

O LE PUPU PUE NATIONAL PARK, SAMOA

PRELIMINARY BIRD SURVEY

10-17 Nov 2009

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**Report compiled by D.J. Butler for Forestry Division, Ministry of
Natural Resources & Environment.**



Fuiua Samoan starling

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Introduction

Native Birds of Samoa

Thirty-five species of landbird and 21 sea and shorebird species have been recorded in Samoa in recent times. This diversity is a reflection of two conflicting influences. Firstly Samoa is relatively isolated well to the east of South-east Asia, the ultimate origin of most of the South Pacific's birds, so a limited number of species reached here. However the country's two main islands are relatively large (c2900 km²) and high (up to 1858m asl) thus offering a wide range of different habitats that have allowed different forms to establish and evolve. This is reflected in eight of the landbird species being endemic, i.e. only found here, (Table 3), a relatively high 23% of the total. There are also six endemic sub-species.

The significance of Samoa's avifauna has been recognised by the International Council for Bird Preservation which listed it as one of the world's 'Endemic Bird Areas' in need of urgent conservation attention (ICBP 1992).

One species, the Samoan Woodhen or Punae (*Pareudiastes pacificus*), is critically endangered and may be extinct. A further 12 species are listed as threatened (Table 4) and all may occur in the National Park. The key factor that has threatened bird survival has been loss of forest habitat, particularly in the lowlands. Other threats faced by birds in those forests that remain include cyclones, hunting, and invasive species. O Le Pupu Pue National Park potentially has a major role to play in bird conservation as a large area protected from forest clearance and, to some extent, hunting.

Samoa has single representatives of many bird families: one duck, one owl, one cuckoo, one kingfisher, one woodhen, one parrot, one swiftlet, one thrush, one robin, one whistler, one white-eye, one parrotfinch. Those with multiple representatives are pigeons and doves (Columbidae) - 6, crakes and rails (Rallidae) - 5, honeyeaters (Meliphagidae) - 3, and starlings (Sturnidae), flycatchers (Monarchidae) and trillers (Campephagidae) – 2 each.

This survey

O Le Pupu Pue National Park (5019 ha) was established in 1978, the first National Park in the South Pacific. It extends from the southern coast of Upolu to the top of the mountain range running through the centre of the island at around 1175m a.s.l. It provides an important, complete altitudinal forest sequence and stream, river, swamp, lake, cave and sea cliff habitats for birdlife. This is the first bird survey to cover the full range of altitudes in the Park since initial work by Ollier et al. (1979). Lowland areas were included in a survey by Park et al. (1992) and upland areas in one by Schuster et al. (1999).

The Park's forests were severely damaged by Cyclones Ofa (1990) and Val (1991) and a brief follow-up survey in 1992 documented significant declines in birdlife as a result (Lovegrove et al. 1992). The current survey provides a brief snapshot of the birdlife 18 years after the cyclones. It has been entitled a 'preliminary' survey as it involved a fairly rapid 'walk through' to provide a general picture of the birdlife. More work would be needed, including surveys at different times of year, to provide an accurate assessment of the numbers and distribution of all species in the Park

Objectives

Butler was contracted to facilitate the achievement of three objectives. This report covers objectives 1 and 3 while the leaflet (objective 2) was delivered separately.

1. Carry out a brief field survey to provide updated general information of the birds inhabiting O Le Pupu Pue National Park
2. Prepare a short bird survey leaflet detailing information required by Park agencies, appropriate survey methodologies, equipment and references.
3. Advise of any particular management initiatives suggested by the survey results, e.g. to protect endangered species.

Survey Methodology

The survey was conducted as a 'walk through' over 6 days from 10-17 November 2009 following trails which had been re-cut and re-marked the previous week. Most of these trails had been developed for the establishment of 8 vegetation plots in 2008 and seven of these plots were visited (plots 2-8). Birds were continuously recorded as they were seen or heard while walking, with observations assigned to different sections of track defined by waypoints obtained with a Garmin GPSMAP 60CSx, or geographical features. In each section different bird species were assigned subjectively to one of three relative categories 'very common', 'common', and 'uncommon' or listed as a number of individuals. Four or five observers made up the survey team with a further six going on ahead during the 3-day trek on the main trail to set up campsites.

Stops of 10-15 minutes were made occasionally at vantage points offering wider views and at the vegetation plots in an effort to detect all the species present at these sites. No five-minute counts were undertaken as these are only worthwhile if they can be repeated at the same site on consecutive days at the same time of day. Single series of counts tend to be given a weight and used for comparative purposes when this is not justified.



Photo 1: The team during main trail survey

It had been hoped to use the playback of taped calls to detect the presence of two wetland species, the White-browed and Spotless Crakes, and the Mao. Repairs were made to a speaker system held by the Ministry of Natural Resources & Environment but the tape recorder would not function when the equipment was assembled prior to departure.

The survey largely provided 'presence' or 'absence' information. Determining the 'presence' of a species is straightforward provided that errors are not made in identifying it or its calls. In this regard, Butler was well prepared for the survey as he spent most of the previous 10 days in various forests in Upolu studying or searching for birds as well as listening to tape recordings. Several of the Forestry Division team were familiar with all but the rarer species. Determining 'absence' is more difficult and it is risky to draw conclusions from one brief survey.

Survey schedule and routes

Tues 10 to Thurs 12th November - Three days on main trail.

Road access from Cross Island Road. Walked trail towards Mt Fito diverting to Mt Pu'e along trail cut by EPC and surveying craters and Plot 7 area on route. Overnight camp 1 near Fito. Cut new trail to access unnamed crater marked as 1008m, surveyed Plot 8 area. Overnight camp 2. Surveyed Plot 5 area, surveyed Peapea cave and out to vehicle pick up at cattle farm at Togitogina.

Friday 13th November – Day trip to coastal forest.

Drove from Apia, walked coastal trail, walked/drove road to coast in 500m sections including survey of Plot 3 area, walked Ma Tree trail.

Monday 16th November – Day trip to western side of Park.

Drove from Apia and accessed from Cross Island Road. Walked to Plot 6. Drove/walked to Plot 2.

Tuesday 17th November - Day trip to river valley up from Peapea Cave.

Drove to cattle farm, walked up river to high dry waterfall and return.

Figure 1 (annexed) shows the location of the main trail, plots 2, 4-8, Peapea Cave and the end of the Ma Tree trail. Figure 2 (annexed) covers the full Park so shows the coastal forest, road and trail not included on Figure 1. GPS waypoints were obtained during the current survey but not mapped given the limited time available.

A presentation on the survey and its preliminary results was made to staff of Forestry Division, Environment and Conservation Division and the Pacific Invasives Learning Network on Thursday 19th November in Apia.

Results

The detailed results are provided in Annex 1 tabulated for different sections of track and summarised here by habitat and species. A total of 25 species were recorded, 21 landbirds and 4 seabirds. Ten species previously found in the Park were not located indicating that they are either relatively rare or absent. In general fewer birds were recorded than expected and sections of forests were very quiet. Whether this represents low numbers of birds or reduced vocal activity at this time of year is discussed later. Low numbers of flying foxes were seen and weather conditions with only very occasional sun did not suit lizard activity

The upper and lower parts of the main trail, the trail into plot 6, part of the trail into plot 2 and areas beside the coast road were occupied by secondary forest dominated by tree ferns with many open areas, infestations of invasive trees and climbers. These areas had a limited range of native bird species and were the only places that the invasive birds, mynahs and bulbuls were found. Much of this forest appears to be recovering slowly from the impact of the cyclones of 1990/91 and it is currently of little significance for native birdlife.

Intact native forest is found within an altitudinal range of 990m to 1175m going up the main trail from the north and then down to c. 420m on the southern side – roughly the area between plots 7 and 5. A wider range of species were found here including Pacific pigeons and fruit doves and a few seabirds likely to be nest at a different time of year.

The coastal forest is dominated by native trees, though logged over in the past, and it held the highest numbers of pigeons and doves as well as being the most significant area for the Samoan Broadbill.

There are small areas of open water and swamp in craters, and cliffs and rock stacks on the coast, which provide very specific habitats with their own range of species.

Results by habitat

Habitats are described more from an ornithological (bird-related) than a botanical viewpoint. The first habitat described as secondary forest effectively includes both disturbed montane forest and disturbed lowland forest, however it is all much the same from a bird point of view with limited large native, fruit-bearing trees. It thus supports a smaller number of species with more generalist feeding requirements.

Secondary forest – open areas – tree ferns - invasive trees and climbers

This habitat which can be described in various ways occupies significant areas within the Park largely as a result of the impacts of Cyclones Ofa and Val in 1990 and 1991. The photo below shows the extent of this habitat in the northwest corner of the Park - as a patchy paler green. It currently provides for a limited range of native bird species and is the

only habitat in which the invasive bird species mynahs and bulbuls were found. Wattled and cardinal honeyeaters and Polynesian trillers were very common and Robins, Fantails, Samoan Starlings and, in thicker parts in gullies etc. Samoan Whistlers, were common. Most of the rare Samoan triller were also seen in this habitat.

It remains to be seen how rapid a succession there is from this forest to primary forest. It depends largely on the impacts of invasive weeds, particularly the climbers like *Meremia*, and on birds bringing sufficient seeds of the tree species that come in later once the colonising species like tree ferns have established a shady environment.



Photo 1: Aerial view of Mt Pu'e (centre right) with north coast of Upolu in background.



Photo 2: Typical area of Night-flowering Cestrum and vines with tree ferns.

Closed canopy forest – primary forest – forest with large emergents

Much of the centre of the Park from Mt Fito down to an altitude of around 400m a.s.l. on the south side consists of forest dominated by native species. Its quality varies with location and aspect largely as a result of Cyclones Ofa and Val. The best patches which are found on the sides of some of the craters or in the river gorges have a high canopy with a layer of very tall trees emergent above this.



This habitat supports a wide range of native species. Samoan Whistlers are very common along with the honeyeaters, robins and fantails found everywhere. Samoan Starlings,

Pacific Pigeons and Crimson-crowned fruit doves are encountered often wherever trees are in fruit and several seabird species nest. It is hoped that populations of rarer species such as the Many-coloured Fruit Dove, Tooth-billed Pigeon, Friendly Ground Dove and Island Thrush persist in some of these areas

Crater wetlands

Black duck (Toloa) were present in every crater with significant open water. Purple swamphen (Manulili) and White-browed crake (Vai) were not located during this survey but have previously been recorded.



Rocky coast

No seabirds were nesting on the cliffs or offshore stacks during the survey but several species of noddy and tern are expected to do so in the breeding season.



Coastal Forest

The Park has a significant area of forest on more recent lava flows that flowed to the coast. Some could strictly be defined as coastal forest, with pandanus and hibiscus, and some as lowland forest, but all the land south of the main road is included within the one definition here. This was the key habitat for Samoan Broadbill in the Park and held the highest numbers of Pacific Pigeon and Crimson-crowned Fruit Dove associated with the fruiting of certain trees. This forest is generally in good condition and restoration planting is occurring in some open areas.

Caves

The Peapea Cave is well known as a nesting site for the White-rumped Swiftlet and used to hold Sheath-tailed Bats (*Emballonura semicaudata*) which are probably now extinct in Samoa. The main trail passes one collapsed lava tube. No doubt there are others in the Park that remain unexplored and potentially support Swiftlets.

Results by Bird Species

Species known to occur in Upolu are listed in the order used by Watling (2001) as 'Common Name, Samoan Name' and '*Scientific Name*'.

LANDBIRDS

Pacific Black Duck Toloa *Anas superciliosa*

Rare. Single birds seen on the crater lake at Mt Pue and the swamp at waypoint 24 named as 'Mt Fito swamp' by Atherton et al. (1990).

Banded Rail Ve'a *Gallirallus philippensis*

Rare. Only seen on access roads into the Park and to the coast but footprints were seen in riverbed just above Peapea cave. Very young chicks observed on one occasion.

White-browed Crake Vai *Porzana cinereus* Spotless Crake *Porzana tabuensis*

Not recorded. Sound recording equipment was non-functioning so unable to play taped calls to see if there was any response at the two crater wetlands visited. Schuster et al. (1999) report that they encountered the white-browed rail a few times in the craters during their upland survey.

Purple swamphen Manulili Porphyrrio porphyrio

Not recorded. Schuster et al. (1999) observed birds at crater wetlands they visited in the north of the Park in 1996.

White-throated pigeon Fiaui Columba vitiensis

Not recorded. A pair seen prior to the survey at Malolelei were calling quite frequently so the failure to hear any in the Park suggests they are rare there.

Friendly Ground Dove Tuameo Gallicolumba stairii

Not recorded. A hard bird to see as it flies off well ahead of the observer but no calls were heard. This species is now considered to be very rare on Upolu.

Pacific Pigeon Lupe Ducula pacifica

Quite common. Pigeons were most numerous and conspicuous in the coastal forest where birds were feeding on mosooio and tavai fruits. They are absent from most of the weed-affected secondary forest with open areas. The first pigeons were located close to Plot 7 when climbing up the main trail in the north of the Park and when then detected occasionally all along the trail down to Peapea Cave.

Pigeons were generally detected by their calls, usually the ‘*prrrrrrrrrhh*’ call but occasional single ‘*oooo*’s, or when flying off above the observer. No prolonged ‘cooing’ was heard.

Tooth-billed Pigeon Manumea Didunculus strirostris

Not recorded. No Manumea were seen during the upland survey either (Schuster et al. 1999) but one was recorded at 311m a.s.l. on the southern side of the Park during the 2005-06 survey (MNRE 2006). The status of this species is giving increasing concern. Further information is being obtained on when it is most vocal and when some of its key food trees are fruiting to determine the best time of year to search for it. The Park contains some areas of quality forest that should provide suitable habitat and the river valley we walked on the last day was one example to be followed up.

Many-coloured Fruit Dove Manuma Manu’ulua Ptilinopus perousii

Rare. Only a single bird was heard at 1072m a.s.l. above the ‘1008m’ crater with pandanus, whereas the closely related was heard on 38 occasions at a wide range of locations.

Watling (2001) notes that the status of this species is of increasing concern throughout its range and he considers hunting to be a major threat.

Atherton et al. (2009) counted almost half as many Many-coloured Fruit Doves compared to Crimson-crowned Fruit Doves (2 to 5) during counts conducted on the main trail in May. Further work is needed to determine whether the Many-coloured Fruit Dove is as rare as the current survey indicates or whether it was particularly quiet at this time of year.

Crimson-crowned Fruit Dove Manutagi Ptilinopus porphyraceus

Quite common. This species was frequently encountered, usually by its call, in areas of suitable habitat carrying fruiting trees throughout the Park. Its distribution closely mirrors that of the Pacific Pigeon. Birds were observed feeding on the fruits of Mosooi and Niu Vao.

Blue-crowned Lory Segavao Vini australis

Uncommon. Over 20 Lory were located at 9 different sites typically as 2-3 birds flying over though detected twice by their very high-pitched calls. These sites varied from the craters of Mt Fito and '1008m' at over 1100m altitude through mid-altitude forests and right down to the coast. They are likely to have been more numerous than these figures suggest as the team were often walking in closed canopy forest when they would not have detected birds flying overhead.

Long-tailed cuckoo Aleva Eudynamys taitensis

Not recorded and probably absent. Most birds would have been back in breeding areas in New Zealand. (Watling (2001) notes that most depart in September and October though some remain into December).

Barn owl Lulu Tyto alba

Not recorded. Owls are likely to occur in more open areas on the edges of the Park.

White-rumped swiftlet Pe'ape'a Aerodramus spodiopygius

Quite common and widespread. Birds were seen flying throughout Park with highest numbers along the river from Peapea cave. No similar concentrations suggesting the presence of other breeding caves were seen.

A nest count was conducted in the Peapea cave from the second roof opening (larger one used by Forestry staff as return point for tours to the cave (Peteri pers. comm.) back to the entrance at 12.40am on 12th November.

Table 1: Nest count of Swiftlets in Peapea cave

Category	Adult sitting	Chick sitting/no adult	Empty	Total
No. of nests	40	14	54	108

Notes: The only nests counted were those in good condition and considered to be in use this season. Some ‘empty’ nests resulted from adults flying off as we moved through the cave and one of these was seen to contain a single egg.

Flat-billed Kingfisher Tiotala Todiramphus recurvirostris

Quite common and widespread. Observations the previous week and during the survey showed the birds to be noisy and often together as pairs. This suggests that most birds along the survey routes will have been detected. They did not appear to be nesting or feeding young. Birds were most common in areas of native forest and particularly along the valley of the river above Peapea Cave.

Polynesian Starling Fuia vao Aplonis tabuensis

Rare - but probably under-recorded. Birds were only recorded at one site on the main trail and then a few times in the coastal forest. Observations in Vaisigano the previous week showed that they were not very vocal and more often detected when flying over. So it is considered likely that they are more common and widespread within the Park than the survey suggests.

Samoan Starling Fuia Aplonis atrifusca

Widespread and common or very common. Samoan starlings were found in all habitats but were most numerous in relative open areas with larger native trees, presumably providing good sources of fruit.

Common Mynah Maina fanua Acridotheres tristis

Jungle Mynah Maina vao Acridotheres fuscus

Uncommon and restricted distribution. Mynahs were only encountered in the disturbed forests at the start of the main trail in the north and on the coast beside the road and open

areas. Their overall impact on native bird species within the Park will thus be insignificant. They were not identified to species as their calls are similar..

Red-vented Bulbul Manu palagi Pycnonotus cafer

Uncommon and restricted distribution. Bulbuls were also only found in disturbed forests on the edge of the Park and along the coast like the mynahs and have a similarly low impact on native species there.

Island Thrush Tutulili Turdus poliocephalus

Not recorded. I am not aware of this species being recorded on Upolu in recent years.

Scarlet Robin Tolaiula Petroica multicolour

Common and widespread. Robins were frequently encountered in all habitats, often seen near the track and heard singing. They were seen feeding fledged young.

Samoan Fantail Se'u Rhipidura nebulosa

Common and widespread. Fantails were also found frequently throughout the Park and were also seen feeding fledged young. They rarely sang full song.

Samoan broadbill Tolaifatu Myiagra albiventris

Uncommon and restricted distribution. Broadbills were most frequently encountered in the coastal forest with only 2 recorded elsewhere on the track to Plot 6. One pair was observed feeding fledged young. No birds were heard giving their full, louder call so the survey may have underestimated their distribution but it seems likely that they are absent from much of the Park. They are listed by the IUCN as 'vulnerable' (Table 4).

Samoan Whistler Vasavasa Pachycephala flavifrons

Very common in forest habitats. Vasavasa were a noisy presence through most of the Park but less common in open weedy areas. They were seen feeding fledged young.

Polynesian Triller Miti *Lalage maculosa*

Very common in more open habitats. Polynesian Trillers were found throughout the Park in all habitats but were most common in open areas of secondary forest.

Samoan Triller Miti tai *Lalage sharpie*

Uncommon. Samoan Triller were relatively quiet during the survey and most were observed in more open areas including secondary forest and the river valley. It is considered that their number and distribution may have been under-recorded and which is their preferred habitat is uncertain. Birds were seen feeding fledged young.

Samoan Parrotfinch Segaula *Erythrura cyaneovirens*

Not recorded. Watling (2001) records this bird as ‘inconspicuous at all times’ so it could easily have been missed during such a ‘walk-through’ survey.

Cardinal Myzomela Segasegamau’u *Myzomela cardinalis*

Very common throughout. Cardinal Myzomela or Honeyeaters were the most conspicuous bird in the survey often noisy and very active. They were found everywhere and were probably most numerous in the secondary forest. They also were seen feeding fledglings.

Wattled Honeyeater Iao *Foulehao carunculata*

Very common throughout. Wattled Honeyeaters appeared equally numerous in secondary and primary forest and sang often. Several were seen with fledged young which called incessantly.

Mao Ma’oma’o *Gymnomyza samoensis*

Not recorded but present (rare). A Ma’oma’o was heard and seen in the Park at the ‘Mt Fito swamp’ in late July c.15 weeks ago but not heard during this survey. The failure of recording equipment meant that taped calls could not be played. Schuster et al. (1999) recorded a few Ma’oma’o during their survey of the uplands of the Park and one was heard on the southern side on the edge of a gully at 468m during a manumea/ma’oma’o survey in 2006 (Beichle 2006).

Observations at the Vaisigano during the week before the survey showed adult Ma’oma’o were generally quiet and feeding fledged young which were making a repeated ‘cheep’.

This is very similar to a call being made by Iao chicks. Such calls were heard at two sites heading up towards Mt Fito, in an area I heard an adult in the mid-1990's, but they were too distant to decide whether they were made by Ma'oma'o or Iao.

SEABIRDS

The four species below were the only seabirds recorded during the survey and all are likely to breed in the Park though not apparently nesting at present. Other Tern species may nest on the rock stacks offshore of the Coastal Trail and walkers there are likely to see other seabird species such as Boobies and Frigatebirds flying past at sea.

White-tailed Tropicbird Tava'e *Phaethon lepturus*

Rare. Only a single Tropicbird was encountered well up the river valley from the Peapea Cave. Observations in the Vaisigano prior to the survey suggested a pair there were prospecting for a nest. It may thus be a little early to determine any idea of the relative number breeding in the Park.

Black-naped Tern *Gogosina *Sterna sumatrana**

Rare. Three birds were seen flying close to the rock stacks offshore of the Coastal Trail. They are considered likely to nest there in the breeding season.

Brown Noddy Gogo *Anous stolidus*

Rare. Birds were only located by calls while flying above the forest in an area before and after Plot 8 suggesting that the Park is not a major breeding site for this species. However as birds are not nesting at this time this conclusion must be treated with caution.

White Tern *Gogosina *Gygis alba**

Uncommon. Several birds were seen flying in each of the craters and single birds at several sites along river valleys and by the coast, totalling 14 in all. They did not appear to be nesting at this time.

Overall status of bird species – this survey and IUCN assessment

Table 2 below summarises the overall status of the birds of the park according to this survey. The individual results of Annex 1 are combined to give an overall status as follows:

Rare – less than ten individuals seen, usually at only one or two locations
 Uncommon – 10-20 individuals seen covering several locations
 Quite common – 20-50 individuals at a wide range of locations
 Common – more than 50 individuals and found at most sites
 Very common – individuals encountered frequently almost everywhere

Table 3 lists those birds endemic to Samoa and Table 4 lists their national status as defined by the IUCN. Birdwatchers visiting the Park are likely to be particularly keen to see the species listed on these two tables.

The survey suggests some changes to the IUCN status of some species and this is addressed in the discussion.

Table 2: Status of Species in this Survey

Status	Species	
Not Recorded	Crake sp. Purple Swamphen White-throated Pigeon Friendly Ground Dove Tooth-billed Pigeon	Long-tailed Cuckoo Barn Owl Island Thrush Samoan Parrotfinch Mao
Rare	Pacific Black Duck Banded Rail Many-coloured Fruit Dove Polynesian Starling	Black-naped Tern Brown Noddy White-tailed Tropicbird
Uncommon	Blue-crowned Lory Samoan Triller White Tern Common and Jungle Mynah (restricted distribution) Red-vented Bulbul (restricted distribution) Samoan Broadbill (restricted distribution)	
Quite common	Pacific Pigeon Crimson-crowned Fruit Dove Flat-billed Kingfisher	
Common	Samoan fantail Scarlet Robin Samoan Starling White-rumped Swiftlet	
Very common	Samoan Whistler (forest habitats) Polynesian Triller (open habitats) Cardinal Myzomela Wattled Honeyeater	

Table 3: Species endemic to Samoa

Species	Endemic status
Tooth-billed pigeon Manumea	Endemic to Samoa
Flat-billed kingfisher Tiotala	Endemic to Samoa
Samoan fantail Se'u	Endemic to Samoa
Samoan broadbill Tolaifatu	Endemic to Samoa
Samoan whistler Vasavasa	Endemic to Samoa
Samoan triller Miti tai	Endemic to Samoa
Samoan parrotfinch Segaula	Endemic to Samoa
Mao Ma'oma'o	Endemic to Samoa**
Samoan starling Fuia	Endemic to Samoa and American Samoa

** Note: The mao used to also occur on American Samoa but was last collected there in 1924 with an unconfirmed report in 1977 (Watling 2001).

Table 4: Threatened landbird species in Samoa that occur/may occur in the Park (IUCN 2008)

Species	Conservation Status (IUCN)
Tooth-billed pigeon Manumea	Endangered
Mao Ma'oma'o	Endangered
Friendly ground dove Tuameo	Vulnerable
Samoan triller Miti tai	Vulnerable
Samoan broadbill Tolaifatu	Vulnerable
Friendly ground dove Tuameo	Vulnerable
Many-coloured fruit dove Manuma	Conservation Concern
Blue-crowned lory Segavao	Conservation Concern
Red-headed parrotfinch Segaula	Conservation Concern
Polynesian starling Fuiavao	Conservation Concern
Scarlet robin Tolaiula	Conservation Concern
Island thrush Tutumalili	Conservation Concern

Note: There are no records of the Friendly Ground Dove or Island Thrush in the Park in recent years and there must be some doubt that they remain.

Other fauna

Mammals

Only five of the day flying Samoan Flying-fox (*Pe'a vao Pteropus samoensis*) were seen, three in river valleys, one on the coastal road and one on the road to Plot 2. Twenty or so of the more nocturnal Tongan Flying-fox (*Pe'a fanua Pteropus tonganus*) were seen flying above the road through the Park around 6.30am one morning but none were seen or heard during the walking survey and no communal roosts were located.

Rats were seen high in trees on two occasions.

Reptiles

Conditions were rarely suitable for lizards to be active being usually overcast or wet. Blue-tailed skinks (*Emoia impar*) were the most common and seen in most habitats. One Samoan skink (*Emoia samoensis*) was seen but no *Emoia nigra*. Medium-sized brownish skinks with horizontal markings on the tail were seen briefly at two sites but not identified. One large Pacific Boa (*Gata Candoia bibroni*) snake was seen sun-bathing on moss at the top of a tall tree during the 'Peapea' River walk. Prolonged alarm calling by an Iao indicated that a snake was also present in an epiphyte-covered tree near plot 2.

Previous bird surveys of the Park

1978 Survey - Ollier et al. (1979)

A three person team commissioned by the United Nations surveyed the Park for its geology, vegetation and fauna in August-September 1978.

1991 Lowland Survey – Park et al. 1991 & Lovegrove et al. 1992

Forty bird counts were undertaken in lowland parts of the Park on 12-14 August 1991 and 13 re-done in March 1992 following Cyclone Val. Comparing the 1991 ones with a 1982 survey by Lovegrove showed a reduction in the number of birds and species per count which was considered a result of Cyclone Ofa in 1990. Further significant declines were seen between 1991 and 1992 due to Cyclone Val, particularly of crimson-crowned fruit dove, whistler and parrot-finch. No white-throated pigeons, many-coloured fruit dove, Samoan triller or robins were recorded in 1992 though they had been present in 1991.

1996 Upland Survey – Schuster et al. 1999

Thirty bird counts were undertaken during a brief visit to the uplands of the Park from Vaivai crater to Mts. Fito and Pue over an altitudinal range of 800-1207m. Twenty species were recorded and notable results include a few mao, low numbers of pigeons and doves and no tooth-billed or white-throated pigeons, very low numbers of Samoan trillers noted as once being common, and a few white-browed crakes.

Discussion

This was designed as a preliminary survey with the aim of covering as much of the Park as possible over a limited time. A key question is how accurate a picture of the relative numbers and distribution of the birds of the Park has been obtained.

The ability of an observer to detect and distinguish a bird depends on the activity of both. The following steps were taken to maximise the chances of making accurate observations:

- The main observer spent over a week prior to the survey birdwatching in the course of research on the Ma'oma'o and Manumea and also listened to taped calls
- The group surveying birds was limited to six and most often consisted of three individuals moving with little noise
- The group stopped at intervals to spend a few minutes observing areas giving wider views
- Tracks were cut or re-cut the week before the survey so that this noisy activity was minimised
- The river valley trail followed quite a wide river that often flew underground minimising its noise

Bird activity and particularly the amount of calling or singing is known to be affected by several factors particularly:

- Time of day
- Weather conditions
- Time of year

Activity is greatest in the morning and evening and minimal in the middle of the day, particularly in hot and sunny conditions. Work was started as early in the day as possible. Weather conditions were generally favourable with almost no wind (which reduces activity and detectability) and usually overcast and not too hot. There was rain at times in upland areas which will have reduced the effectiveness of the survey on occasions.

Time of year may have been a significant factor. Little has been known about the breeding of many Samoan birds but this survey, and work over the previous week, has provided valuable information. The following six species were seen feeding fledged young (iao, seu, miti tai, tolaiula, vasavasa, mao), and vea and peapea also had chicks. Clearly this was towards the end of the breeding season for several species (unless they have further broods). Adult birds tend to be relatively quiet while feeding fledglings and these do call but with relative indistinct 'cheepings'. Birds that have finished breeding may start moulting (replacing) their feathers and they are also quiet during this phase.

It is likely that more birds would have been singing if the survey had been conducted a few months earlier though this information was not really available beforehand. Timing was dictated by the need to conduct the survey before the wet season and by the project cycle. As a preliminary survey it is considered to have provided a valuable 'first look' and provided the means to design a good follow-up if Park managers require this.

Peapea Cave has been surveyed for swiftlets on several previous occasions. Tarburton (2002) visited three times (March 1994 (twice) and October 1996) and noted an increase from 9 to 72 pairs between these observations. The counting of 108 nests during this survey is consistent with the idea that numbers have continued to increase since the devastating cyclones in 1990/91.

Reviewing the list of landbirds of conservation concern in Samoa (Table 4), the survey suggests that the Scarlet Robin may be wrongly categorised as it was widespread in the Park and very common in some areas. Blue-crowned Lory were also found at several different sites and may similarly not be of concern though it is harder to determine their actual numbers based on occasional birds flying over the forest canopy. The survey has reinforced the idea that status of the Many-coloured Fruit Dove, Samoan Parrotfinch and Polynesian Starling are of concern.

Comparison with previous Surveys

Table 5 summarises the results for rarer birds over four surveys over a 31-year period. These surveys visited different parts of the Park and occurred at different times of year so detailed comparisons are not possible. The 1991, 1992 and 1996 surveys used a relatively small number of 5-minute bird counts so their results are given as the average number of birds/count. These are hard to compare with the qualitative results of the widespread surveys of 1978 and the present. However some conclusions can be drawn.

Three species have been consistently unrecorded during surveys, the Friendly Ground Dove, Tooth-billed Pigeon and Island Thrush. If these survive in the Park at all it must be in very low numbers.

The White-throated Pigeon was recorded in surveys up to 1991 but not since and both doves have declined in numbers over the period though the Many-coloured Fruit Dove has never been common. Cyclones Ofa and Val are evidently the key reasons behind these changes. The number of Crimson-crowned Fruit Doves seems likely to have increased in the 18 years since the Park experienced a devastating cyclone (Val 1991) but this appears not to have been the case for the other dove or the White-throated Pigeon.

The Mao appears to have declined and gone from lower parts of the Park. The Samoan Triller, Broadbill and Parrotfinch have never been recorded in large numbers but apparently declined since the cyclones. Whether there has been a recovery since 1992 could only be determined by a thorough quantitative survey based on 5-minute counts.

There is no clear trend for the Polynesian Starling though it appears to have been most abundant in the uplands covered in the 1996 survey around Mt Fito.

Table 5: Survey results for rarer species 1978-2009

Species	1978	1991-1992	1996	2009
White-throated pigeon	Seen & heard within most forested areas at all altitudes	Recorded in 1991 but not in 1992	Not recorded	Not recorded
Many-coloured fruit dove	Not recorded	Recorded in 1991 but not in 1992	Considerably lower numbers compared to 1982 and 1991	Single bird heard
Crimson-crowned fruit dove	Extremely common	Declined significantly between 1991 and 1992	Considerably lower numbers compared to 1982 and 1991	Quite common
Friendly ground dove	Not recorded	Not recorded	Not recorded	Not recorded
Tooth-billed pigeon	Not recorded	Not recorded	Not recorded	Not recorded
Samoan triller	Very uncommon - seen singly or in pairs throughout.	Recorded in 1991 but not in 1992	Low numbers	Uncommon
Polynesian starling	Uncommon but seen at all altitudes	Low numbers	Good numbers	Rare
Island thrush	Not recorded. One heard in montane forest to east of Park.	Not recorded	Not recorded	Not recorded
Mao	Recorded in small numbers around Mt Fito and Mt Le Pue	Gone from lowland parts of Park where quite common in 1982	A few recorded	Not recorded during survey but a pair seen in July
Samoan parrotfinch	Observed in very small numbers	Declined significantly between 1991 and 1992	Fewer recorded than at Lake Lanutoo	Not recorded
Samoan broadbill	Low numbers from coastal and lowland forests to montane.	Low numbers – declined between 1982 and 1991	Low numbers	Uncommon

Further Bird Surveys and Monitoring

This survey is considered to have provided a good initial snapshot of the birds of the Park. However it has left a number of questions unanswered which could be addressed by further surveys. These include:

- Status of Tooth-billed Pigeon – this species is the subject of a recovery plan (MNRE 2006) and of major concern. The plan identifies the Park as a possible key area but this is not supported by the current survey. Research is needed to determine the best time of year to search for this species, based on its calling and feeding on key trees. A further survey could be conducted, making use of taped calls if birds respond to these, concentrating on good forest areas around the craters and river gorges. The same survey could shed more light on the status of the White-throated Pigeon, Friendly Ground Dove and Many-coloured Fruit Dove.
- Status and distribution of Mao – a re-survey at a time of year when Mao are territorial and responding to taped calls could be made and this would accurately determine the significance of the Park for this endangered species.
- Distribution of crakes – calls could be played in wetlands during a future survey. Calls of the Spotless Crake have been obtained but a search is needed internationally to locate White-browed Crake calls.
- Breeding of seabirds – a repeat survey at the right time of year (to be determined) would clarify the breeding status of seabirds
- Significance of river gorges – these areas may contain the best forest in the Park where it was protected from the cyclones. The valley above the Peapea Cave could be walked much further than during the survey if a team camped part way up and other valleys may be passable. These sites seem worth exploring as possible refuges for rare species.

Monitoring is a separate issue from surveying and implies making many counts of birds in a repeatable way to detect changes in numbers. It is recommended that a good baseline is obtained now against which one could compare the impact of future changes, whether they are a continuing improvement in forest condition or the impact of a future natural disaster. This would mean setting up a series of transects at least 2km long and undertaking 5-minute counts repeated over several days at stations 200m apart, ideally with several observers. One transect should be along the riverbed from Peapea Cave as this appears to have been counted previously in 1982, 1991 and 1992.

Monitoring would also be worth considering as a way of evaluating any change in Park management that would affect birdlife. It is hard to think of any such scenario at present but an example might be attempts to reduce the number of introduced predators (rats and feral cats) by poisoning.

Management Issues

Bird conservation

Currently the key role of the Park would seem to be providing a very large area of forest habitat protected from clearance which supports large numbers of birds and is likely to provide them with multiple refuges in the event of future natural disasters such as cyclones. Efforts to continue to improve the quality of this habitat through control of invasive species and restoration planting (see below) should be encouraged. The Park also has a major role in advocacy and education teaching people about the significance of their birdlife and how it can be looked after.

This survey does not suggest the Park has a key role in the conservation of Samoa's most threatened species though further work may reveal significant populations of some of these. If such populations are found then specific management of the areas they occupy may be needed.

Invasive species – animals

Rats are probably widespread and numerous judging by the observations of two animals during the day. Their ongoing control would be a very intensive and costly task and would clearly only be considered if part of the Park was a key site for a threatened native species – clearly not the case at present.

Pig sign was encountered in several areas, particularly up the 'Peapea' River, but no significant damage was seen and no organised control programme seems justifiable.

Invasive species - plants

Clearly weeds are a significant feature of the cyclone-damaged and secondary forest on many areas of the Park and three species stand out. Currently these areas are not important habitat for any of Samoa's rarer birds, however their regeneration to mature forest is clearly being threatened.

Night-flowering Cestrum (Ali'i o le po *Cestrum nocturnum*) grows as large thickets particularly on the northern and western edges of the Park where it inhibits the regeneration of native species and makes trail development and maintenance difficult. Space & Flynn (2002) recommend its control or eradication in 'sensitive and natural areas such as Vailima Reserve'. This is probably not currently a priority for the National Park.

Merremia peltata (fue lautetele) is prominent as a climber in many areas of disturbed forest. Space & Flynn (op. cit.) recommend its control in 'sensitive and natural areas. Park management should take a close interest in research on its management being carried out throughout the region and consider taking action when cost-effective control methods (including biocontrol) become available.

Mile-a-minute (fue saina *Mikania micrantha*) is also widespread in open areas but not considered manageable without effective biocontrol which may be an option in the future.

Hunting

Several piles of shotgun cartridges were found on the track to the coast – also the area where lupo were most frequently encountered – and two hunters with guns were found in the Park near Plot 2. Clearly hunting continues to occur in the National Park and it is likely to be a key factor behind the poor diversity of pigeons and doves.

Restoration Planting

Restoration plantings of native trees were seen alongside the road to the coast and this is clearly a beneficial activity for native birds, particularly given some of the rapid growth rates seen with the favourable climate. Species which provide nectar and then fruit for pigeons and doves could be priorities. Weed control clearly needs to continue around such plantings for a significant time into the future.

There has been discussion on whether to include Mosooi (*Cananga odorata*) among the trees that are planted as it provides fruit used by pigeons. It is native to South-East Asia and considered an early Polynesian introduction to Samoa. National Parks are typically places that are managed strictly as sites for native biodiversity with forests that best match those naturally evolved there. It is thus recommended that this and other introduced trees are not included in restoration plantings.

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Figure 1: Map of northern part of Park showing Vegetation Plots and route of main trail (in green). Peapea Cave is shown as a red dot.

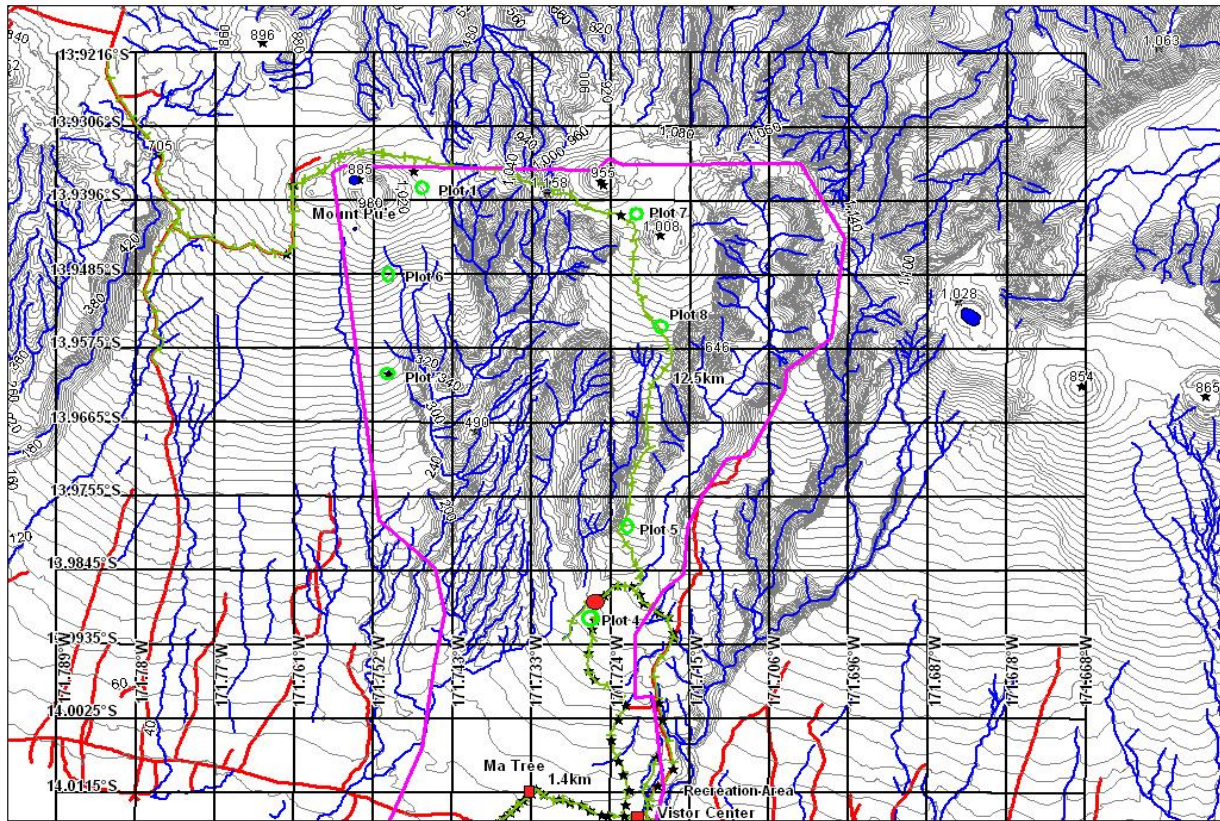
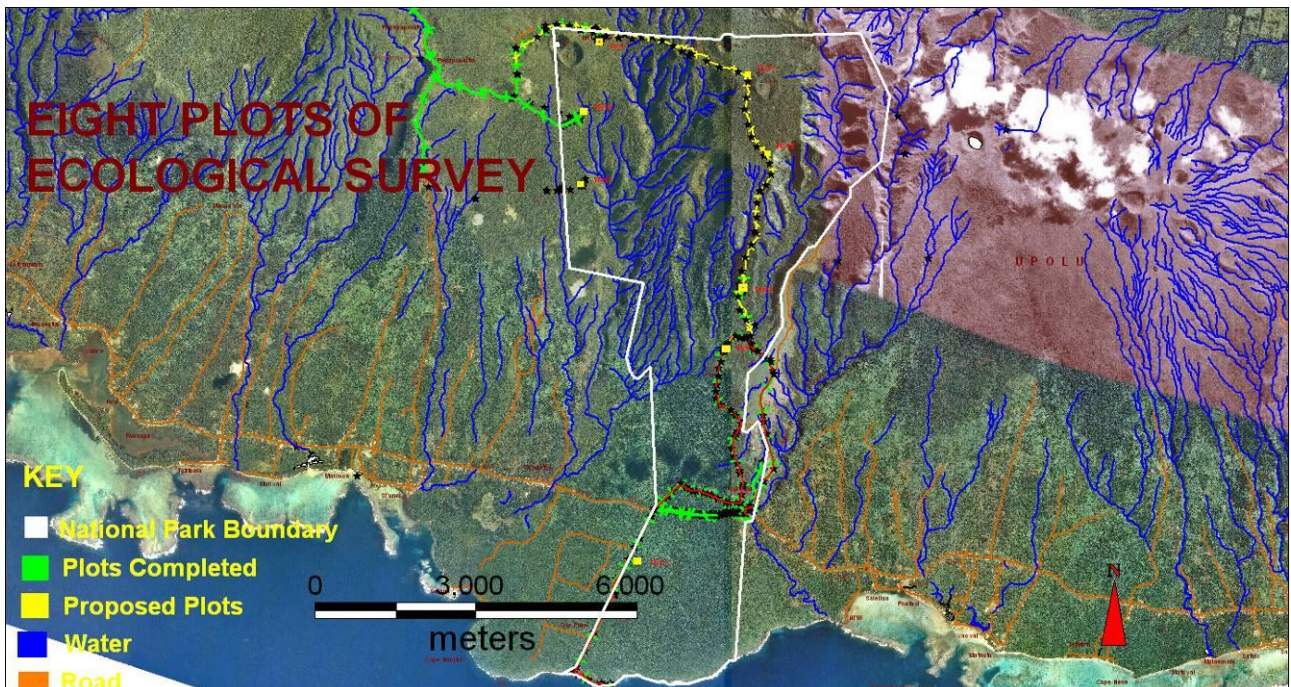


Figure 2: Full extent of Park showing coastal road and trail



ANNEX 1: Detailed Results

Notes: Separate tables are presented for different habitats or locations. Position coordinates are abbreviated – see Annex for full figures. Birds are generally listed by Samoan names except when these are used for multiple species, e.g. gogosina when White Tern is used – see species accounts in main report for other names. Segasegamauu is abbreviated to ‘segasega’.

10-12 November Main Trail

Date - Time	10/11/09 7.30-11am	Weather	Fine then rain
Start position	93457 75658	Start altitude	not recorded
End position	93534 74226	End altitude	954m
Location	Main trail from start to change of habitat		
Habitat	Secondary forest – open areas - weeds – tree ferns – Albizia		
Photos	1020365		
Birds:			
Miti	very common	Peapea	common
Segasega	very common	Fuia	common
Iao	very common	Seu	common
Tolaiula	very common	Manu palagi	common
Maina	uncommon		
Vasavasa	uncommon		

Date - Time	10/11/09 9.30-9.40am	Weather	overcast
Position	93530 75371	Altitude	994m
Location	Vantage point on EPC trail overlooking crater of Mt Pue		
Habitat	Crater wetland – lake – surrounding forest - tree ferns		
Photos	1020366-369		
Birds:			
Miti	very common	Peapea	common
Iao	very common	Fuia	common
Tolaiula	uncommon	White tern	1 flying
Toloa	1 on lake		

Date - Time	10/11/09 11am-1.40pm	Weather	Light rain, heavy rain then drizzle
Start position	93534 74226	Start altitude	954m
End position	93868 73096	End altitude	1175m
Location	Main trail – climb up to high point of ridge before Mt Fito		
Habitat	‘better’ forest as climb along ridge – still secondary but more natives and few weeds		
Photos	none		
Birds:	Observations seriously affected by rain		
Vasavasa	very common	Fuia	common
Segasega	very common	Iao	common
Seu	common	Miti	uncommon

Date - Time	10/11/09 12.25-12.35am	Weather	overcast, sunny intervals
Position	93751 73339	Altitude	1131m
Location	Wetland in small crater just to right of track (Mt Fito swamp)		
Habitat	Crater wetland – open water – reedbeds – surrounding forest -		
Photos	None		
Birds:			
Peapea	very common	Seu	common
Iao	common	Segasega	common
Miti tai	1 feeding fledgling	Tiotala	1 heard
Toloa	1 on water	Manutagi	1 heard
Note: Two Mao were seen and heard at this wetland in July but were not detected during this visit.			

Date - Time	10/11/09 1.40-3.40pm	Weather	Overcast, some drizzle
Start position	93868 73096	Start altitude	1174m
End position	94146 72297	End altitude	1053m
Location	Main trail on from high point of ridge, past Plot 7 (10 minutes there) to camp.		
Habitat	Secondary forest – natives – few tall trees emergent – Plot 7 typical of vegetation in this area.		
Photos	None		
Birds:			
Iao	very common	Seu	uncommon
Segasega	very common	Lupe	2 heard
Vasavasa	very common	Manutagi	1 heard
Tolaiula	uncommon – 1 feeding fledgling		
Note: Generally quiet			

Date - Time	10/11/09 2.55-3.15 pm	Weather	overcast
Position	c.94089 72411	Altitude	1129m
Location	Vantage point overlooking crater of Mt Fito (and 10 minutes looking over good forest to its east (photo 1020375)		
Habitat	Crater rim and base: tree ferns and range of small trees – forest to east – even-aged forest, no emergents, no climbing weeds		
Photos	1020372-381		
Birds:			
Segasega	very common	Peapea	common
Iao	very common	Manutagi	2 heard
Tolaiula	1 heard	White tern	2 flying
Segavao	2 flying over		

Date - Time	10/11/09 5-6pm	Weather	Overcast, drizzle, light rain
Position	94146 72298	Altitude	1053m
Location	Short walk from first night camp.		
Habitat	Native forest		
Photos	None		
Birds:			
Iao	very common	Seu	1 with begging fledgling
Lupe	3 flew off from trees above track		

Date - Time	11/11/09 7.40-8.35am	Weather	Overcast, some drizzle
Start position	94146 72298	Start altitude	1053m
End position	94616 71923	End altitude	1014m
Location	Main trail on from camp until new track cut to '1008' crater.		
Habitat	Good native forest with some large mamala, oa, maota		
Photos	None		
Birds:			
Iao	very common	Seu	common
Segasega	very common	Tolaiula	common
Vasavasa	common		

Date - Time	11/11/09 10.17-11.01pm	Weather	overcast
Position	94565 71759	Altitude	1025m
Location	Crater floor of '1008m'		
Habitat	Crater wetland – no apparent open water – large wet swamp forest of lau paago (pandanus) – good forest on crater sides including atone, ulu, vivau, pua lulu, mamala (common), gasu, lautivao, olioli, uunu, asi vai.		
Photos	1020383-389		
Birds:			
Peapea	1 seen	Tolaiula	2 heard
Iao	1 heard	Miti	2 seen
Fuia	uncommon	Vasavasa	1 heard
Lupe	1 heard	Manutagi	1 heard
White tern	6 flying	Segavao	2 flew over
Note: Maps seem to underestimate altitude of crater floor, marked on maps as 1008m but recorded by GPS at around 1025m.			

Date - Time	11/11/09 11.01-12pm	Weather	overcast
Start position	94565 71759	Start altitude	1025m to 1072m
End position	94482 72081	End altitude	1017m
Location	Climbing up side to try to get full view of Crater '1008m' then to lunch at campsite near main trail		
Habitat	Diverse, tallish native forest		
Photos	none		
Birds:			
Vasavasa	very common	Seu	common
Tolaiula	common	Miti	uncommon
Iao	uncommon	Manuma	1 heard
White tern	1 flying		
Note: The only manuma heard on the survey.			

Date - Time	11/11/09 12.36-2.16pm	Weather	Overcast then rain
Start position	94482 72081	Start altitude	1018
End position	95139 72049	End altitude	946m
Location	Main trail from lunch camp through to beyond plot 8		
Habitat	Native forest with increasing large emergents particularly tava		
Photos	1020390-91 plus 1020392-93 of mistletoe		
Birds:			
Vasavasa	very common	Seu	common
Segasega	common	Fuia	common
Iao	common	Peapea	common
Tolaiula	common	Noddy	commonly calling above forest
Tiotala	1 heard	Manutagi	5 heard
Lupe	4 heard		

Date - Time	11/11/09 2.16-3.30pm	Weather	Overcast then drizzle, low cloud
Start position	95139 72049	Start altitude	946m
End position	96153 71910	End altitude	698m
Location	Main trail from previous site through to overnight camp		
Habitat	Native forest with increasing amounts of open areas, weeds particularly climbers but continuing large emergents including tava and pua lulu		
Photos	1020394-5		
Birds:			
Segasega	very common	Fuia	very common
Iao	very common	Peapea	very common
Vasavasa	uncommon	Miti	uncommon
Tiotala	1 heard	Manutagi	2 heard
Miti tai	1 heard		

Date - Time	12/11/09 6.30-8.30	Weather	Fine – sunny and cloud
Start position	96153 71910	Start altitude	698m
End position	97185 72116	End altitude	500m
Location	Overnight camp through to sound of waterfall in big gorge to right (waypoint 63). Track close to side of gorge at times.		
Habitat	Good quality native forest, thicker at times with continuing large emergents particularly tava. Very occasional tamaligi.		
Photos	1020396-8		
Birds:			
Iao	very common	Fuia	very common
Vasavasa	very common	Peapea	common
Segasega	common	Seu	common
Tolaiula	common	Lupe	9 seen/heard
Miti tai	uncommon	Manutagi	6 heard
Tiotala	2 heard		

Date - Time	12/11/09 8.40-9.10am	Weather	sunny/cloudy
Position	97514 72200	Altitude	419m
Location	Sitting looking over river gorge to west for 30 mins.		
Habitat	Large gorge with diverse forest – Niu vao and tree ferns prominent but many large emergents		
Photos	1020399-400		
Birds:			
Segasega	present	Peapea	present
Iao	present	Fuia	present
Lupe	2 seen	White tern	1 flying lower down
Note: 2 Pea seen (assumed Samoan flying fox) – first seen in survey.			

Date - Time	12/11/09 9.10-10.17am	Weather	Fine – sunny and cloud
Start position	97514 72200	Start altitude	419m
End position	98518 71994	End altitude	276m
Location	From just above Plot 5 to river above Peapea Cave		
Habitat	Forest deteriorating with lower canopy, fau common at times, more open areas with <i>Meremia</i> , tree ferns and patches of grass. Two large strangler figs.		
Photos	1020401-03		
Birds:			
Iao	very common	Fuia	common
Vasavasa	common	Peapea	common
Segasega	common	Tiotala	1 heard
Miti	common	Fuia vao	2 seen
Tolaiula	common	Lupe	4 heard

Date - Time	12/11/09 10.17-11.17am and 12.42-1.00pm	Weather	sunny hot
Start position	98518 71994	Start altitude	276m
End position	98840 72565	End altitude	245m
Location	Peapea River and Plot 4		
Habitat	Plot 4 in native forest under tava		
Photos	1020404-07 Team and looking into cave hole		
Birds:			
Vasavasa	common	Peapea	very common
Iao	common	Fuia	common
Miti	common	Seu	common
Segasega	common	Manutagi	1 heard
Segavao	2 flew over		

Date - Time	12/11/09 1.00-1.20pm	Weather	sunny hot
Start position	98518 71994	Start altitude	276m
End position	98840 72565	End altitude	245m
Location	From Peapea Cave to house on cattle farm		
Habitat	Open areas, many weeds, some emergents, grass		
Photos			
Birds:			
Vasavasa	common & fledged chick	Peapea	common
Iao	common & fledged chick	Fuia	very common
Segavao	1 flew over		

13 November Coastal Forest

Date - Time	13/11/09 6.50-7.50am	Weather	fine, mostly sunny, hot
Start position	(Car park)	Altitude	13-33m
End position	(Car park)		
Location	Coastal trail, out along coast and back on inland 'short-cut.		
Habitat	Low forest, parts dominated by pandanus or fau, rocky cliffs and offshore stacks		
Photos	1020423-4		
Birds:			
Miti	very common	Segasega	very common
Tolaifatu	2 seen	Tolaiula	very common
Fuia	common	Manu palagi	common
Maina	common	Manutagi	1 heard
Vasavasa	uncommon	Lupe	1 heard
Black-naped tern	3 flying offshore		

Date - Time	13/11/09 7.54-8.09	Weather	fine, mostly sunny, hot
Start position	(Car park)	Altitude	c35m
End position	500m along road		
Location	Road to coast, 500m walked from far end.		
Habitat	Open areas then coastal forest		
Photos			
Birds:	Results are nos. seen or heard over the 500m walk		
Miti	1	Segasega	3
Tolaifatu	1	Fuia	1
Segavao	1	Tiotala	1
Maina	2	Manutagi	1
Vasavasa	1	Lupe	5

Date - Time	13/11/09 8.12-8.25	Weather	fine, mostly sunny, hot
Start position	1000m along road from far end	Altitude	c40m
End position	1500m along road		
Location	Road to coast, 500m walked from 1000-1500m from far end		
Habitat	Open areas then coastal forest		
Photos			
Birds:	Results are nos. seen or heard over the 500m walk		
Miti	4	Segasega	10+
Iao	1	Fuia	5
Seu	2	Tiotala	1
Maina	1	Tolaiula	2
Vasavasa	4	Lupe	9
White tern	1		

Date - Time	13/11/09 8.27-8.40	Weather	fine, mostly sunny, hot
Start position	2000m along road from far end	Altitude	c40m
End position	2500m along road		
Location	Road to coast, 500m walked from 2000-2500m from far end		
Habitat	Open areas then coastal forest		
Photos			
Birds:	Results are nos. seen or heard over the 500m walk		
Iao	2	Segasega	3
Segavao	3	Fuia	1
Lupe	6		

Date - Time	13/11/09 8.40-8.55	Weather	fine, mostly sunny, hot
Start position	Road	Altitude	43m
End position	14.02421 74070		
Location	Walk from coast road to and including Plot 3.		
Habitat	As described for plot 3.		
Photos			
Birds:			
Segasega	very common	Vasavasa	common
Miti	common	Iao	common + fledglings
Fuia	common	Segavao	2 seen
Tolaifatu	3 seen/heard	White tern	1 flying
Fuiavao	1 seen	Lupe	1 heard
Note: One pea seen – assumed Samoan flying fox			

Date - Time	13/11/09 9.20-9.30	Weather	fine, mostly sunny, hot
Start position	3000m along road from far end	Altitude	c45m
End position	3350m along road		
Location	Road to coast, 350m walked to main road		
Habitat	Open areas then coastal forest		
Photos			
Birds:	Results are nos. seen or heard over the 350m walk		
Miti	1	Segasega	1
Seu	5	Fuia	1
Fuiavao	1	Ve a	1 + 3 small chicks

13 November – Lowland Forest on Ma Tree Trail

Ma tree (*Heritiera ornithocephala*) located at S14.01126 W171.73288

Date - Time	13/11/09 10.00-10.30	Weather	fine, mostly sunny, hot
Start position	Main road	Altitude	63-81m
End position	Main road		
Location	Ma tree trail		
Habitat	Native forest with some open areas, tava and mosooi (fruiting) prominent		
Photos	1020425-6		
Birds:			
Miti	Common	Segasega	very common
Iao	Common	Fuia	common
Vasavasa	Common	Peapea	common
Tiotala	1 heard	Segavao	2 seen
Lupe	4 heard	Manutagi	3 heard/seen

16 November – Western side – Plots 6 and 2.

Date - Time	16/11/09 6.40-8.20am, 8.45-10.40am	Weather	Overcast & sun, breezy
Start position	94598 76197	Start altitude	809m
End position	94983 75110	End altitude	771m
Location	Track cut from road in towards Plot 6 and return		
Habitat	Secondary forest – open areas - weeds – tree ferns – Albizia – occasional stream gullies with more native trees		
Photos	1020458-9		
Birds:			
Miti	very common	Peapea	uncommon
Segasega	very common	Fuia	common
Iao	very common	Seu	common
Tolaiula	common	Manu palagi	uncommon
Vasavasa	uncommon	Lupe	1 heard
Tolaifatu	2 seen	Miti tai	common
Ve'a	1 seen		

Date - Time	16/11/09 8.20-8.45am	Weather	Overcast & sun, breezy
Start position	94983 75110	Start altitude	771m
End position	94866 74974	End altitude	792m
Location	Track close to and including Plot 6		
Habitat	Secondary forest but more larger native trees above weeds, tree ferns. As Plot 6 data		
Photos	none		
Birds:			
Miti	common	Peapea	common
Segasega	very common	Fuia	common
Iao	very common	Tolaiula	common
White tern	1 seen	Lupe	1 heard

Date - Time	16/11/09 11.10am – 1pm	Weather	Sun, hot
Start position	96167 75610	Start altitude	555m
End position		End altitude	
Location	Track to Plot 2 (and return)		
Habitat	As Plot 2. Secondary native forest with low canopy and few emergents. Large fig near plot.		
Photos	102060-1 Starting point of track, 1020462 (fig)		
Birds:			
Iao	very common	Peapea	common
Segasega	common	Fuia	common
Vasavasa	common	Segavao	4 seen/heard
Manutagi	1 heard	Lupe	2 heard
Miti tai	1 heard	Tiotala	1 heard
Note: One Pea seen over road by car on return			

17 November River Valley above Peapea Cave

Date - Time	17/11/09 7.24-11.50am	Weather	Sun and cloud, little wind
Start position	Where trail from farm joins river	Start altitude	c275m
End position	96117 70899	End altitude	439m
Location	Walk up the river above Peapea cave – dry at intervals when water underground		
Habitat	Open river flats with climbers but good native forest on valley floor and true right side of gorge. True left side very steep with tree ferns and niu vao.		
Photos	20463-20484		
Birds:			
Miti	uncommon	Peapea	common
Segasega	common	Fuia	common
Iao	very common	Seu	uncommon
Tolaiula	uncommon	Vasavasa	common
White tern	1 seen	Tiotala	common
Lupe	5 seen	Miti tai	3 seen/heard
Manutagi	13 seen	Segavao	4 seen
Tavae	1 heard/seen		

ANNEX 2: List of Photos

These photos taken by Butler were passed to Forestry Division staff via a memory stick.

Folder: 'O Le Pupu Pue Nov09'

10 20365 – Near start of main trail S13 93457 W 171 75658 Looking over secondary forest (tree ferns, Albizia)

20366-20369 – Overlooking crater of Mt Pue from trail cut for EPC S13 93530 W 171 75371

20372-20374 – Looking into crater of Mt Fito.

20375 – Looking to right of crater of Mt Fito from same position – good forest observed for 10 mins.

20376-20381 – In front of Mt Fito.

20382 – First camp site

20383-20389 – In floor of crater marked 1008m on maps S13 94565 W 171 71759 – pandanus forest and one looking at forest on crater side.

20390-20391 – On trail in vicinity of Plot 8.

20392-20393 – Mistletoe in flower between waypoints 54 and 55 – fed on by segasegamauu.

20394 – Open area with weeds and emergent tufaso between waypoints 56 and 57.

20395 – Typical of some areas with more native understorey around waypoint 58.

20396-20397 – Looking into the sides of the river gorge to right of track around waypoint 61.

20398 – Looking south from same area over coastal forest.
20399 – Looking into river gorge again near waypoint 64.
20400 – Looking south from near waypoint 64 showing ridge of native forest on lower part of river gorge and Tamaligi behind.
20401-20402 – Weedier area with some emergents by waypoint 66.
20403 – Josua descending fixed rope at waypoint 67.
20404-20405 – Team at river above Peapea cave.
20406-20407 – Looking into cave roof entrance at Plot 4
20408-20419 – Peapea Cave
20420-20421 – Looking north from cattle farm to the range traversed by trail.
20422 – Island of Nu’usafe’e from cattle farm

Folder: ‘O Le Pupu Pue 13Nov09’

20423-20424 – Coastal trail
20425-20426 – Ma tree
20427-20438 – Togitogina waterfalls
20439 – Waterfall - Cross Island Road
20440 – View from Malololei subdivision

Folder: ‘O Le Pupu Pue 09 last’

20458 – taken from waypoint 93 on way to plot 6
20459 – weeds etc at waypoint 100
20460-20461 – starting point on road for walk to plot 2
20462 – looking up fig near plot 2
20463-20464 – weedy area at waypoint 116 heading upriver from Peapea Cave
20465 – looking left from river around waypoint 118
20466-20468 – looking right from river around waypoint 120
20469 – looking ahead towards good forest around waypoint 123
20470-20484 – shots within riverbed

ANNEX 3: List of Waypoints

Positions were recorded using Map Datum WGS 84 and Position Format hddd.ddddd

Main Trail

Waypoint	Day/Time	Position	Altitude
Not stored	10-NOV-09 7.30.00AM	S13.93457 W171.75658	Not taken
Not stored	10-NOV-09 9:31:22AM	S13.93408 W171.75545	Not taken
Not stored	10-NOV-09 9:31:22AM	S13.93369 W171.75388	Not taken
Not stored	10-NOV-09 9:31:22AM	S13.93425 W171.74768	Not taken
018	10-NOV-09 9:31:22AM	S13.93531 W171.75370	994 m
019	10-NOV-09 11:02:59AM	S13.93535 W171.74226	954 m

020	10-NOV-09 11:26:28AM	S13.93571 W171.73775	1051 m
021	10-NOV-09 11:38:01AM	S13.93591 W171.73672	1069 m
022	10-NOV-09 12:05:14PM	S13.93706 W171.73455	1127 m
023	10-NOV-09 12:16:19PM	S13.93739 W171.73372	1134 m
024	10-NOV-09 12:26:23PM	S13.93751 W171.73339	1131 m
025	10-NOV-09 1:28:59PM	S13.93790 W171.73082	1150 m
026	10-NOV-09 1:41:49PM	S13.93868 W171.73096	1174 m
027	10-NOV-09 2:34:48PM	S13.94093 W171.72407	1064 m
028	10-NOV-09 2:48:43PM	S13.93945 W171.72423	1079 m
029	10-NOV-09 2:51:10PM	S13.93913 W171.72433	1097 m
030	10-NOV-09 2:55:51PM	S13.93845 W171.72445	1129 m
031	10-NOV-09 3:40:37PM	S13.94146 W171.72297	1053 m
032	11-NOV-09 8:07:43AM	S13.94488 W171.72094	1008 m
033	11-NOV-09 8:17:21AM	S13.94500 W171.72063	1006 m
034	11-NOV-09 8:32:23AM	S13.94594 W171.71954	1013 m
035	11-NOV-09 8:36:38AM	S13.94616 W171.71923	1014 m
036	11-NOV-09 8:40:48AM	S13.94627 W171.71895	1018 m
037	11-NOV-09 8:43:19AM	S13.94640 W171.71862	1022 m
038	11-NOV-09 8:48:16AM	S13.94654 W171.71818	1025 m
039	11-NOV-09 8:57:47AM	S13.94701 W171.71703	1016 m
040	11-NOV-09 9:06:52AM	S13.94746 W171.71606	1012 m
041	11-NOV-09 9:09:45AM	S13.94703 W171.71582	1018 m
042	11-NOV-09 9:18:52AM	S13.94594 W171.71540	1029 m
043	11-NOV-09 9:42:40AM	S13.94733 W171.71633	1010 m
044	11-NOV-09 10:03:15AM	S13.94672 W171.71756	1020 m
045	11-NOV-09 10:08:09AM	S13.94632 W171.71743	1046 m
046	11-NOV-09 10:18:46AM	S13.94565 W171.71759	1025 m
047	11-NOV-09 10:37:47AM	S13.94497 W171.71814	1030 m
048	11-NOV-09 11:26:34AM	S13.94541 W171.71884	1072 m
049	11-NOV-09 11:33:50AM	S13.94546 W171.71880	1072 m
050	11-NOV-09 12:23:48PM	S13.94482 W171.72081	1018 m
051	11-NOV-09 12:55:22PM	S13.94609 W171.72155	1005 m
052	11-NOV-09 1:25:21PM	S13.94885 W171.72125	974 m
053	11-NOV-09 1:40:48PM	S13.95010 W171.72087	962 m
054	11-NOV-09 2:01:54PM	S13.95139 W171.72049	946 m
055	11-NOV-09 2:32:14PM	S13.95462 W171.71859	892 m
056	11-NOV-09 2:42:40PM	S13.95571 W171.71810	877 m
057	11-NOV-09 3:06:42PM	S13.95806 W171.71698	793 m
058	11-NOV-09 3:19:26PM	S13.95944 W171.71733	749 m
059	11-NOV-09 3:47:01PM	S13.96153 W171.71910	698 m
060	11-NOV-09 4:51:07PM	S13.96157 W171.71909	690 m
061	12-NOV-09 7:02:58AM	S13.96605 W171.71997	607 m
062	12-NOV-09 7:27:09AM	S13.96741 W171.71973	585 m
063	12-NOV-09 8:09:08AM	S13.97185 W171.72116	500 m
064	12-NOV-09 8:43:10AM	S13.97514 W171.72200	419 m
065	12-NOV-09 9:21:01AM	S13.97834 W171.72252	387 m
066	12-NOV-09 9:43:34AM	S13.98002 W171.72301	359 m
067	12-NOV-09 10:04:37AM	S13.98416 W171.72118	290 m
068	12-NOV-09 10:17:12AM	S13.98518 W171.71994	276 m

069	12-NOV-09 11:16:34AM	S13.98840 W171.72565	245 m
070	12-NOV-09 1:11:36PM	S13.98647 W171.72173	287 m
071	12-NOV-09 1:41:10PM	S13.98894 W171.71913	277 m
072	12-NOV-09 1:43:56PM	S13.98953 W171.71874	269 m
073	12-NOV-09 1:44:49PM	S13.98969 W171.71847	270 m
074	12-NOV-09 1:52:54PM	S13.99040 W171.71744	273 m

Coastal Trail

075	13-NOV-09 7:32:12AM	S14.04410 W171.74754	33 m
076	13-NOV-09 7:34:18AM	S14.04396 W171.74721	35 m
077	13-NOV-09 7:37:34AM	S14.04391 W171.74785	13 m
078	13-NOV-09 7:45:23AM	S14.04356 W171.74851	16 m
079	13-NOV-09 7:50:28AM	S14.04299 W171.75020	20 m

Plot 3

080	13-NOV-09 8:46:29AM	S14.02421 W171.74070	43 m
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Ma Tree Trail

081	13-NOV-09 10:04:54AM	S14.01457 W171.73652	63 m
082	13-NOV-09 10:12:23AM	S14.01306 W171.73506	71 m
083	13-NOV-09 10:18:08AM	S14.01187 W171.73359	78 m
084	13-NOV-09 10:21:02AM	S14.01126 W171.73288	81 m
085	13-NOV-09 10:21:50AM	S14.01109 W171.73275	81 m

Trail to Plot 6

086	16-NOV-09 6:45:07AM	S13.94598 W171.76197	809 m
087	16-NOV-09 6:52:54AM	S13.94724 W171.75986	811 m
088	16-NOV-09 6:56:11AM	S13.94720 W171.75935	810 m
089	16-NOV-09 7:01:25AM	S13.94709 W171.75818	822 m
090	16-NOV-09 7:05:21AM	S13.94700 W171.75740	825 m
091	16-NOV-09 7:10:30AM	S13.94633 W171.75667	844 m
092	16-NOV-09 7:14:44AM	S13.94614 W171.75567	847 m
093	16-NOV-09 7:20:18AM	S13.94686 W171.75521	839 m
094	16-NOV-09 7:33:55AM	S13.94809 W171.75545	812 m
095	16-NOV-09 7:41:05AM	S13.94870 W171.75535	805 m
096	16-NOV-09 7:49:29AM	S13.94920 W171.75443	798 m
097	16-NOV-09 7:59:25AM	S13.94928 W171.75398	797 m
098	16-NOV-09 8:04:14AM	S13.94925 W171.75366	798 m
099	16-NOV-09 8:19:43AM	S13.94956 W171.75189	780 m
100	16-NOV-09 8:26:10AM	S13.94983 W171.75110	771 m
101	16-NOV-09 8:31:10AM	S13.94948 W171.75043	778 m
102	16-NOV-09 8:39:47AM	S13.94866 W171.74973	792 m
103	16-NOV-09 9:49:30AM	S13.94762 W171.75553	814 m
104	16-NOV-09 10:07:35AM	S13.94694 W171.75731	825 m

Route to Plot 2

105	16-NOV-09 11:10:12AM	S13.96167 W171.75610	555 m
106	16-NOV-09 11:20:05AM	S13.96194 W171.75423	547 m
107	16-NOV-09 11:31:24AM	S13.96130 W171.75376	552 m
108	16-NOV-09 11:38:01AM	S13.96088 W171.75303	564 m
109	16-NOV-09 11:56:13AM	S13.96099 W171.75113	562 m
110	16-NOV-09 12:06:30PM	S13.96062 W171.75038	564 m
111	16-NOV-09 12:07:44PM	S13.96058 W171.75012	563 m
112	16-NOV-09 12:45:18PM	S13.96118 W171.75354	553 m

Walk up river from Peapea Cave

116	17-NOV-09 7:51:16AM	S13.98169 W171.71799	291 m
117	17-NOV-09 8:11:07AM	S13.97745 W171.71754	309 m
118	17-NOV-09 8:14:42AM	S13.97704 W171.71743	311 m
119	17-NOV-09 8:31:06AM	S13.97538 W171.71740	316 m
120	17-NOV-09 9:22:13AM	S13.97124 W171.71306	338 m
121	17-NOV-09 9:48:08AM	S13.96888 W171.71141	347 m
122	17-NOV-09 10:55:57AM	S13.96444 W171.71193	399 m
123	17-NOV-09 11:19:12AM	S13.96256 W171.71010	413 m
124	17-NOV-09 11:50:18AM	S13.96117 W171.70899	439 m