SURVEYS AND CONSERVATION PLANNING FOR THE SANTA CRUZ GROUND-DOVE AND SANTA CRUZ SHRIKEBILL, SOLOMON ISLANDS, SEPTEMBER – OCTOBER 2016

EcoOceania Pty report prepared by Ray Pierce with field support from Titus Godfrey, Jerry Meioko, John-Chris Mwelo, Stephen Sopi and Donald van der Westhuizen, for CEPF, OceansWatch and the Solomon Islands community.

November 2016 *raypierce@bigpond.com*

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Frontespiece – A male Vakavakatia or Santa Cruz Ground-dove on rat-free Tinakula – all photops by R Pierce except where indicated otherwise.

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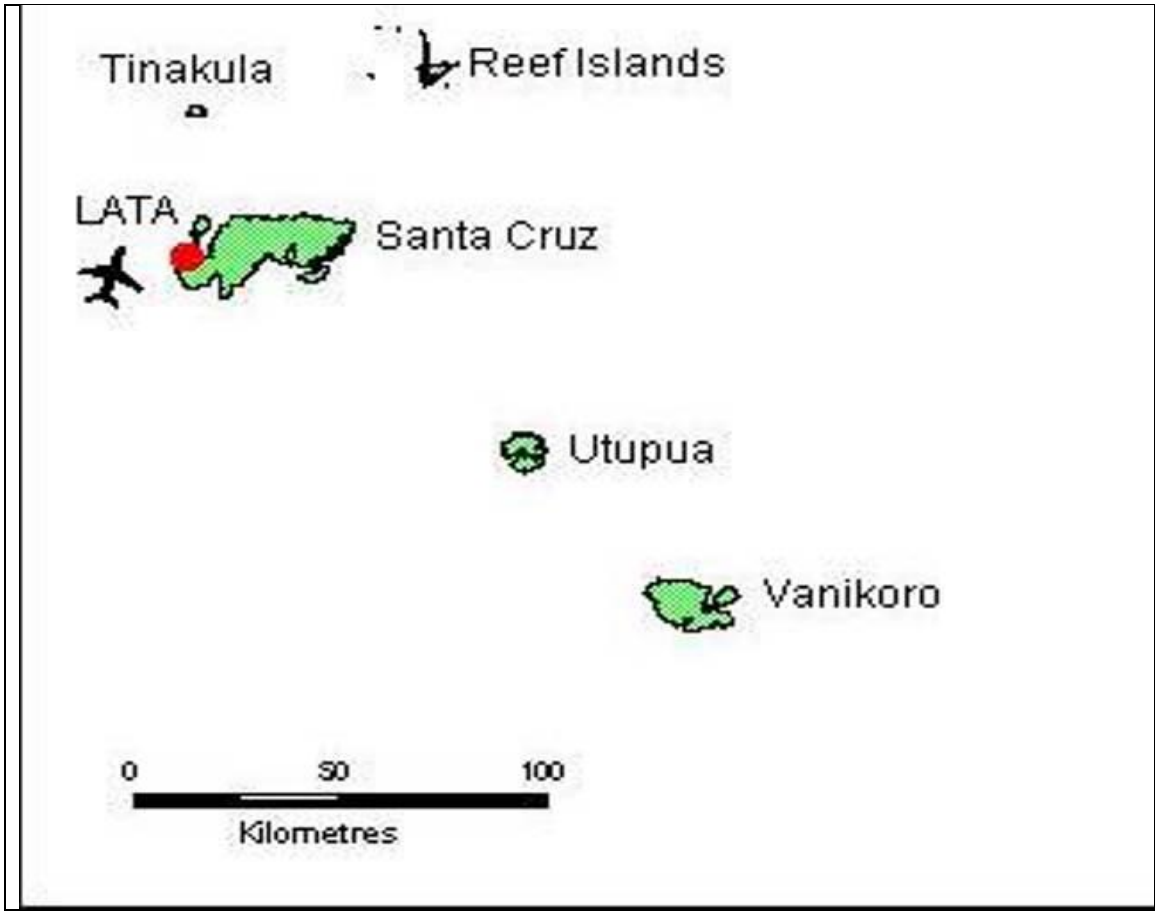


Fig 1.1 – Map of Santa Cruz Islands, Solomon Islands

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 (electric ant) *Wasmannia auropunctata* is an invasive species
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 *Anaplolepis gracilipes*, an invasive species

EXECUTIVE SUMMARY

This work was undertaken at Nendo and Tinakula of the Santa Cruz Islands (Temotu Province), Solomon Islands, in September-October 2016. It was a follow-up to surveys of IUCN red-listed vertebrate species previously undertaken on the islands of Vanikoro, Nendo and Tinakula in September-October 2014 during which we found apparently viable populations of two fruit-bat species (the Vanikoro Flying-fox (CR) and Temotu Flying-fox (EN)) and three bird species (the Santa Cruz Ground-dove (EN), Santa Cruz Shrikebill (EN) and palm lorikeet (VU)). The present work focused on gathering more information on the ecology of two of these species, the Santa Cruz Ground-dove known locally as Vakavakatia on the rat-free volcanic island of Tinakula and the Santa Cruz Shrikebill, known locally as Upalalir, which is endemic to the forests of Nendo.

The 2016 surveys revealed that the Santa Cruz Ground-dove population on Tinakula was in the order of 400-600 birds and currently healthy. There was no evidence of rats being present on the island. A key finding is that the island is partially or wholly overrun with little fire ants (*Wasmannia auropunctata*), an extremely damaging IAS which appears to have depleted much of the invertebrate fauna, especially ants. However, there was no indication of poor recruitment of subadult ground-doves into the population despite these invasive ants being

abundant throughout the study area. A workshop with the customary ownership community based on Malo showed that the pathways and risks of invasive species reaching Tinakula were many and high respectively and improved biosecurity and surveillance is needed. This risks are accentuated by the fact that there are competing claims for customary ownership of the island, all from villages on the island of Malo.

The 2016 surveys also obtained more data on the locations and habitat of the Santa Cruz Shrikebill. As with the 2014 survey, this species was found only in primary forest. Upalalir were located on valley slopes and valley bottoms of dense forest. Densities were very low and population estimates suggest that a change from Endangered to Critical ranking under IUCN criteria is warranted. There are no records or reports of Upalalir recolonizing secondary forest up to 40-45 years of age despite some formal surveys in these 40-45 year old regrowth and many years of informal surveys there by local bush rangers. Given that it is an old growth forest specialist, the endemic Upalalir will be extremely sensitive to any forest disturbance. The current proposals to log much of the old growth forest of Nendo (its only home) would almost certainly result in the rapid decline and ultimate extinction of this species.

The key recommendations are to:
- Implement effective biosecurity for Tinakula to exclude rats, snakes, cats, etc.
- Support the community in efforts to secure Tinakula as a rat-free sanctuary/national park under the Protected Area Act
- Monitor the impact of *Wasmannia* on Santa Cruz Ground-doves (Vakavakatia) and other threatened and sensitive biota on Tinakula and develop contingency plans as needed
- Prohibit commercial logging of primary forests of Nendo, the home of the Santa Cruz Shrikebill (Upalalir)
- Use present data and other supporting data in customary owners' efforts to secure formal protection of primary forests throughout Nendo (and other islands of the Santa Cruz Islands where fauna, clean water and sustainable harvesting is threatened by logging)
- Survey other potential sites in Santa Cruz Islands, e.g. rat free islands in Reef Islands, for threatened biota.

1 BACKGROUND

The Santa Cruz Islands or Temotu Province supports a number of endemic or near-endemic bird and bat species, many of them threatened. These were the focus of a CEPF-funded survey in 2014 (Pierce 2014) during which apparently viable populations of four key species were found:

- Santa Cruz Ground-dove (*Gallicolumba sanctaecrucis* or Vakavakatia EN) on the island of Tinakula
- Santa Cruz Shrikebill (*Clytorhynchus sanctaecrucis* or Upalalir EN) on the island of Nendo
- Vanikoro Flying-fox (*Pteropus tuberculatus* or Basapine CR) on Vanikoro and
- Santa Cruz Flying-fox (*Pteropus nitendiensis* or Mako EN) on Nendo.

Apart from finding populations of all four of these species, the key ecological finding of the 2014 survey was that Tinakula is a rat-free island and supports probably the last viable population of Santa Cruz Ground-dove in existence anywhere, and other threatened species present on the island (Pierce 2014). A survey of bats funded by CEPF and NSW NPWS in 2015 confirmed the distribution of the threatened bats species and also raised the question that Nendo tube-nosed bats may survive on Tinakula (Leary 2016).

Whilst the 2014 survey findings were basically good news for Santa Cruz and Solomon Islands biodiversity as a whole, none of the above threatened species are truly secure owing to a number of threats. Tinakula, the home of the Santa Cruz ground-dove, is currently free of rats and cats, but it was evident in 2014 that it did have invasive ants, including Yellow Crazy Ants (*Anaplolepis gracilipes*, YCA), which could be impacting on ground-dove productivity. Vertebrate predators such as rats, cats, snakes and pigs could easily also invade via visits from local people and potentially eco-tourists in the future. In 2014 it was evident too that ground-doves were being taken for food, which may have been sustainable at that time, but in September 2016 chiefs from villages on Malo reported some of their villagers had "live-trapped at least 10 ground-doves and sold each for 50 Solomon dollars to Chinese buyers via Reef Islands" outlet(s). This live export trade from Tinakula was also stated to have "just recently ceased" and there is pending legislation to block live export of birds, and Solomon Islands is also a signatory to CITES.

Meanwhile, on Nendo and Vanikoro, the forest homes of Santa Cruz Shrikebill and other endemic birds and flying foxes, are threatened by commercial logging – this was exemplified by forest scars on Vanikoro in September 2014 where an Asian company had just begun logging that year and this is continuing (C. Bone, pers. comm., 15 September 2016). Even more alarming are current plans for extensive logging of primary forests of Nendo. There are currently (September 2016) five Asian logging companies with interests in logging the primary forests of Nendo. At village level there is currently general opposition to these logging proposals, but significant payments have been made for some elders and chiefs to attend meetings and support the commercial logging proposals (C. Bone, pers. comm., 15 September 2016). The groundswell support is to continue with sustainable harvesting only which is based on customary ownership and which has been practiced for centuries.

2. OBJECTIVES OF 2016 WORK

The key objectives of the 2016 surveys and consultation are in support of maintaining viable populations of the Santa Cruz Ground-dove on Tinakula and Santa Cruz Shrikebill on Nendo. The key outcomes to help achieve these population objectives are to:

<u>For Tinakula</u>

- Better understand invasive ant impacts on Santa Cruz Ground-dove on Tinakula
- Better understand Tinakula biota values generally
- Work with community to improve biosecurity of Tinakula

- Work with community to prevent harvesting of ground-doves from Tinakula (local consumption and export)
- Develop options for protection and sustainable management of Tinakula

For Nendo

- Define habitat of Santa Cruz Shrikebill
- Develop protocols for protecting forest habitat of Santa Cruz Shrikebill

General

- Help in the development of options for sustainable ecotourism for Santa Cruz biota generally.

3. TIMETABLE

Surveys and consultations were undertaken at Nendo and Tinakula. Specific locations and key activities are outlined in Table 2.1 below.

Table 2.1 – Dates, locations and key activities for Temotu work

Date	Location	Key activities
11 September - 7 October		
11-12	Cairns-Honiara	Travel; meet with Environment staff
13	Honiara-Lata	Travel
14	Graciosa Bay	Survey gardens for Mako etc.
15 -16	Graciosa Bay	Biosecurity planning for Tinakula and Temotu Ecotourism scoping
17	Graciosa Bay, Malo	Biosecurity planning; Tinakula consultations
18	Nende	Survey secondary forest for Upalalir, Mako etc.
19	Nende	Preparation for Tinakula, overnight Lata
20-27	Tinakula	Vakavakatia and other biota surveys
28-1	Nende	Survey primary forest for Upalalir, Mako, etc.
2	Malo	Community meeting to discuss findings on Tinakula and biosecurity needs
3	Lata	Meet with Customs, Agriculture; evening dinner and Upalalir debrief with community
4	Lata-Honiara	Travel
5-6	Honiara	Debrief with Environment and meetings with Biosecurity
7	Honiara- Cairns	

4. SITES SURVEYED AND METHODS USED

4.1 Consultations and sites surveyed

Consultations

Initial community consultations regarding Tinakula were held at Minivi Village on 16 September and later at a workshop on the island of Malo on 2 October 2016. An informal debrief of the Upalalir surveys occurred at Graciosa Bay on the evening of 3 October 2016. Meetings were held with Environment before and after the surveys and with Solomon Islands Department of Biosecurity after the surveys.

Field work was focused at Tinakula, Nendo primary forest, Nendo secondary forest and Nendo gardens.

Tinakula

Tinakula is a volcanic island c.3.5 km wide and 11 km^2. It comprises a roughly conical stratovolcano rising to 851 m asl. The volcano currently erupts several times daily, with some eruptions providing spectacular plumes of ash and accompanied by rock-falls. The extent and composition of Tinakula's forest reflects a long history of eruptions and the localized impacts of a large eruption and associated fires in 1971. The lower altitude forest (to c.250 m asl., sometimes higher) comprises a mix of broadleaf trees, tree ferns and palms, including coconuts scattered and clustered throughout the gentle to moderate sloping areas. Above 250 m there is a significant increase in tree ferns and the flora dwindles on the steeper slopes above 250 m and particularly in areas prone to rock-fall.

A village site is located adjacent to a stony landing bay on the eastern side of the island. This village is usually deserted, but was occupied by two pig farmers at the time of our visit, and some other visitors also arrived from Malo during the weekend.

Importantly, Tinakula lacks rats (Pierce 2014), one of the largest islands in the Solomon Islands to lack rodents. However, some other very serious invasive species are present, notably yellow crazy ants (*Anaplolepis gracilipes*) and little fire ant (*Wasmannia auropunctata*), plus the invasive vine *Mikania micrantha*.


Fig. 4.1 – Tinakula, illustrating the many lava flows penetrating the rainforest

Nendo

Nendo surveys in took place between 14 September and 1 October as follows:
- Nendo primary forest surveys occurred east of Graciosa Bay on private family lands in 28 September – 1 October. This primary forest network extends the length of Nendo.
- Secondary forest surveys took place to the SE of Graciosa Bay on 18 September on private and community lands. This area was different to the secondary forests surveyed in 2014.
- Garden surveys took place in SE Graciosa Bay in 14 – 17 September 2015 in the same gardens as surveyed in September-October 2014 (Pierce 2014).

Fig. 4.2 – The primary forests of Nendo with Graciosa Bay and Malo in background

4.2 Methods

General survey approach

Methods for the threatened species transects were previously developed in 2014 (Pierce 2014) and are directly comparable. We recorded all target species seen or heard, plus other threatened or unusual species. These were analysed as encounter rates per km and encounters per hour along transects that followed current or old walking tracks through the forests and these were tracked on a GPS. Habitat at the stations was ranked for apparent age of forest (primary, secondary and age if known). For target species we estimated the widths of transects in order to allow density estimates to be made. This varied for each species, e.g. Vakavakatia and Mako were detected out to about 10 m each side (20 m wide transect) but for Upalalir and Vlumba this was wider (see below). All vertebrates were recorded on a few transects only.

Vakavakatia - Santa Cruz Ground-dove

We checked all “ground-doves” that were flushed from the walking transects on Tinakula, which comprised rough walking tracks and steep lava flows. We estimated that all birds would be detected out to 10 m either side of the walking path, so a 20 m wide transect. We also established three camera traps lured with grated coconut and broken open coconuts. Cameras were located at 3-5 m from the coconut lures and set to 30 s videos. The weather throughout was fine with light winds.

Vlumba – Palm Lorikeet

This species was searched for during the transect surveys described above on all islands, particularly listening for their soft calls coming from coconut trees. Their soft calls were detectable out to 25 m either side of the walking path, so transects would have been c.50 m wide.

Upalalir - Santa Cruz Shrikebill

Surveys were as for the general survey and Mako approaches above, particularly targeting old growth forest. Methods generally followed Pierce 2014 with the Jerry, Titus and Chris giving semi continuous loud whistles (single and especially double note) which was intended to illicit a response from the male shrikebills which are territorial and vocal (Dutson 2006). The weather was fine (sunny and light to moderate winds) on all but one day in the primary forest which saw continuous rain for 1.5 hours one afternoon.

Mako – Temotu Flying-fox

Methods followed those of Pierce 2014, searching for roosting individuals out to about 10 m from the forest tracks. Most individuals flew in response to our approach and so were more readily than those that stayed motionless.

Invasive species surveys

Two methods were used to survey for invasive ants on Tinakula. Firstly, we used 5 lines, each of 10 numbered waterproof cards measuring 10 cm x 10 cm and spaced at c.5 m intervals. It was planned to observe cards for 30 s and count YCA etc. visitations, but the scarcity of YCAs caused us to dispense with this approach. Instead we used protein and sugar lures which were added to opposite corners of the card and ants were counted on each of the lures after 30 minutes. These lured cards were located in the core of the known ground-dove distribution on Tinakula and between 30 and 130 m asl. at 5 sites. Typically these sites were at least 100-200 m apart and included representative island habitat including forest (2), gully/forest edge (2) and village (1). We used shaded sites as much as possible and made our observations in the mornings before high temperatures potentially caused a reduction in ant activity. In addition to this lured approach, we made targeted searches at sites of flowering plants, particularly *Morinda citrifolia*.

Rodent surveys on Tinakula comprised evening and night observations with headlamps. We also checked for rat sign on coconuts placed out for ground dove lures and on other local fruits. Other rat observations were conducted opportunistically, e.g. at our camp site at Nendo primary forest. *Mikania*, *Lantana*, *Wedelia* and other weeds were recorded opportunistically.

5 RESULTS

5.1 VAKAVAKATIA - SANTA CRUZ GROUND-DOVE – *Gallicolumba sanctaecrucis* (EN)

Fig. 5.1 – A male Vakavakatia with tail cocked in threat posture.

Encounter rates

Transect surveys for Vakavakatia (Fig 5.1) and other threatened fauna were carried out on Tinakula (25 km of transect) and Nendo (64 km). Results are compared with those of 2014 and summarized in Fig 5.2. As in 2014 Vakavakatia were found only at Tinakula where encounter rates averaged 1.96 per km, compared with 1.0 per km in 2014. Vanikoro was not surveyed in 2016, but none were found there in 2014 and locals were encouraged to report any sightings of this species (Pierce 2014).

As in 2014 and 2016, birds were detected on transects up to c.400 m asl., but the main range appears to be between 20 and 300 m asl., a slightly wider range than previously estimated

(Pierce 2014). In terms of population estimates much of the western side of the island provides poor habitat due to steep terrain and slow plant regeneration due to falling rocks.

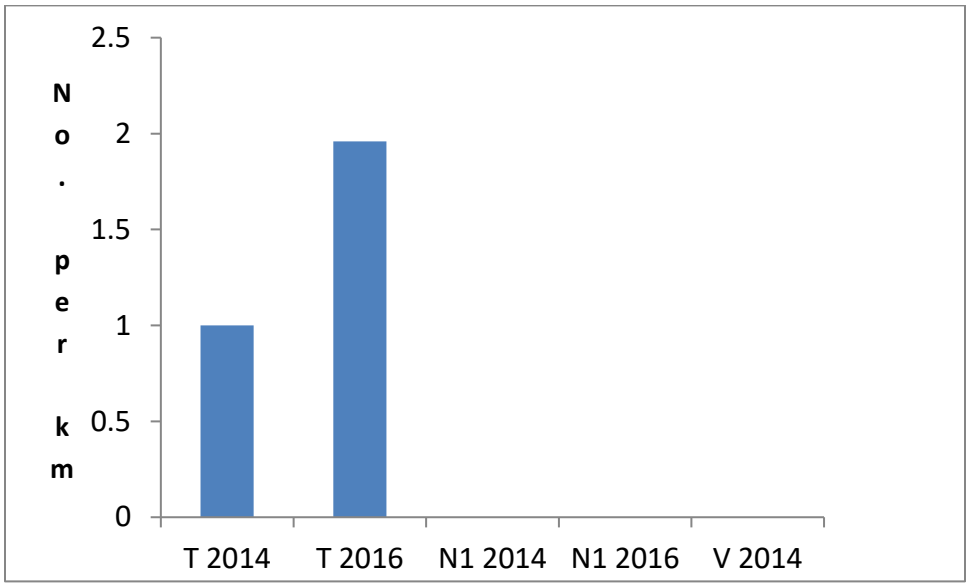


Fig 5.2 – Encounter rates of Vakavakatia per km at Tinakula (T) and other sites in 2014 and 2016 (N1 = Nendo primary, N2 = Nendo secondary forest).

From Tinakula photographs, google earth and ground surveys, the best habitat on the island is confined to an estimated 500 +/- 100 ha. If the detection rate is reasonably accurate at 10 m each side of the track (so about 20 m x 25 km of transect covered in 2016) the 49 birds sampled were from an area equivalent to 50 ha. This equates to about one bird per ha. If our sampling pattern of Vakavakatia is representative of the island this would equate to a total population in the order of 400-600 birds being present.

Habitat

Vakavakatia were typically encountered in patches of old growth forest and regenerating forest recovering from the volcanic eruption of 1971. These areas were mixed fern-palm-broadleaf forest with dominant trees being tree ferns (*Cyathea* sp.), coconuts and *Pandanus*, but also a variety of other species spanning laurels, figs, rosewood, etc. The understory was usually quite dense comprising a variety of ferns (e.g. *Asplenium*, *Phymatosurus*, *Polystichum*) and regenerating tree seedlings. Vakavakatia were encountered at elevations of 60 - c.350 m asl., including in areas above (or outside) the altitudinal (and patchy distributional) range of coconuts which are a preferred food (see later).

There was no significant difference in detection rates of Vakavakatia between the forest tracks and gully transects. We gained the impression that birds were easier to see in the gullies than in forest, e.g. forest birds often flushed providing poor views of each bird and we inevitably often made more noise on the forest transects (clearing pathways, etc.) than on the gully transects. Overall however, detection rates were similar between gullies and forest.

Fig. 5.3 - Gullies with lava base (left) or scoria (right) punctuate the Tinakula landscape.

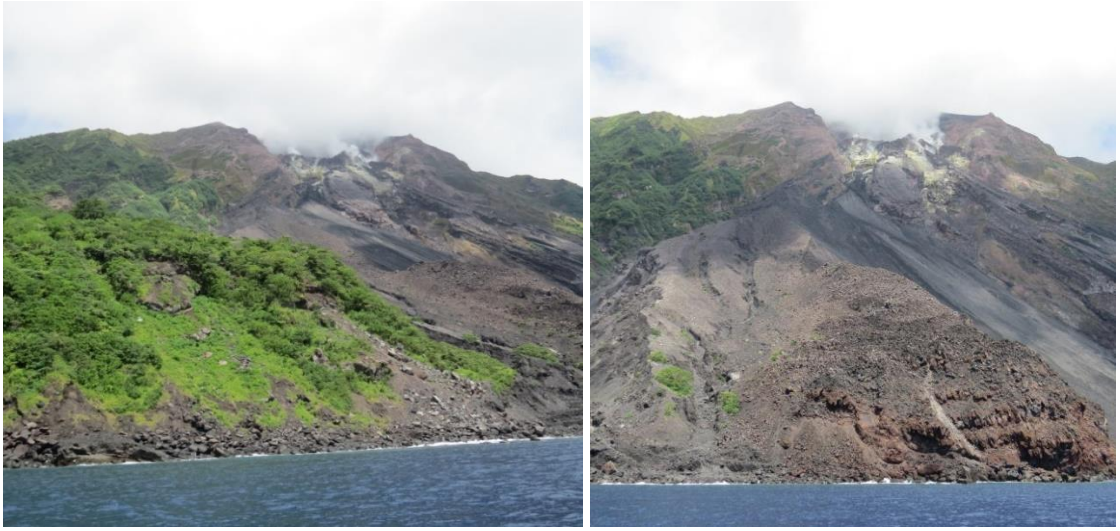


Fig. 5.4 – Habitat ends abruptly for c. 400 m on the NW coast of Tinakula (Pierce 2014)

Fig. 5.5 – Female Vakavakatia feeding on steep (left) and gentle-sloping (right) gully edges

Age structure

During transect surveys there was no significant difference in encounter rates between males and females, but subadults were detected at much lower rates than were adults (Table 5.1).

Table 5.1 – Mean detection rates per km of Vakavakatia on Tinakula transects (n = 25 km) 20-26 September 2016.

Cohort	Number seen	Mean no. seen/km
Male	22	0.88
“Adult female”	21	0.84
“Juvenile/Subadult female”	6	0.24
Total birds	49	1.96

However, some of the birds that we adjudged to be “adults” could well have been subadults because most individuals flying off provided poor views of their plumage. The possibility of our underestimating the proportion of young birds gained support after considering the results of three other sampling approaches – motion cameras, hide photography and examining a captured sample in the hand. These methods enabled a closer examination of the size and plumage patterns of individuals with plumage markings, wing moult and length, allowing the best estimates of age (Figs 5.6, 5.7).

Fig. 5.6 – Typical bright plumage of adult female (left) contrasting with darker plumage of subadult female retaining juvenile streaking in wing coverts.

Fig. 5.7 – Typical bright (whiter) plumage of adult male (left) contrasting with darker markings of subadult male retaining some juvenile streaking and small size (right).

Table 5.2 – Estimated age structure of Vakavakatia from different sampling methods

Method	Adult male	Adult female	Subadult male	Subadult female	Total (and %) subadults	Total birds
Transect	22	21	0	6	6 (12)	49
Motion camera	8	5	0	2	2 (13)	15
Hide photography	5	3	1	1	2 (20)	10
Captive sample	3	3	1	3	4 (40)	10

We confirmed through photography that adult males displayed a range of facial and breast markings as depicted in HBW (2006) and Dutson (2011). Others had intense white plumage not unlike that of White-breasted Ground-dove, but they lacked the white eyebrow of that species.

Foraging behaviour of Vakavakatia

Typically we encountered male-female pairs or single birds during the transect surveys. All were wary and tended to fly low with a characteristic 1-4 loud wing flaps at the onset, unlike "whirring of wings" described by Dutson (2012). Viewing from a hide at two sites revealed birds foraging along the gully edges, both amongst vegetation and also on coarse sand of the gully floors. They were seen taking small prey items including seeds, insects (including ants) and small fruits. Artificial food in the form of grated coconut and split coconut was very appealing food for ground-doves with up to 7 congregating at feeding stations (Fig. 5.8). In

most cases foraging was undertaken with little intraspecific aggression, but on several occasions low intensity aggression was observed involving tail cocking and chasing another bird on foot.

Fig. 5.8 – Up to seven Vakavakatia (here 4 males and a female and two Polynesian starlings) were seen foraging together at bait stations. This abundance of food was accompanied by little intra-specific or inter-specific aggression.

Invasive Species at Tinakula and their potential impacts on Vakavakatia

Existing Tinakula invasive species include the yellow crazy ant and little fire ant which have been present on the island for an unknown period of time. The identification of little fire ant (*Wasmannia auropunctata*) was confirmed by Gary Morton of Biosecurity Queensland who identified preserved specimens from Tinakula on 28 October 2016. This highly invasive species is thought to have invaded the Solomon Islands at Makira in the 1970s (Wetterer 1997), and Sarnat *et. al.* (2013) recorded it from Makira. However it was introduced to many other islands (some possibly deliberately), and is now present on many of the larger islands including Santa Cruz (Fasi 2009), and there was an attempted eradication of *Wasmannia* in the Reef Islands 4-5 years ago (F. Tsatsia, Director Biosecurity October 2016, pers. comm.).

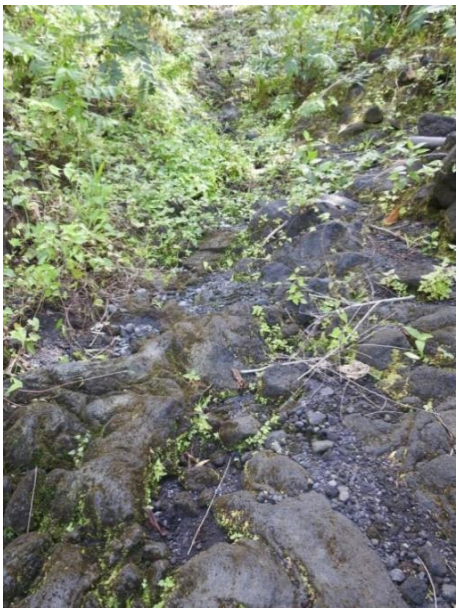
In October 2014 yellow crazy ants were common on Tinakula and an unidentified fire ant was uncommon (Pierce 2014). In September 2016, however, fire ants were abundant in all sites sampled averaged 44 to 295 per lured card over 30+ minute sampling intervals. YCAs were much less common in 2016 than in 2014 and none were detected on standard cards with protein and sugar lures in 2016. The only sites where a few YCAs were detected in 2016 were

those with flowers of *Morinda citrifolia* (two sites) and at one terrestrial site, all at 30-50 m asl.

Our observations indicated that some recruitment of ground-doves was occurring in the presence of little fire ants in 2016, and overall the ground-doves were detected at higher rates than in 2014. However, if *Wasmannia* is still colonizing Tinakula then future impacts on ground-doves and other vertebrates can be expected as experienced elsewhere (Fasi 2009) and so monitoring of nests and subadult recruitment is needed in the near future, and contingency planning is advisable.

The South American invasive vine *Mikania micrantha* (Fig 5.9) is invading Tinakula. It is widespread along forest edges, including the village, and in the gullies (Fig 5.10). This plant has the potential to quickly smother the feeding areas of Vakavakatia as plants have been recorded growing at 9 cm per day in ideal conditions and individual plants can produce up to 40,000 seeds per annum (DAF 2016).

Fig 5.9 - *Mikania micrantha* beginning to spread over and suffocate native plants.



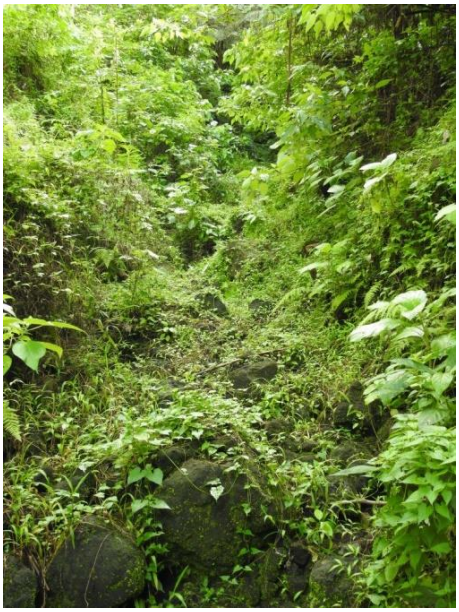


Fig 5.10 - *Mikania* in early (left) and middle (right) stages of smothering gully plants.

Other IAS threats to Tinakula

In 2014 we concluded that Tinakula is rat-free and cat-free and so the key threat is invasion of the island by rats and/or cats, and potentially escaped pigs. In 2016 Tinakula is still rat-free, but other significant risks have been identified following a more intensive survey and a workshop with community stakeholders on 2 October 2016 (Table 5.3).

Table 5.3 – Key biosecurity risks for Tinakula's biota

IAS	Source	Risk	Explanation
Rats	Malo et al.	Extreme	Up to 30 visits annually by customary owners, fishermen, illegal landings
Snakes	Malo/Nendo	Extreme	Has been at least one failed introduction attempt to Tinakula
Disease	Malo/Nendo etc.	Extreme	Avian influenza a known risk for ground-doves generally
Ants	Solomon's	Extreme	Several invasive ant species occur in the Solomon Is
Weeds	Malo/Nendo etc.	High	*Mikania* already establishing, while *Wedelia* and *Lantana* are establishing at Nendo
Cats	Malo etc.	Moderate	Up to 30 visits annually by customary owners, fishermen
Pigs	Malo etc.	Moderate	Regulated farming of piglets currently occurs

The workshop of customary owners at Malo confirmed patterns of usage at Tinakula. During a risk assessment c.100 participants contributed to information sharing on Tinakula values, biosecurity risks, biosecurity needs and the way forward. The latter includes enhanced

biosecurity, rangers, ecotourism scoping, restrictions on prospecting, etc. These were detailed in a draft Tinakula Biosecurity Action Plan which needs to be taken forward to the next stages with the community in 2017 and beyond. The Quarantine staff member present at Lata in 2014 is currently away on study leave, but the position will be refilled at Lata in 2017 (Francas Tsatsia, Director of Biosecurity, Honiara, pers, comm., 5 Oct 2016).

Fig 5.11 - 35 pigs were being farmed at Tinakula, hemmed in by these steep gullies c.1 km apart.

Two new invasive species on Nendo are worth targeting immediately for eradication as they pose a threat to Tinakula and the Santa Cruz Islands generally:
- *Wedelia trilobata* and
- *Lantana camara*

Infestations of *Wedelia* (Singapore daisy, Fig 5.12) in the vicinity of the large school in Graciosa Bay were reported by Pierce (2014). One of these infestations has since been managed by community women, encouraged by Ranger Titus Godfrey of Graciosa Bay. However, the larger infestation at the large school site at Graciosa Bay in October 2016 covers about 4 ha and is rapidly expanding. This includes spreading eastward along the road edge of Graciosa Bay where infestations of Singapore daisy extend semi-continuously for about 400 m east of the school, and odd pockets of infestation have established beyond this. Clearly the weed is spreading by one or more forms of road transport. Unless managed, Singapore daisy will become very destructive to gardens, coconut plantations and secondary forest. Immediate containment and sustained control is needed to prevent this becoming a nightmare for the communities of the Santa Cruz Islands. In Queensland and in Pacific nations, Singapore daisy is being managed with the use of fire, boiling water and boiling steam, as well as with herbicides.

A few specimens of *Lantana camara* were also noted in gardens of Graciosa Bay in October 2016 (Fig 5.21). I suggested to the local women around these sites that it would be best to dig them out before they become invasive.

Fig 5.12 - Two IAS establishing at Nendo – *Wedelia* (left) and *Lantana* (right) – and which should be eradicated before they overrun Nendo and also pose a risk to Tinakula and other islands through accidental or deliberate introduction.

5.2 UPALALIR – SANTA CRUZ SHRIKEBILL – *Clytorhynchus sanctaecrucis* - (EN)

Encounter rates and habitat of Upalalir

During the seven days of survey in primary and secondary forest and gardens, a total of 10 Upalalir were detected at 6 sites. All 6 sites were in primary forest east of the Shore Point and Molley (Bullet) Point area of Graciosa Bay and between 100 m and 250 m asl. None were detected in secondary forest or gardens, consistent with previous surveys and local knowledge (see later). An average of one bird was encountered for every 6.4 km (n = 64 km) of primary forest surveyed, less than encounter rates in 2014 and which are compared in Fig. 5.13.

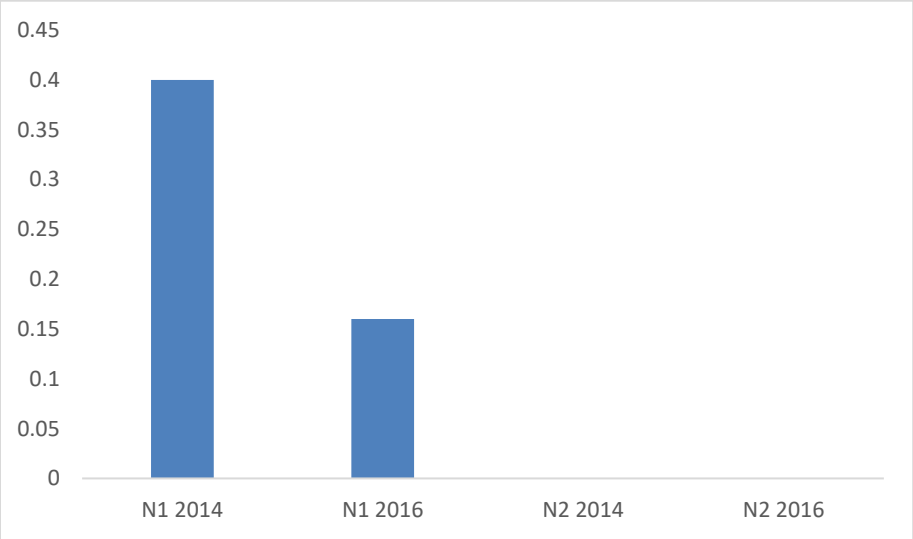


Fig 5.13 – Encounter rates of Upalalir per km in 2014 and 2016 – N1 = Nendo primary forest and N2 = Nendo secondary forest

Typically two birds were detected at each site comprising a brown bird (female) and males being heard and one subadult male also being seen (Table 5.4). Habitat at encounter sites was generally moderate to steep-sided gullies, including two sites that were less than 20 m down from the ridge lines, three approximately in the gully bottoms themselves and two unknown. Invariably there were old growth trees (laurels, figs, rosewood) present in these sites and a dense understory of *Cyathea* tree ferns, palm trees, broadleaf understory trees, climbers and a ground layer of *Selaginella* and other ferns. We had limited opportunity to determine microhabitat but two birds (females/brown birds) were flushed from near identical sites – each was at the down-hill base of a very large tree (strangler fig or rosewood) where the ground was gently sloping, damp and with a dense layer of a litter in which they had been grubbing.

Fig 5.14 – Examples of ancient rosewoods and figs in the hills above Molley Point, 2014 and 2016.

Table 5.4 – Details of Upalalir encounters in September-October 2016

Site	Date	Birds	Microhabitat – all primary forest
1	28	1 F seen	Gentle-sloping spur
2	28	1 F seen 1 M heard	Steep valley; female in flat rosewood base
3	29	1 F seen	Upper valley slope; flat tree base, 100 m from Site1
4	29	1 F seen, 1 M heard	Valley
5	30	1 F seen, 1 SAM seen	Small moderately steep gully within lower valley
6	1	1 F seen, 1 M heard	Near bottom of steep valley

It is not clear about our efficiency of detecting Upalalir – for the more vocal males, we could possibly have recorded all birds within 100 m of the track, so a transect swath 200 m wide. However, for females, which seemed to be silent during our surveys, we are unlikely to have detected a high proportion of these birds at 100 m. Two of our observations of females were of birds flushed as we were walking transects. A subadult male (Fig 5.15), however, appeared to be attracted to our whistles. If we were detecting all birds within 100 m of the track (200 m transect) the 10 records in 64 km of transects would equate to 10 birds per 1280 ha or 1 bird per 128 ha. However, it is more likely that we were efficient with detections within, on average, 50 m of the track, so a c.100 m wide transect. Assuming the latter, and with 10 birds encountered in 64 km, and assuming that we detected all birds within 50 m of the track, one bird per 6.4 km of transect equates to one bird per 64 ha or one per 0.64 km^2.

Fig 5.15 – A subadult male Upalalir in the understory of primary forest. Note the large whitish coloured bill.

Population estimate

The area of Nendo is about 505 km^2 of which about 30% (c.150 km^2) comprises primary forest (Fig 5.16). Assuming the above encounter statistics (one bird per 0.64 km^2) and assumptions are consistent for Nendo primary forest generally, the population is likely to be in the order of 234 individuals of which c.150 could be mature. The IUCN Critical/Endangered threshold is 250 mature individuals. From the above density calculations I conclude that there may be as few as 150 mature individuals in the Upalalir population and it is recommended that the IUCN status be revised to consider CR status.

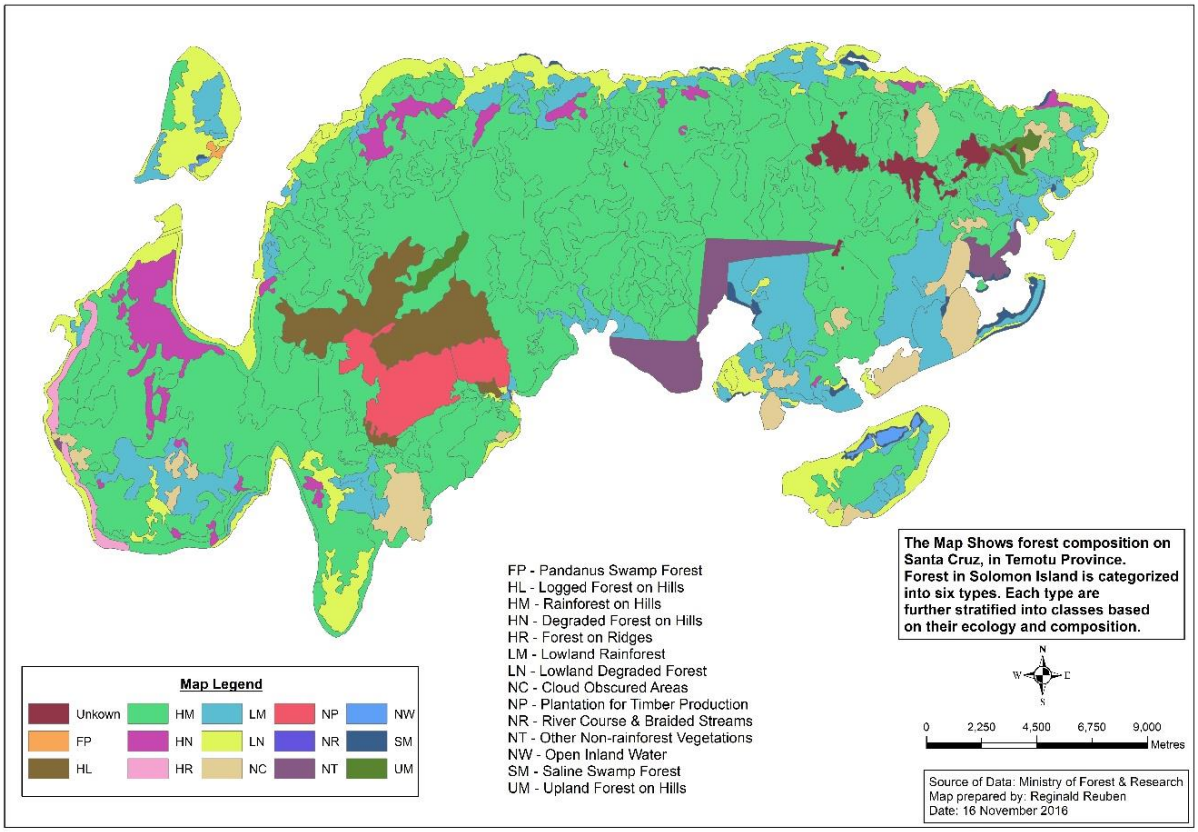


Fig 5.16 - Map of forest composition on Nendo, courtesy Ministry of Forest and Research.

<u>An Upalalir Nest</u>

About four years ago (2011-12) Jerry Meioko found a nest of Upalalir which he sketched in October 2016 (Fig 5.16) and he also demonstrates location of nest below (Fig). Jerry said that this was a typical nest of Upalalir as described by his father whom had found several nests over the years.

Key features of the nest found and described by Jerry were:

- Nest was in a big-leaved sapling of 3-4 m height in understory
- Nest c.1.8 m off ground
- Nest located directly beneath leaf of upper branch
- Nest made of root fibre and moss, with moss hanging down from nest as per sketch
- Nest relatively small for the bird and smaller than a whistler nest
- A single egg was in the nest
- Female Upalalir perched beside the nest
- He could not remember the time of year.

Fig 5.17 – Jerry Meioko demonstrating approximate location (left) of Upalalir nest that he found several years ago and his sketch of the nest (right)

Threats to Upalalir

Logging activities have long been suggested before as a major threat (Lees 1990, Dutson 2006, IUCN 2014, Pierce 2014) and currently is the key threat to Upalalir habitat. No matter the IUCN ranking of Upalalir, the future for this endemic monarch looks bleak if more of Nendo's primary forest is harvested. It is quite possible that the species would go extinct in the near future if any significant logging of primary forest were to occur. It would not be possible to mitigate impacts through setting simple slope exclusions, e.g. avoiding all gullies and sloping ground of 25 degrees and above. This would not be effective given that Upalalir also utilize relatively flat land to an unknown extent.

Rattus rattus occurs in Upalalir forests and were visitors to our camp site and gnaw marks were seen on fruits. It is not known how much of an impact they have on the monarch, but it is possible that nests are sometimes preyed upon by rats.

5.3 SURVEYS FOR OTHER THREATENED FAUNA

Palm Lorikeet – *Charmosyna palmarum* - (VU)

Vlumba were recorded only on Tinakula in 2016. They were less conspicuous and generally more patchily spread in September 2016 than in October 2014. This may be because coconut flower (a key source of nectar) was only just beginning in September 2016 whereas it was well underway in October 2014. Alternatively, invasive ants may be impacting on Vlumba either directly through predation or indirectly through competition for food. It is likely that Vlumba travel between islands in the Santa Cruz Group (Pierce 2014) and they were noted on one of the Reef Islands in September 2016 (D van der Westhuizen pers. comm.).

Mako - Temotu flying fox – *Pteropus nitendiensis* (EN)

Mako were common in gardens of Graciosa Bay, Nendo in September 2016, but were less common in Nendo primary and secondary forest. Garden encounters were noticeably higher than those of September-October 2014 (Fig 5.18, Pierce 2014) and in September 2015 (Leary (2016). A possible explanation for this is that fruiting of breadfruit (a favoured food) was well underway in Nendo gardens in September 2016. This fruit was present, but less common, in all other habitats. A number of other fruits were ripe in primary and secondary forest (Fig 5.20) but it is apparent that breadfruit is a very appealing food for these bats.

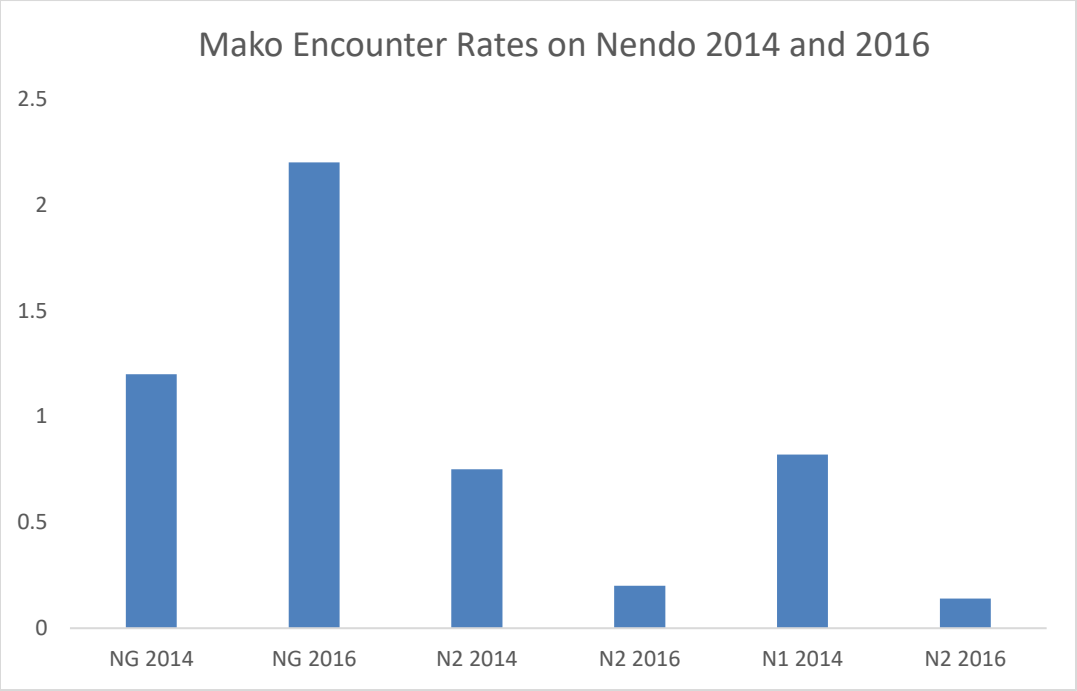


Fig 5.18 - Mako encounter rates in different habitats in 2014 and 2016. NG = Nendo Gardens, N2 = Nendo secondary forest, N1 = Nendo primary forest.

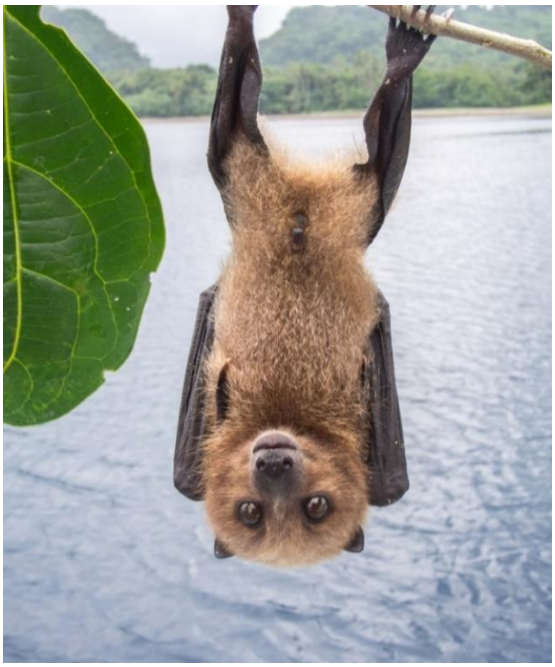


Fig 5.19 - A young Mako caught by locals at Graciosa Bay in October 2016 (D van der Westhuizen).

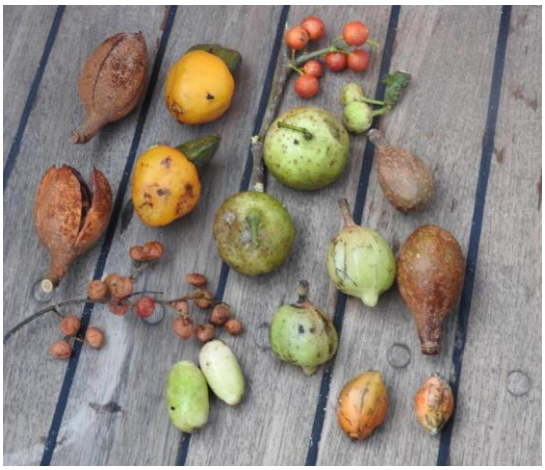


Fig 5.20 - Representative fallen fruits found in secondary forest transect of 18 km (left) and primary forest transect of 12 km (right). Fruits common to both sites were posion tree, figs (*Ficus*), beans and *Calamus*. The blue fruits from primary forest are of *Elaeocarpus*

Other bats

Mist nets were operated on the edge of Tinakula village for 3 nights in areas of fruiting trees. No bats were caught. Local temporary residents Chris and Nelson often hunted at night and they indicated that they had never seen any unusual bats – pale bats, strange noses etc.

Fig 5.21 - Stephen Sopi furling a mist net set for bats at a Tinakula garden

Seabirds

Evening seabird fly-ons to Tinakula along with incidental observations revealed no evidence of seabirds nesting on Tinakula. However, a variety of seabirds were observed flying northwards in the general direction of Nupani and the western Reef Islands (Table 5.5).

Table 5.5 – Seabirds flying northward past Tinakula in the evening (after 1700 h) plus incidental sightings offshore (in parentheses)

Species	Date, September 2016						
	20	21	22	23	24	25	26
Great frigatebird	0 (3)	0 (3)	1	0	0	0 (2)	0
Frigatebird sp.	0	0	0	0	0 (2)	0	0 (3)
Brown booby	0	7	1	1	2	0 (2)	3 (6)
Red-footed Booby	0	9	0	0	2	0	0 (2)
White-tailed Tropicbird	0	0	0	0	0 (1)	0 (2)	0 (6)
Brown Noddy	0	0 (100)	70	3	0	0	40
White Tern	0	0 (1)	0	0 (1)	0	0 (1)	0 (1)

Two fishing captains (Chris Mekopi and Leslie Pungamu) indicated that Nupani was a prolific seabird island. They both pointed to storm-petrels in the Melanesian bird book (Dutson 2011). When further prompted about rats they said that rats were absent despite a few families of people living on the island.

Other birds

Most species previously recorded in the Santa Cruz Islands or Tinakula for the first time in 2014 were also seen in 2016 - white-tailed tropicbird, spotless crake, Pacific emerald dove, uniform swiftlet and long-tailed cuckoo (Appendix 1). Several wader species frequented Graciosa Bay and this included the first Santa Cruz record of pectoral sandpiper and other infrequent visitors (Table 5.6).

Table 5.6 – Waders at Webelea River-mouth September-October 2016.

Species	14 September	3 October	Comments
Pacific golden plover	7	6	Also seen/heard flying on intervening days
Whimbrel	1	0	Also heard 15-16 Sept
Wandering tattler	1	1	Also seen/heard flying on intervening days
Common sandpiper	2	2	Also seen/heard flying on intervening days
Ruddy turnstone	7	6	Also seen/heard flying on intervening days
Pectoral sandpiper	1	0	
Sharp-tailed sandpiper	1	1	

Logging

The current surveys highlighted the dependence of Upalalir (EN/CR) on primary forest habitat (Section 4), while some of the targeted timber species are threatened species in their own right, notably Pacific kauri (EN) and rosewood (VU). The threats of foreign logging companies were already apparent at Vanikoro In 2014 where a Malaysian company began using a dragline to bring logs to the foreshore for collection. This has continued to 2016 with immense damage to the vegetation and water quality of streams and coastal waters alike (Fig 5.22). Chiefs and other important people throughout Temotu are being bribed to for example attend meetings and vote in favour of logging. The issue of logging at Nende has recently polarized the community, with many arguing cases of loss of water quality, loss of timber, loss of habitat and invasion by alien species, e.g. the arrival of African snails at Vanikoro with logging equipment in 2014 (Pierce 2014). Lavery et al. (2016) highlight a number of issues associated with logging in general, including habitat loss, impacts on threatened species, food depletion, flooding, impacts on stream life and impacts on reef life.

Fig 5.22 – A heavily silted lagoon and reef following logging at SE Guadalcanal, 13 September 2016.

5. DISCUSSION AND RECOMMENDATIONS

This survey progressed the findings of the 2014 survey (Pierce 2014) by gathering population data on two Endangered species, the Vakavakatia or Santa Cruz ground-dove on rat-free Tinakula and the Upalalir or Santa Cruz Shrikebill. Key findings were that:

- Tinakula is still free of rats

- Vakavakatia currently have a healthy population on this rat-free volcanic island but still merits Endangered status

- The invasive ant *Wasmannia auropunctata* has invaded Tinakula and threatens Vakavakatia and other biota

- The shrikebill Upalalir are rare (population estimates warrant Critical status) and confined to Nendo where they are threatened by logging plans

- All Upalalir records were from primary forest, none in secondary forest.

<u>Tinakula</u>

Whilst Tinakula continues to be rat-free and has a healthy population of Vakavakatia, this could easily change in different ways. There are many visits to the island from multiple sources and for multiple purposes annually, so that the risks of rats and other invasive species arriving is very high, extreme in some cases. A risk assessment and pathway analysis workshop was undertaken with Tinakula stakeholders that revealed the vulnerability of this environment, including some close calls with IAS that almost invaded, e.g. a failed attempt at snake introduction. Fortunately, the community appears eager to support a more structured process for achieving effective biosecurity for the island's future, despite competing claims for customary ownership. This includes a desire to achieve reserve status for the island and surrounding marine ecosystem and implement effective biosecurity to accompany tourism and other sustainable uses.

The recent arrival of *Wasmannia* on Tinakula means that this invasive ant could negatively impact on the recruitment of ground-doves and severely impact biota and ecological processes generally (Fasi 2009, Foucaud *et al.* 2010). There is a need to monitor the populations and recruitment of ground-doves and other biota and develop a recovery plan for Vakavakatia in particular, that would potentially include captive populations. The uncertainty of the status of Vakavakatia in Vanuatu (where they have been recorded only twice in recent years, G. Dutson, *in litt*.) means that Tinakula may currently support the last viable population of the species in existence.

It is only a matter of time before *Wasmannia* is spread generally throughout the Santa Cruz Islands as has occurred throughout the larger Solomon Islands. The local transport of coconuts and other garden produce, together with contaminated logging equipment are considered the most likely ways of *Wasmannia* invasion within the Solomon Islands (Fasi 2009). Solomon Islands Biosecurity reported having unsuccessfully targeted *Wasmannia* in the Reef Islands a few years ago (Frances Tsatsia pers. comm.). It is critical that surveys of other potentially valuable islands within the Santa Cruz Islands, e.g. Nupani, be undertaken urgently to assess status of threatened species and IAS, particularly rats and invasive ants and develop management plans.

Meanwhile, in discussion with the Director of Biosecurity, Francas Tsatsia, on 5 October 2016, it is clear that the Solomon Islands government needs support in improving the effectiveness of national biosecurity by developing codes of practice for detecting and managing rodents, ants, weeds, etc. For example, I observed a newly establishing species in the form of several Eurasian Tree Sparrows (*Passer montanus*) carrying nest material at Henderson Airfield on Guadalcanal, on 13 September 2016, and passed details on to Director of Quarantine, Solomon Islands on 5 October 2016 along with an example of a draft eradication plan for this species. It is likely that more damaging species are also arriving undetected.

Upalalir

The population of Upalalir appears to be healthy albeit modest in size in the primary forests of Nendo. Whilst some follow-up work involving rangers and monitoring of nest success in the face of *Rattus rattus* is needed, the overwhelming need is for forest protection. If the plans of some people to log the primary forests proceeds (and the Solomon Islands Government ratified logging of Pacific Kauri in October 2016, C. Bone *pers. comm.*), this could bring about the extinction of Upalalir. Given it is showing no sign of adapting to secondary forest of up to 40-45 years of age, Upalalir has a tenuous hold in the primary forests of Nendo. Many other flora and fauna species, e.g. Mako (EN) and Sanford's white-eye (endemic and probably qualifies as IUCN Vulnerable), also depend on these primary forests seasonally or annually.

The increased fragmentation of forests on Santa Cruz would make the remaining remnants of primary forest more vulnerable to the impacts of IAS (including those brought in by logging practices, Fasi 2009, Pierce 2014) and stochastic events such as cyclones. These primary forests therefore need full protection under the Protected Areas legislation and associated community agreements to harvest timber and other resources sustainably. IUCN and other international conservation organizations have protection of primary forest as a key goal for biodiversity conservation globally. Within the Solomon Islands there are several legislative acts which provide the framework for supporting forest protection including The Environment Act 1998, The Protected Area Act 2010 and The Wildlife Protection and Management Act 1998.

Recommendations

The following recommendations are offered:

1. Tinakula

- Encourage the communities at Malo to work together in maintaining Tinakula as a rat-free island and free of other invasive species.
- Build on the current workshop that scoped a biosecurity action plan for the short and long term, including training Rangers and seeking advice and assistance from Quarantine.

- Train Rangers in IAS and bird survey and other fauna monitoring at Tinakula, including monitoring population size and recruitment of Vakavakatia and the impacts of *Wasmannia* on ground-doves and biota generally.
- Develop contingency plans for managing Vakavakatia population *in situ* and/or *ex situ*
- Support community in their plans for making Tinakula a reserve, e.g. nature reserve, or other appropriate reserve, under the Protected Areas Act. This will require a cooperative approach amongst stakeholders at Malo.
- Develop management plans for making Tinakula a tourist destination involving the employment and stationing of Rangers at Malo and at Tinakula.

2. Upalalir

- Re-evaluate IUCN status of Upalalir as it may merit Critical given the low population estimate and imminent logging threats.
- Support the local community in its efforts to prevent the loss of the globally important primary forests of Nendo to logging.
- Work with Rangers to complete additional surveys of Upalalir in more eastern locations to confirm distribution.
- Work with Rangers to locate Upalalir nests and monitor these in the presence of rats, and depending on outcomes, in a rat-control scenario. Also evaluate feasibility of finding Upalalir nests as a tourism magnet for international birders.

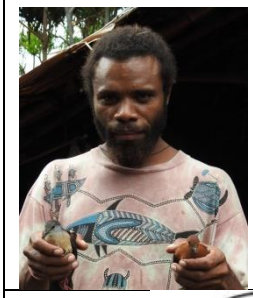
3. Other surveys

- Survey Nupani and other potentially rat-free islands in the Reef Islands to evaluate importance for seabirds and palm lorikeets, and determine IAS status, Use this survey as an opportunity to train Rangers in IAS and biota survey and monitoring, and also evaluate tourism potential with community.

ACKNOWLEDGEMENTS

Key people assisting with field work were Titus Godfrey, Jerry Meioko, Donald Vander West Huizen, Chris Mekoa, John Paulo, Stephen Sopi (see below for their key roles along with supporting Solomon Islands Directors and staff of Fisheries, Environment, Biosecurity and OceansWatch. Honorable member Nixon and Chiefs, and many community members provided additional expert advice and guidance. Margaret prepared a beautiful farewell meal at Graciosa Bay. Trevor Maeda and Agnetha Vavekaramui of Ministry of Environment, Conservation and Meteorology in Honiara provided permit guidance. Technical advice was provided by Peter Hitchcock and Roger James (reserves), Gary Morton of Biosecurity Queensland (invasive ants) and Tanya Leary of NSW National Parks and Wildlife Service (bats). Pam Schultz provided editorial support. Funding for this work was provided by CEPF and EcoOceania, while OceansWatch provided logistics support.

	Ranger Titus Godfrey displaying rare endemic snails which he collected along streams in primary forest east of Graciosa Bay. The “Maestro of shortcuts”, Titus provided guidance in the forests of Nende and Tinakula and facilitated community meetings and introductions at Lata and Graciosa Bay.
	Jerry Meioko beside one of the many pristine streams that run through his family property in the hills east of Graciosa Bay, Jerry is a talented bushman with a broad knowledge of forest species and ecology and the threat of logging. He has an exceptionally keen ear and eye which helped in finding Upalalir and other threatened fauna. Both Jerry and his father have found nests of this cryptic bird that we came to call “the phantom” on this trip
	John Paulo preparing for another day of searching for Upalalir in the hills above Nende. Like Jerry, John has a special panache for bush work with a broad knowledge of tree species, their fruits and the animals living in the forests and waterways, and a great team member.
	OceansWatch crew Donald van der Westhuizen reviewing GPS Tracks for Titus prior to setting off on another search for the phantom. Besides his technical skills, Donald’s preparation of expedition gear and provisions together with good humour, kept the team humming along.

	Neo resident Stephen Sopi, about to let go one of the ground-doves on Tinakula for which he successfully negotiated release. Stephen's wide ranging knowledge and his ability to discuss and defuse potentially difficult situations was a great asset for our visit to Tinakula, which is an island whose customary ownership is disputed by 2-3 villages. He has an important role ahead in the protection and management of Tinakula.
 	Chris Mekoa and Nelson with ground-doves being released at Tinakula. These two guys living temporarily on Tinakula had expert knowledge of the island, including diurnal and nocturnal critters which assisted in the success of this survey
	Honorable member Nixon Lanoli facilitated a Tinakula biosecurity meeting at Malo. Nixon's deep understanding of the political situation with Tinakula and his ability to stay focused on key generic biosecurity needs was a great asset for the workshop.
	Fisheries Director Luke Paul at the helm of his boat following our pickup at Tinakula. Luke and Leslie Pungamu's boating and shore landing skills were greatly appreciated to get the team to Tinakula and back safely. The Fisheries office also doubled as quarantine station and overnight quarters for our team prior to our early morning departure to the island.
	Environment Director Trevor Maeda and assistant Agnetha Vavekaramui of Solomon Islands Ministry of Environment, Climate Change, Disaster Management and Meteorology Trevor and Agnetha facilitated granting of the research permit and hoped to provide officers in field support but circumstances intervened. It is hoped to work more closely with staff in future.

	Solomon Islands Quarantine Director Francas Tsatsia In discussion with Francas at Honiara after the field work, we both undertook to work closely together going forward to improve biosecurity at Temotu, Rennell and the Solomon Islands generally.
	Chris Bone, Director of OceansWatch and volunteers Imogen Page and Frieda. OceansWatch has undertaken a raft of climate change, reef and other work at Temotu over the years. Chris' organizational skills and support from staff throughout the project were greatly appreciated.
	Gary Morton of Biosecurity Queensland identified ant specimens

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Appendix 1 - Summary of birds and mammals observed September-October 2016

Common name	Summary of observations September-October 2016
Red junglefowl	Common on forests of Nendo and Tinakula
White-tailed tropicbird	Up to 4 together off Tinakula 20-26 Sept 2016
Striated heron (Koabu)	Several sightings at Graciosa Bay, Nendo
Pacific reef heron (Koa)	Common at Nende
Great frigatebird	Several off Tinakula 20-26 Sept 2016
Red-footed booby	Several off Tinakula 20-26 Sept 2016
Brown booby	Several off Tinakula 20-26 Sept, 2 in Graciosa Bay 2 Oct 2016
Buff-banded rail (Birlak)	Common at Nendo in gardens, roadsides
Spotless crake	Common on Tinakula 20-26 Sept 2016
Purple swamphen (Tirklae)	Common in gardens especially near Webelea River-mouth
Pacific golden plover (Nirla)	Present airport; up to 7 at Webelea River-mouth, 14 Sept-3 Oct
Whimbrel (Nirlatiuopu)	One Webelea River-mouth 15-16 Sept; one Malo 2 Oct 2016
Wandering tattler (Nirla)	Few at Graciosa Bay, singles at Tinakula, Sept-Oct 2016
Common sandpiper (Nirla)	2 at Webelea River-mouth, Nendo 14 Sept and 3 Oct 2016
Ruddy turnstone (Nirla)	Up to 7 at Webelea River-mouth, 14 Sept-3 Oct; also Malo 2 Oct
Pectoral sandpiper (Nirla)	1 at Webelea River-mouth, Graciosa Bay, Nendo 14 Sept 2016
Sharp-tailed sandpiper (Nirla)	1 at Webelea River-mouth, 14 Sept and 3 Oct 2016
Brown noddy	Several flocks up to 100 birds off Tinakula 20-26 Sept 2016
White tern	Several off Tinakula 20-26 Sept 2016
Great crested tern (Nari)	Few at sea, roosting Tinakula and at Graciosa Bay, Nendo
Sooty tern	Few flocks of up to 100 birds off Tinakula 20-26 Sept 2016
McKinlay's cuckoo-dove (Leo)	Very common on Nendo and Tinakula
Pacific emerald dove (Leibu)	Common on Nendo and uncommon at Tinakula
Santa Cruz ground dove (Vakavakatia)	Common on Tinakula
Red-bellied fruit dove (Nuan)	Very common on Nendo and Tinakula
Pacific pigeon (Bonakane)	Very common on Nendo and Tinakula
Coconut lorikeet (Vlu)	Common on Nendo and Tinakula
Palm lorikeet (Vlumba)	Common on Tinakula
Long-tailed cuckoo (Nongiabir)	Two on Tinakula 20-27 Sept, one eating terrestrial crab 26 Sept
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 Tinakula
Cardinal myzomela (Mangavu)	Common on Nendo and Tinakula
Polynesian triller (Teso)	Uncommon on Nendo
Melanesian whistler	Common on Tinakula
White-throated whistler (Utopia)	Common on Nendo
Rufous fantail (Upe)	Common on Nendo and few at Tinakula
Sta Cruz shrikebill (Upalalir)	Located at 7 sites in primary forest on Nendo 28 Sept-1 Oct
Pacific swallow (Nulabwe)	Common on Nendo and Tinakula
Sta Cruz white-eye (Dirlirve)	Common on Nendo
Sanfords white-eye (Wakio)	Moderately common on Nendo primary forest
Rusty-winged starling (Pwatirbao)	Common on Nendo
Polynesian starling (Misse)	Common on Tinakula
Temotu flying-fox EN	Common on Nendo especially gardens; one at Tinakula
Pacific flying-fox	Common on Nendo and Tinakula
Microbats	Common on Vanikoro and Nendo, reported from Tinakula cave
Rattus rattus (Black Rat)	Common on Nendo including in forests