village community and the Government. It also facilitated the passing of skills to staff of the Ministry of Natural Resources & Environment (MNRE).

Finally, one person working largely full-time on the project provided the flexibility needed to adjust the programme as new information was obtained. This was particularly important for the Ma'oma'o as at the outset we did not know when its breeding season was and this proved to be spread over a long period.

Working with village communities

This is a challenging issue throughout the Pacific and particularly in Samoa where much of the land is in communal village ownership. The project benefited from the fact that it was not the first time that the different villages involved had been involved in discussions about bird conservation. A national project to raise awareness of the manumea had been conducted in 1995 funded by the RARE Center for Tropical Conservation and all the villages had been approached either during surveys for the two species in 2006 or in a programme to identify Important Bird Areas in 2008/09. This meant that the project did not need to start with *fono* or meetings with Village Councils which involve relatively significant traditional fees and sometimes generate expectations that funds will flow to the village. Instead we could work through *pulenuu* (village mayors whose role is to liaise with Government), and in the case of the Ma'oma'o, individual landowners. Workshops were held at intervals with the main village associated with the Ma'oma'o work, but probably more important to maintaining productive relationships was the near-daily contact with the project team. The team periodically employed villagers to assist in the field, though this was not without its challenges. It also earned considerable goodwill by doing small things like always stopping to give lifts to villagers heading to and from their plantations.

Ministry staff played crucial roles guiding the project team on how to approach villagers, leading such approaches and communicating with villagers encountered in the field in Samoan. In one such encounter a family were persuaded not to clear any further land for plantations in a particular area when the staff person told them how important their forest was for the Ma'oma'o.

Working with Government

A project such as this when most of the funding is directed through an NGO and Government is in a supporting rather than leading role, is also challenging. The Government committed to providing US\$150,000 of in-kind support and certainly lived up to its commitments largely through making considerable staff time available. One skilled field staff person contributed significantly to the field research through his commitment, observational and tree climbing skills. The head of the Parks & Reserves section provided key day to day support, as did the Assistant CEO (Biodiversity and Conservation). Relationships with staff at these levels were generally very positive and productive, but we did not do such a good job of keeping the CEO of MNRE informed. I think there were three lessons here:

- It would have been beneficial if the grantee and Government had signed an MOU at the outset setting out how the relationship between the two would work
- An NGO grantee cannot assume that other Ministry staff will do a thorough enough job of keeping their CEO informed and needs to take some responsibility for this itself.
- It also cannot be assumed that if there is a change in CEO the new appointee will be adequately briefed on the detail of all projects. The grantee needs to make an approach to enquire if the new CEO would like a briefing on the work.

There were specific issues around money as the CEPF approach meant that funds could not be transferred directly to Government to carry out any aspects of the project. Thus the usual system whereby suppliers are provided with order forms from Government which guarantee

they will be paid does not operate. In its absence, suppliers will rarely provide materials or service and invoice for later payment. Instead the project needs to pay cash up front which makes the work of managing the project much more difficult. Greater flexibility whereby some funds could be transferred to Government to undertake specific tasks, e.g. run a village workshop, would be beneficial.

Additional Funding

Provide details of any additional funding that supported this project and any funding secured for the project, organization, or the region, as a result of the CEPF investment in this project.

Donor	Type of Funding*	Amount	Notes
Ministry of Natural Resources & Environment, Government of Samoa	Project Co-financing	US\$150,000	Covered involvement of managerial and field staff, office and logistical support.
New Zealand Department of Conservation	Project Co-financing	US\$14,820	Covered involvement of two staff in the field and assistance with supply and organisation of equipment.
National Geographic Fund	Grantee & Partner leveraging	US\$17,061	Grant awarded to Stirnemann to support work on Ma'oma'o
Rufford Small Grants Foundation	Granting & Partner leveraging	GBP3,500	Grant awarded to Stirnemann to support work on Ma'oma'o
Mohamed bin Zayed Species Conservation Fund	Granting & Partner leveraging	US\$5,000	Grant awarded to Stirnemann to support work on Ma'oma'o

***Additional funding should be reported using the following categories:**

- A** *Project co-financing (Other donors or your organization contribute to the direct costs of this project)*
- B** *Grantee and Partner leveraging (Other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF funded project.)*
- C** *Regional/Portfolio leveraging (Other donors make large investments in a region because of CEPF investment or successes related to this project.)*

Sustainability/Replicability

The key to sustaining project achievements and to tackling the urgent need for work on the Manumea lies with the Ministry of Natural Resources & Environment. At the November 2012 meeting the Ministry re-affirmed its commitment to the recovery of the two species and stated that it would do its best to act on its recommendations. However it

has limited financial resources and few experienced staff so that it will require outside support in terms of major funding and expertise.

The Ministry's ability to carry out field activities and to develop funding proposals has been severely constrained by Cyclone Evan which struck Samoa, particularly Upolu Island, on 13 December 2012. Effort has been concentrated on cyclone relief and damage assessment and at the time of writing (February 2013) its work programme has not yet returned to normal.

Safeguard Policy Assessment

N/A

Additional Comments/Recommendations

Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our Web site, www.cepf.net, and publicized in our newsletter and other communications.

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*****If your grant has an end date other than JUNE 30, please complete the tables on the following pages*****



Performance Tracking Report Addendum

CEPF Global Targets

(Enter Grant Term)

Provide a numerical amount and brief description of the results achieved by your grant.
Please respond to only those questions that are relevant to your project.

Project Results	Is this question relevant?	If yes, provide your numerical response for results achieved during the annual period.	Provide your numerical response for project from inception of CEPF support to date.	Describe the principal results achieved
1. Did your project strengthen management of a protected area guided by a sustainable management plan? Please indicate number of hectares improved.	No			
2. How many hectares of new and/or expanded protected areas did your project help establish through a legal declaration or community agreement?	No			
3. Did your project strengthen biodiversity conservation and/or natural resources management inside a key biodiversity area identified in the CEPF ecosystem profile? If so, please indicate how many hectares.	No			
4. Did your project effectively introduce or strengthen biodiversity conservation in management practices outside protected areas? If so, please indicate how many hectares.	Yes	50ha	50ha	A village community owning land which is a key area for the Ma'oma'o has expressed a commitment to its conservation and is in discussion with Government.
5. If your project promotes the sustainable use of natural resources, how many local communities accrued tangible socioeconomic benefits? Please complete Table 1 below.	No			

If you answered yes to question 5, please complete the following table

Table 1. Socioeconomic Benefits to Target Communities

Please complete this table if your project provided concrete socioeconomic benefits to local communities. List the name of each community in column one. In the subsequent columns under Community Characteristics and Nature of Socioeconomic Benefit, place an X in all relevant boxes. In the bottom row, provide the totals of the Xs for each column.

Name of Community	Community Characteristics							Nature of Socioeconomic Benefit											
	Small landowners	Subsistence economy	Indigenous/ ethnic peoples	Pastoralists/nomadic peoples	Recent migrants	Urban communities	Communities falling below the poverty rate	Other	Increased Income due to:				Improved tenure in land or other natural resource due to titling, reduction of colonization, etc.	Reduced risk of natural disasters (fires, landslides, flooding, etc)	More secure sources of energy	Increased access to public services, such as education, health, or credit	Improved use of traditional knowledge for environmental management	More participatory decision-making due to strengthened civil society and governance.	Other
									Adoption of sustainable natural resources management practices	Ecotourism revenues	Park management activities	Payment for environmental services							
Total																			

If you marked "Other", please provide detail on the nature of the Community Characteristic and Socioeconomic Benefit: