



**CRITICAL ECOSYSTEM**  
PARTNERSHIP FUND



## BIRD AND INVASIVE SPECIES WORK AT SANTA CRUZ ISLANDS, SOLOMON'S, IN OCTOBER 2017



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Frontespiece – The heavily eroded motu of Nalongo at Niupani



Fig 1 – Locations of Niupani and Tinakula

## List of acronyms and definitions

Biosecurity	Actions that prevent invasive species from arriving at Santa Cruz, Tinakula etc.
BirdLife	BirdLife Pacific based in Suva, Fiji
CEPF	Critical Ecosystem Partnership Fund
CITES	Convention on Trade in Endangered Species
Endemic	Being confined to a place e.g. Upalalir is endemic to Nendo
GPS	Global Positioning System using satellites for fixing positions etc.
IAS/Invasive	Invasive alien species e.g. rats, yellow crazy ant, little fire ant, Singapore daisy
IUCN red list	International Union for the Conservation of Nature's list of threatened species
LFA/EA	Little fire ant (or electric ant) <i>Wasmannia auropunctata</i> , very damaging IAS
m asl	Metres above sea level
Mako	Temotu flying-fox
Monitoring	Repeated surveys to measure change in a specie's abundance
Primary forest	Unmodified or old-growth forest
Rodents	Rats and mice, which are dangerous invasive species in the Pacific region
Roost	A site where birds or bats spend their non-active period, e.g. tree roost of bats
Secondary forest	Modified or cut-over forest that is regenerating
Status	Distribution and abundance of a species, often referring to IUCN red list
Upalalir	Santa Cruz Shrikebill
Vakavakatia	Santa Cruz ground-dove
Vertebrate	Animal with backbone, e.g. bird, mammal, amphibian, reptile, fish
Viable population	Any dead individuals in a population are replaced by young ones
YCA	The yellow crazy ant <i>Anaplolepis gracilipes</i> , an invasive species

## EXECUTIVE SUMMARY

Field work was abbreviated in 2017, being largely postponed to 2018 due to sea conditions and social and volcanic developments at Tinakula. Field work involving ranger and community training was undertaken at Niupani and on Nende. Several tactical meetings were held with Agriculture, Biosecurity, Environment and others. Key findings were that poaching of Santa Cruz Ground-doves continues from Tinakula, while opportunities for restoration are available on outer islands, along with potential ecotourism opportunities throughout. A key and urgent need for the Temotu Province is enhanced biosecurity and plans were developed for proceeding these including further training in 2018 and beyond.

## 1 BACKGROUND

Previous CEPF-funded work in the Santa Cruz Islands or Temotu Province confirmed the presence of several near-endemic bird and bat species, many of them threatened (Pierce 2014, 2016, Leary 2016). These studies have also revealed intense pressure from logging and invasive species, with *Wasmannia auropunctata* (LFA) being of particular concern, as it has invaded the last refuge of Vakavakatia (Santa Cruz Ground-dove; *Gallicolumba sanctaecrucis* EN) on rat-free Tinakula. Other threatened fauna on Tinakula include the Palm Lorikeet (*Charmosyna palmarum*) and one or

more threatened bats. Meanwhile the LFA continues to advance in Temotu and it is now reportedly present on many islands. A key need is to determine how Vakavakatia and other threatened fauna fare in the presence of *Wasmannia* and whether this IAS and YCA can be tolerated at managed translocation sites. Tinakula needs to be a focal study site where the health of Vakavakatia and other species' populations need to be monitored and understood in relation to invasive species.

## 2. OBJECTIVES OF 2017 WORK

The key objectives of the 2017-18 surveys and consultation are in support of maintaining viable populations of the Santa Cruz Ground-dove on Tinakula and assessing options for translocation elsewhere. The key outcomes needed to help achieve these population objectives are to:

### For Tinakula

- Better understand invasive ant impacts on Santa Cruz Ground-doves on Tinakula
- Better understand Tinakula biota values generally
- Work with the community to improve biosecurity of Tinakula
- Work with the community to prevent harvesting/poaching of ground-doves from Tinakula (local consumption and export)
- Develop options for protection and sustainable management of Tinakula

### General

- Help in development of stronger biosecurity for Tinakula and Temotu Province generally
- Help in the development of options for sustainable ecotourism for Temotu biota generally.

## 3. TIMETABLE

Surveys and consultations were undertaken at Nendo and Tinakula. Specific locations and key activities are outlined in Table 3.1 below.

Table 3.1 – Dates, locations and key activities for Temotu work

Date	Location	Key activities
3-28 October 2017		
3	Cairns-Honiara	Travel via Port Moresby
4	Honiara	Species Forum; 10 min presentation on Sta Cruz Ground-dove
5-10	Honiara	SICCP and meetings with MECCDM (ECD), Director Biosecurity SI, specialists, scoped ecotourism opportunities, scoped concept plans for biosecurity and <i>Wasmannia</i> control
11	Honiara-Lata	Fly to Lata, meet with OW staff, prepare supplies
12	Lata-Minivi-Niupani	Depart Lata, visit Minivi, Neo, arrive Niupani pm, survey
13	Niupani	Survey main motu and Nalongo
14	Niupani-Tinakula-Lata	Abort Tinakula landing
15	Nende	Survey caves, river-mouth
16	Nende	Prepare survey templates, Fisheries meetings
17	Nende-Honiara	Meetings with TPG, Agriculture; travel to Honiara
18	Honiara	Meetings with Director Biosecurity, John Fasi, ECD comms.
19	Honiara-Cairns	Travel Honiara-Cairns

## 4. CONSULTATION AND HONIARA SYMPOSIUM

### National Resource Management Symposium, Honiara

On 4-6 October I attended the National Resource Management Symposium 2017, the first of its kind in the Solomon Islands. On 4 October I presented a 10 minute power point on the Santa Cruz Ground-dove for the Species Forum section of the symposium. During the three days key discussions were held with individuals and groups as follows:

- Francis Tsatsia, Director SIO Biosecurity – we discussed means of getting support to his Department in the areas of IAS pathway analyses and Early Detection Rapid Response plans; and the potential for using Temotu as a pilot study for strengthening biosecurity in the provinces
- ECD staff on plans for the current stage of Vakavakatia work and links with other IAS work in the Pacific
- Ant research specialist John Fasi on the potential for managing LFAs and studying their impacts on biota generally at e.g. Tinakula
- Oceans Watch staff including Director Chris Bone.

### Consultations

Nelson Nyieda and Titus Godfrey had some consultations with the Minivi and Malo communities on planned Tinakula work, and with extended families of Niupani residents. Representatives from all communities were subsequently involved with the surveys and debriefs.

## 5. SITES SURVEYED AND METHODS USED

### 5.1 Sites Surveyed

Originally Tinakula and Niupani were the target islands, but landing on Tinakula was aborted due to bad weather. Other issues (refer Poaching) prompted a delay to revisiting Tinakula. Niupani was visited for two nights to assess conservation opportunities and threats. This is an atoll located c.67 km N of Nende and 37 km NNW of Tinakula (Fig 1). Additional surveys and Ranger training were undertaken at Nende.

### 5.2 Methods

Niupani surveys were undertaken to determine vertebrate species and invasive species present. Surveys of birds were undertaken by targeting the island perimeters and counting edge-focused species and searching and listening for others in the interior. Evening fly-on observations of seabirds were made at the main motu and at Nalongo. Surveys of waders were made during these perimeter counts and at Graciosa Bay, while bats were observed at two caves at Graciosa Bay.

Training sessions for OW staff were undertaken for invasive ants outside the OW office following methods of Pierce 2016. Bird identification via bird calls was repeated throughout the week. Rat measurements were demonstrated to staff and the community at Niupani.

## 6. NIUPANI

A summary of the Niupani physical and biological environments is provided below along with a discussion of opportunities for conservation.

### Surveyors

Ray Pierce, Nelson Nyieda (OW), Titus Godfrey (OW), Coulten (Minivi), Stephen Sopi (Neo) and local Niupani residents, 12-14 October 2017

### Location

Niupani Island located 60 km NW of Santa Cruz Island at 10.0458 S and 165.72119 W.

### Island geology

Niupani comprises an atoll about 5 km in length with a deep lagoon. It comprises two sandy motu, the main Niupani motu of 28.6 ha and the much smaller motu of Nalongo 3 km south of the main motu and spanning only 0.84 ha (Fig 6.1). Both motu are eroding very quickly. A wetland occurs in the middle of the main motu (Fig 6.2). This was formerly an inlet of the sea, but the 2011 “Japanese tsunami” caused the passage to close and the water of the wetland to become brackish.



Fig 6.1 – Niupani with the main motu at north and Nalongo in the SE

### Climate and rainfall

The island is located in the Temotu Province with high annual rainfall concentrated in the wet season from December to March when predominating winds are variable, but with a northerly tendency. At other times of the year SE trade winds predominate. Mean daily temperatures are estimated in the high twenties and low thirties.



Fig 6.2 – Main motu of Niupani revealing location of dwelling clusters (west side) and north of wetland (centre).

### Vegetation and flora

The main island has distinct vegetation zones with grassy beaches and *Ipomoea* on the leeward (West) side of the island, backed by stands of *Casuarina equisetifolia* and diverse littoral trees including *Guettarda speciosa*, *Hibiscus, sp.*, *Scaevola taccada*, and *Tournifortia argentea*. This gives way towards the interior of the island by moderately tall forest trees with very healthy

*Cocos* throughout (abundant fruiting, large fruits), and a dense understory of shrubs and ferns. The northern side of the island has a littoral fringe of tall forest trees including large specimens of *Pisonia* and *Callophyllum*, but these and other trees e.g. *Cocos* are coming under intense pressure from rising sea-level (see Threats). Gardens comprise a variety of healthy trees including breadfruit, mango, banana and cut nut and there are grassy clearings around the houses.

The small motu of Nalongo is like a small version of the main Niupani motu with a variety of tall forest trees including *Pisonia*, *Callophyllum*, and *Cocos*. The perimeter includes *Guettarda*, *Tournefortia*, *Scaevola*, *Pandanus* and *Noni*. The interior of the forest has a dense fern layer (*Polystichum* and *Asplenium*).

### Fauna

The vertebrate fauna comprised at least 14 resident bird species, all likely to be breeding seasonally on the island. These included two species of each of boobies, frigate birds, noddies and pigeons, plus Pacific Reef Heron, Buff-banded Rail, White Tern, Collared Kingfisher, Polynesian Starling and Cardinal Myzomela. The numbers of Brown Boobies present (100+) is locally significant and we also saw evidence of two cliff-breeding sites of this species (c. 20 birds including juveniles) on the western side of Tinakula on 14 October 2017. Reptiles present included three species of lizard and less commonly Green Turtle (see Table 6.1 for full list).



Fig 6.3 – Brown Boobies at Niupani (above), Wandering Tattler and Pacific Emerald Dove below.



### Habitation

About 10 families live on Niupani, comprising at least 25 people (Fig 6.4). Dwellings are concentrated in the western and central part of the island. Temporary shelters are also used by fishermen visiting Nalongo. Food is virtually all provided by the reef, lagoon, forest and gardens. Seabirds are harvested including boobies, frigatebirds and noddies. Gardens provide banana, coconut, breadfruit, taro, mango and others.



Fig 6.4 – Community members and some surveyors at Niupani

### Threats

Sea-level rise is a huge threat to the island and islanders. The northern and eastern shorelines are being severely eroded with large *Pisonia* trees having recently fallen into the sea along with coconuts, *Callophyllum* and other coastal trees (Fig 6.5). The land area of both motu has contracted significantly in recent decades (Father George pers. comm., see also Google Earth)



Fig 6.5 – Fallen *Pisonia* at main motu and erosion at Nalongo (below)



Invasive species are also a serious threat to ecosystem, species and people. Rats, YCAs and LFAS are all present.

### Opportunities

If climate change and sea-level rise can be slowed, there are opportunities for Niupani to improve the health of the island through invasive species removal and introduction of native species, e.g. SCGD.



Fig 6.6 – Rat processing and discussion after trapping throughout the village.

Table 6.1 - Summary of birds and mammals observed at Niupani October 2017. Common names follow Dutson (2011) and local names after Pierce (2016).

Common name (and Nende name)	Summary of observations 12-14 October 2016
Pacific Reef Heron (Koa)	Three, two dark morph, one white
Great Frigatebird	c.10 with Lesser Frigatebirds at main motu 13-14 <sup>th</sup>
Lesser Frigatebird	c.200 at main motu, not nesting 13-14 <sup>th</sup>
Red-footed Booby	200+ at main motu 13-14 <sup>th</sup>
Brown Booby	c.100 (50 during day); 10 of 44 birds were juveniles
Buff-banded Rail (Birlak)	Present on main motu
Pacific Golden Plover (Nirla)	13; 8 at main motu and 5 at Nalongo 13 <sup>th</sup>
Large Sand Plover	One at Nalongo 13 <sup>th</sup>
Bar-tailed Godwit	One at Nalongo 13 <sup>th</sup>
Whimbrel (Nirlatir Pu)	One at Nalongo 13 <sup>th</sup>
Bristle-thighed Curlew	5; 2 on main motu 12-13 <sup>th</sup> , 3 at Nalongo 13 <sup>th</sup>
Wandering Tattler (Nirla)	12; 8 on main motu and 4 on Nalongo
Ruddy Turnstone (Nirla)	135+; 120+ on main motu, 15 on Nalongo
Brown Noddy	Common (300+) on main motu, nesting; 5 on Nalongo
Black Noddy	Common (500+) on main motu, nesting; c.10 on Nalongo
White Tern	Rare; 5 seen on main motu, 2 on Nalongo
Great Crested Tern (Nani)	One at Nalongo
Pacific Emerald Dove (Leibu)	Moderately common on main motu, none Nanongo
Pacific Pigeon (Bona)	Uncommon on both motu
Collared Kingfisher (Penda)	Few on main motu; one on Nalongo
Cardinal Myzomela (Mangarau)	Common on main motu; one or two on Nalongo
Polynesian Starling (Misse)	Present around village on main motu
Pacific Flying-fox	Common on Nendo and Tinakula
Pacific Black Skink	Common on main motu
Snake-eyed Skink	Common
Oceanic Gecko	Common

## 7. SANTA CRUZ GROUND-DOVE

### 7.1 Poaching on Tinakula

On the day of our departure to Niupani and Tinakula, we heard rumors of a large number of birds having been removed from Tinakula to the mainland of Santa Cruz. This is described in the following brief to ECD on 18 October 2017.

#### **SANTA CRUZ GROUND-DOVES (ENDANGERED) CAPTURED FOR EXPORT MARKET: A briefing for ECD Honiara 18 October 2017**

##### *Background*

*On 11 October 2017 I visited Lata with the intention of spending about one week on Tinakula researching the Endangered Vakavakatia or Santa Cruz Ground-dove with Oceans Watch staff and community. On this day I heard rumours around Lata that Chris Meioko of Minivi was on Tinakula and collecting live ground-doves. He was the person whom one year ago (in October 2016), held 10 live SCGD on Tinakula, but was successfully persuaded by rangers and community representatives to release the birds back on the island.*

##### *2017 Events*

*On 12 October 2017 our party departed Lata for Niupani and Tinakula, but in the course of voyage overheard at Neo that Chris Meioko had brought birds from Tinakula to Minivi so we detoured and were allowed by Mr Meioko to inspect and photograph the caged birds (Fig 1). There were about 74 SCGD in 3 cages at Minivi, comprising a mix of males and females. We attempted to alert authorities via Oceans Watch on 12 and again on 14 October, but lack of reception and poor sea conditions precluded contact before late on 14<sup>th</sup>.*



*Fig 1 – About 50 Santa Cruz Ground-doves, some of c.74 held in 3 cages at Minivi.*

*On returning to Lata we were informed that some of the birds had departed on the Lata-Honiara flight that day, but that most were still at Minivi and might be expected to leave on the flight on Tuesday 17<sup>th</sup>. The buyers are reportedly the same people as buy beche de mer and include James Bonunga licensee. Overseas markets being mentioned by locals included Vietnam and Jordan, which is illegal under CITES regulations which Solomon Islands has signed. ECD were alerted to these developments via OW, but no birds arrived for freighting on the Lata-Honiara flight on 17th.*

### **Recommendations**

- 1. OW staff at Lata and Honiara update ECD with developments at Lata**
- 2. Have ECD officers available at Honiara airport for subsequent flight arrivals from Lata (Saturday 21<sup>st</sup> Tuesday 24<sup>th</sup> etc.) and intercept birds and exporters**
- 3. Before birds are released back on to Tinakula they will need firstly to be screened for pathogens by a veterinarian**
- 4. Convene chiefs and TPG meeting to agree on blocking this illegal poaching of Endangered Vakavakatia (both Fisheries and Agriculture Chief Field Officers at Lata indicate they would help facilitate this).**

*Dr Ray Pierce 18 October 2017*

Subsequently ECD indicated via staff emails that the Director was working on the above issue.

## 7.2 Update on plans for research and monitoring of ground-doves on Tinakula

The captive sample depicted in Section 7.1 above indicated that large numbers of ground-doves were frequenting the relatively small part of Tinakula in which the poacher indicated that he had been operating recently – this was evidently the same c.100 ha area as our study area of 2016 (Pierce 2016). Close examination of the birds indicated that subadults were moulting and were only distinguishable at close range. Hence, our transect monitoring is unlikely to provide reliable age classifications at this late stage in the year. It is proposed to delay the proposed ground-dove assessment to April-May 2018 for the following reasons:

- Allow the ground-dove population on Tinakula to recover from poaching
- Allow for more effective age determination of the birds (closer to the breeding season)
- Sea and landing conditions are usually calmer and safer at that time of year.

Research and monitoring objectives for SCGD in 2018 are essentially unchanged and comprise the following:

- Determine baseline population densities of SCGD from transects
- Determine baseline age structure of SCGD from transects and photo samples
- Determine distribution and relative abundance of LFA, YCA and other ants

The above three objectives will assist in determining whether SCGD can survive on Tinakula in the face of two of the world's most invasive ants – Yellow Crazy Ant and Little Fire Ant. If LFAs are present in only part of the island, the monitoring of population and age structure will reveal if

there are any trends in these parameters with LFA presence/absence. Alternatively, if the LFAs are now distributed throughout Tinakula, monitoring over time will reveal if there is an issue with recruitment and population health.

The above monitoring will have a strong bearing on whether SCGD can be reintroduced to rat-free islands in Temotu. For example, several small islands in the Reef Group and near to Tinakula could be cleared of rats to allow SCGD translocation, but we need to firstly know whether the LFA is a problem as these ants are spreading throughout all the Reef Islands.

In addition to the SCGD monitoring the following monitoring will be implemented in 2018 if possible to help understand the relative impacts of LFA and YCA on other vertebrate fauna of Tinakula. This monitoring will include:

- Determine baseline population indices of Palm Lorikeet (VU)
- Determine baseline population indices of all other forest birds on Tinakula
- Determine whether any seabirds utilize Tinakula
- Determine whether there are refugia for *Rattus exulans* and other invasives on Tinakula.

The above monitoring will be implemented via point and transect counts for Palm Lorikeet and other birds; index baiting for invasive ants; and rat trapping at distant sites and altitudes. These methods are described in more detail along with data templates in Appendix 2. Rangers and local community representatives will be trained in this monitoring. This work could be complimented by additional research on invasive ants on biota generally and discussions are underway with specialists to determine how this might best be achieved.

## 8. SUPPORTING BIOSECURITY AT TEMOTU AND SOLOMONS

### 8.1 Training

Currently Solomon Islands has a Biosecurity Act, but it is up to the nine provinces to develop their ordinances and plans. Discussions were held with the Solomon Islands Director of Biosecurity (Francis Tasatsia) and the Principal Field Officer for Agriculture at Lata (Selvin Meplu) on ways in which external specialists could help. We concurred that the most effective support would be in targeted biosecurity training and awareness raising and developing a pilot action plan for Temotu Province which could be used as a template and adapted for other provinces in SI. These are outlined in Table 8.1:

The choice of Temotu for a pilot action plan is favorable physically given the limited and identifiable inter-island traffic, plus a trend towards increased international trade directly with Vanuatu. Developing a practical and workable system for Temotu is desirable before tackling the more complex issues of the larger SI provinces, but it does need the full cooperation of the Temotu Provincial Government and other stakeholders.

Table 8.1 Recommended biosecurity training topics for implementing in Solomon Islands

Topic	Where	Who Trained	Potential trainers
Pathway analysis and risk assessments	Honiara	Biosecurity and Agriculture staff	Pacific Biosecurity, Biosecurity Queensland
Early Detection and Rapid Response	Honiara	Biosecurity and Agriculture staff	Pacific Biosecurity, Biosecurity Queensland
Develop a pilot Biosecurity Action Plan for Temotu Province as a model for SI <sup>1</sup>	Lata	Lata Agriculture, Fisheries, Rangers, Community reps	SI Biosecurity, PB, John Fasi
Awareness Raising stage 1 – identify the target groups and messages needed	Honiara/Lata	All above	SI Biosecurity, PB

Note 1: Other island provinces e.g. Rennell and Bellona could also be used as pilot studies.

## 8.2 Existing Nende IAS

### Wedelia and Lantana

The *Wedelia* infestations of Lata have increased since 2016 and a decision needs to be made urgently as to whether to target this species or allow it to smother gardens. No *Lantana* follow-up surveys were made.

### Common Myna

Small numbers of Common Myna (*Acridotheres tristis*) have invaded Lata. Left alone they will increase and become a serious pest to garden fruits (breadfruit, papaya, mango, etc) as has occurred in Samoa and elsewhere in the tropics. They could, however, be easily eradicated by using the many talented sling shooters of the community. At the same time the invasion pathway needs to be identified as per workshops as described in Section 8.1 above, and the pathway(s) blocked.

## 9. POTENTIAL ECOTOURISM AT TEMOTU

Temotu Province offers many opportunities for worthwhile tourism experiences. Majestic volcanic islands, virgin kauri forests, sheltered harbours, mangrove forests, coral reefs, endemic birds and mammals, and beautifully set villages, all combine for an impressive natural environment. These opportunities will be lost if logging and mining proposals proceed. Some ecotourism opportunities and constraints are described in Appendix 3.

## 10. CONCLUSIONS AND RECOMMENDATIONS

This survey confirmed the importance of Tinakula to Santa Cruz Ground-dove, albeit from information obtained largely from a “poaching” group”. A survey of nearby Niupani and discussions with captains and island residents confirmed that most Reef Islands are infested with 1-2 species of rat and 1-2 species of invasive ant. These islands still may offer restoration opportunities

however, given their small areas and if there are positive community attitudes towards conservation. The way forward for ground-doves and other biota in the Temotu province include a combination of research, monitoring, biosecurity training and, potentially, increased tourism.

Key recommendations are:

- There is a need to build on current training of rangers and representatives in IAS survey, recognition and monitoring, to enable them to confidently survey invasive ants and rats on islands in Temotu generally to help identify refuge islands (Refer Section 6).
- Bring Temotu community leaders, TPG and key Temotu field officers together to agree on concerted efforts to block the illegal export of Santa Cruz Ground-doves (refer Section 7.1).
- Train local rangers and community representatives in monitoring techniques for ground-doves and other indigenous biota. This monitoring is aimed at detecting whether the SCGD population continues to be healthy or whether management action is needed in response to invasive ants or other issues, e.g. translocation of SCGD to other refugia. Once baseline monitoring is implemented, it should be repeated annually until consistency in results is achieved, and frequency reviewed after that time (refer Section 7.2).
- Use Temotu as site for developing a pilot Biosecurity Strategy and Action Plan, which could also be used as a template for the other provinces. This should be preceded by training of SI Biosecurity and Agriculture staff in IAS pathway analyses, risk assessments, early detection and rapid response methods and other needs they may have, e.g. for community awareness tools (refer Section 8).
- Highlight the natural and biodiversity values of Temotu Province that could form the basis of a tourism strategy for the islands (refer Section 9).

## ACKNOWLEDGEMENTS

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### Field workers



Ranger Titus Godfrey at Niupani with Tinakula in background.



Nelson Nyieda, Oceans Watch Temotu staff member, at Niupani



Stephen Sopi from Neo



Coulten from Minivi



Lesley, our boat captain from Fisheries



Chief Dennis at Niupani

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## APPENDIX 1 - SUMMARY OF BIRDS AND MAMMALS OBSERVED OCTOBER 2017

Common name	Summary of observations September-October 2016
Red Junglefowl	Present Nendo
White-tailed Tropicbird	One seen at sea near Tinakula 14 October 2017
Striated Heron (Koabu)	Present at Graciosa Bay, Nendo
Pacific Reef Heron (Koa)	Present at Nendo, 3 on Niupani
Great Frigatebird	Present Niupani
Lesser Frigatebird	Common Niupani, occasionally over Nendo
Red-footed Booby	Common Niupani
Brown Booby	100+ Niupani; c.20 including juveniles at Tinakula western cliffs
Buff-banded Rail (Birlak)	Present Nendo and Niupani
Pacific Golden Plover (Nirla)	Up to 20 Lata Airport 14 <sup>th</sup> , present Niupani and Graciosa Bay
Large Sand Plover	One Niupani
Whimbrel (Nirlatir Pu)	One Niupani 13 <sup>th</sup>
Bristle-thighed Curlew	Present Niupani 12-14 <sup>th</sup>
Wandering Tattler (Nirla)	Present Niupani and Graciosa Bay
Grey-tailed Tattler	One present Graciosa Bay
Common Sandpiper (Nirla)	Two Graciosa Bay at Birela River-mouth
Ruddy Turnstone (Nirla)	Common Niupani, present Graciosa Bay
Brown Noddy	Common Niupani
Black Noddy	Common Niupani
White Tern	Present Niupani
Great Crested Tern (Nani)	Present Niupani and Nende
Bridled Tern	Few individuals at sea
McKinlay's Cuckoo-dove (Leo)	Very common on Nendo
Pacific Emerald dove (Leibu)	Common on Nendo and Niupani
Santa Cruz Ground dove (Vakavakatia)	c. 74 captive birds at Minivi
Red-bellied Fruit dove (Nuan)	Common on Nendo
Pacific Pigeon (Bona)	Very common on Nendo
Coconut Lorikeet (Vlu)	Common on Nendo
Moustached Tree-swift	One at Nendo 17 October 2017
Glossy Swiftlet (Mabola)	Very common on Nendo
White-rumped Swiftlet (Mabola)	Common on Nendo
Uniform Swiftlet (Mabola)	Very common on Nendo
Collared Kingfisher (Penda)	Common on Nendo and Niupani
Cardinal Myzomela (Mangarau)	Common on Nendo and Niupani
White-throated Whistler (Utopia)	Common on Nendo
Rufous Fantail (Upe)	Present on Nendo
Pacific Swallow (Nulabmura)	Common on Nendo
Sta Cruz White-eye (Dirilrve)	Common on Nendo
Rusty-winged Starling (Pwatirbao)	Present on Nendo
Polynesian Starling (Misse)	Present Niupani
Pacific Flying-fox	Common on Nendo and Tinakula
Microbats	Common on Nendo

## APPENDIX 2: A PROPOSED MONITORING PLAN FOR VAKAVAKATIA AND OTHER BIOTA AT TINAKULA

### Objectives

1. Determine population trend of Vakavakatia, i.e. whether they are holding their own or declining
2. Determine whether young Vakavakatia are being recruited into the population

### Explanation

Invasive ants, especially *Wasmannia*, have invaded Tinakula and threaten the health of the ecosystem and species. There is a need to monitor how Vakavakatia are faring as they are Endangered. If they are doing poorly then it may be necessary to begin management of invasive ants there and/or relocate some of the birds. The following are the monitoring protocols and templates that will be used in April 2018 training.

### Methods

On all visits to Tinakula record details of Vakavakatia observed. Two simple observation approaches are recommended for the rangers and community to use and a third (camera traps) could also be added to the repertoire in 2018. The two current methods are:

1. Transect (Vakavakatia only)
2. Point counts (all birds)

1. Transect counts	
Where do this? Use all 5 of the regularly walked paths as follows:	<ol style="list-style-type: none"> <li>a) T1: Village to Gully 2 (800 m)</li> <li>b) T2: Village to Gully 1 Gardens (1200 m)</li> <li>c) T3: Gully 2 lava flow ()</li> <li>d) T4: Landing to N ()</li> <li>e) T5+: Also, OK to add new areas e.g. a long way from village, but they need to be relatively accessible for subsequent monitoring</li> </ol>
How do this?	Count all Vakavakatia seen or heard, usually when they are flushed or seen walking/flying away from track. Be aware of the much greener Emerald Dove also sometimes on ground
When do this?	April-May each year, but also do these counts on all other visit
Time of day?	Morning best but any time OK for walking transects
Who counts?	Everyone can do this. Coordinator confirm methods with counters
Coordinator for data?	Best nominate a local community coordinator who keeps the records and arranges updates for Rangers who keep a back-up copy. The coordinator needs a computer with XL capability

2. Point counts	
Where do this? Use the following sites to be set up in April-May 2018	<ul style="list-style-type: none"> <li>a) Village garden</li> <li>b) Gully 1/Coastal Track</li> <li>c) Gully 1 Gardens (1200 m)</li> <li>d) Gully 2 lava flow (lower track)</li> <li>e) Gully 2 mid site</li> <li>f) Gully 2 top cliff</li> <li>g) X m South of Gully 2</li> <li>h) Gully north of Landing</li> </ul>
How?	<p>Count all the forest birds seen/heard over a 5 minute period Include all birds seen or heard (this is preferable to avoid confusion of distances) Count the minimum number – best keep track of individual birds with a mud map which can just be dots in the cell on data sheet (Fig x) and write on data sheet (Fig x) Try to do each site on another day so there are two counts per site per year to test for variability (may try for 3 each in 2018)</p>
When?	Undertake counts in April-May each year to enable comparison with 2018
Time of day?	Mornings between 0700 and 1100; avoid middle of day or afternoon
Who?	One or more of the trained observers from April 2018
Coordinator for data?	As for transect counts

Table – 5 minute bird counts Tinakula

Date									
Site									
Observer(s)									
GPS									
Time start									
Weather									
Spotless Crake									
McKinlay's Cuckoo-dove; Leo									
Pacific Emerald Dove; Leibu									
Santa Cruz Ground-dove; Vakavakatia									
Red-breasted Fruit-dove; Nuan									
Pacific Pigeon; Bonakane									
Coconut Lorikeet; Vlu									
Palm Lorikeet; Vlumba									
Collared Kingfisher; Penda									
White-throated Whistler; Utopia									
Polynesian Starling									
Cardinal Myzomela; Mangavu									
Other:									

Temotu Flying-fox Mako								
Pacific Flying-fox; Melepa; Lekele,								
Notes:								

3. Camera traps – potentially set up in future	
Where? Use the following sites set up in October 2016	a) Gully 1 Gardens b) Gully 2 mid site c) Gully 2 top cliff
How?	Lay out coconut lures in three open areas as per Fig x and set up camera trap for each less than 3 m away. Set camera to 30 s video and operate for duration of your visit to Tinakula. Download to computer and for each day count the minimum number of individuals visiting the site, and the minimum number seen per visit.
When?	All opportunities, but ideally aim for April-May each year. Also could leave cameras out for longer if nests found as this would provide new biological information on the species
Who?	One or more of the trained operators from April 2018
Coordinator for data?	As for transect counts

### Invasive ant surveys

Target areas at extreme parts of Tinakula (around island from camp and up mountain) starting at distant sites and working back at c. 300-500 m intervals until animals detected then fill in gaps to delineate invasion. Survey for LFA and YCA using a blob of peanut butter and jam (or sugar water on toilet paper) at opposite corners of a 10 cm x 10 cm square of water proof card. Place cards on ground in flat shaded sites. Operate for 30 minutes and count the ants. Enter data as per Table 3.

Table 3 – Ant monitoring data sheet

Island	Date			Observers	
	1	2	3	4	5
GPS S					
GPS E					
Altitude					
Time start					
Finish					
Shade Y/N					
PB LFA					
PB YCA					

PB other ant					
PB insect/lizard					
Jam LFA					
Jam YCA					
Jam other ant					
Jam insect/lizard					