

**SEABIRD SURVEY OF ALEIPATA OFFSHORE ISLANDS 24-26
October 2022
Report**

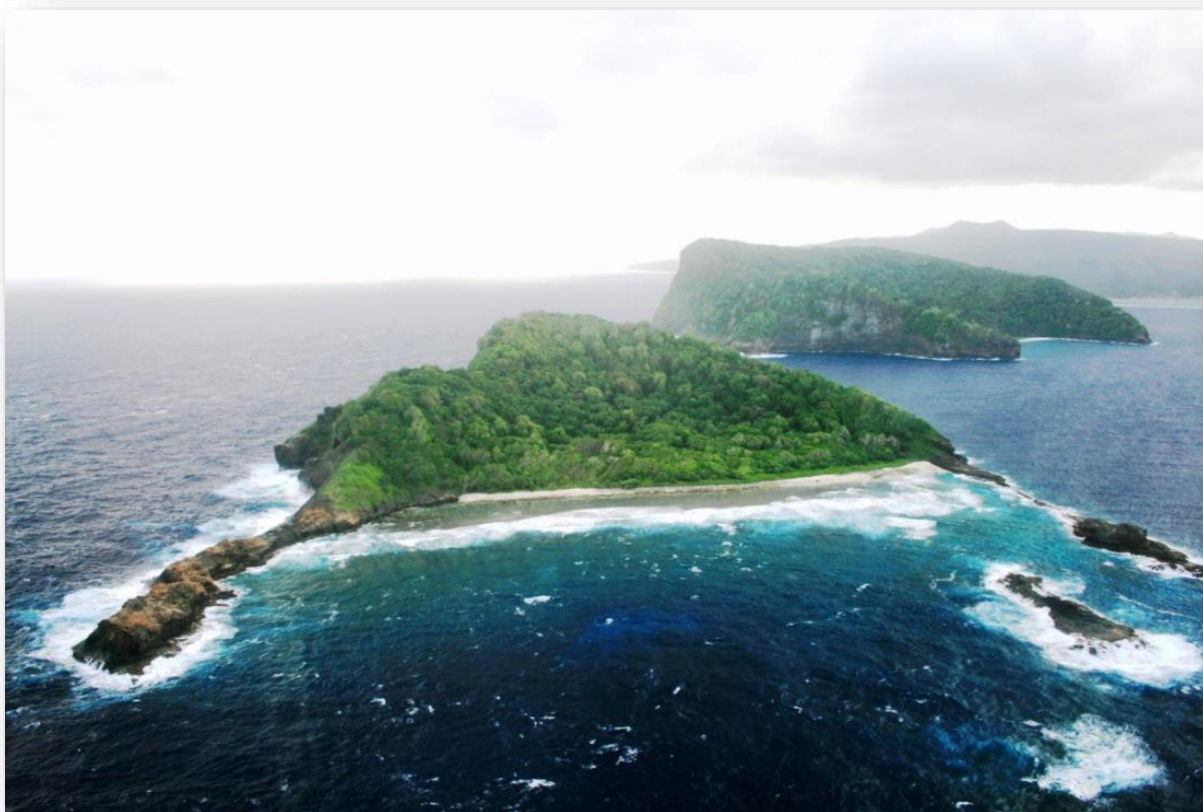


Photo credit James Atherton. Aerial view of Aleipata Islands (Nu'ulua in foreground, Nu'utele behind, with the main island Upolu in the background)

Project partners
Division of Environment and Conservation, Samoa Conservation Society and the Secretariat for
Pacific Regional Environment Programme

November 2022

Background:

The Aleipata group of offshore islands have been identified as one of eight Key Biodiversity Areas (KBAs) in Samoa. They are located at the south-eastern end of Upolu Island at 14°3'447.28"S, 171°25'23.84"W (Nu'utele) and 14°4'22.11"S and 171°24'36.17"W (Nu'ulua) offshore. This project updates population estimates and establish baseline data and information on breeding seabirds of the Aleipata offshore islands and investigate the feasibility of future tracking studies of some species.

There are four islands included in the group Nu'utele (108ha), Nu'ulua (25ha), Namua (15ha) and the smallest island Fanuatapu (6ha). All islands are under the jurisdiction of the Aleipata Marine Protected Area Committee which is made up of eleven communities of Aleipata district. These communities have customary rights over these islands.

The islands are rich in biodiversity and both marine and terrestrial ecosystems support significant populations of seabirds; They are the most important islands for red-footed (*Sula sula*) and brown boobies/Fua'ö (*S. leucogaster*) and greater frigate birds/Atafa (*Fregata minor*) in Samoa. They host two species of fruit bats, coconut crabs and marine turtles including the most important nesting sites for hawksbill turtle (*Eretmochelys imbricata*) in Samoa.

A rat eradication attempt on the Aleipata Islands was made in August 2009. However, rats were detected again on Nu'utele in August 2010 (Parrish and Shirley, 2012); either the eradication failed, or reinvasion occurred. Nu'ulua appears to remain rat free, but should be verified. Pigs are also present on some islands. Yellow crazy ant have slowly become distributed throughout the islands (Fisher *et al* 2010). This is of high concern due to their impacts to nestlings including seabirds.

The islands also support populations of a species of threatened terrestrial bird - the friendly ground dove/Tu'aimeo (*Gallicolumba stairi*), IUCN threat ranking Vulnerable. The Critically Endangered manumea (*Didunculus strigirostris*) has been recorded there in the past.

The islands previously supported populations of petrels such as wedge-tailed shearwater/Taio (*Puffinus pacificus*) and tropical shearwater/Taio (*Puffinus dichrous*), but these have not been recorded recently. One storm petrel specimen was collected in the nineteenth century off Upolu, the Samoan storm petrel (*Fregatta lineata*), but whose existence has not been confirmed since, and remains a mystery. The only specimen for this species is the one that was collected from Upolu and is now in the US National Museum in Washington. Other seabirds are known from nearby American Samoa including Tahiti petrel (*Pseudobulweria rostrata*) and tropical shearwater (*Puffinus dichrous*) and may also be breeding in Western Samoa. One individual Tahiti petrel was found during a Rapid Biodiversity Assessment at 1,347m on central Savaii Aopo montane forest in 2012 (Atherton and Jeffries, 2012). Previously recorded seabirds from Aleipata Islands are included in the table in Appendix 1.

Tahiti petrel is listed by the IUCN as Near Threatened. All other procellariids likely to be on these islands are Least Concern. Samoa does not have its own threat classification system for birds and all of these Procellariiform species are likely to be extirpated from Samoa unless steps are taken to identify populations and protect them. Tahiti petrel and tropical shearwater populations occur on American Samoa and research is ongoing there (A. Raine, *pers comm*). Previous searches for burrowing seabirds on Aleipata Islands by previous authors were unsuccessful although burrows were investigated.

In late February 2023 a fledgling tropical shearwater was found about 600m asl near Tiapapata at Malololelei on Upolu. Although cared for by locals it subsequently died. KB arrived back on the island from NZ on the 13 March and heard tropical shearwaters over her house at Malololelei. This is a first record for these species breeding on Upolo Island. They have been heard early evening and prior to dawn up until now (23 April 2023) and it appears there may be several breeding colonies remaining on Upolo above Malololelei in forested areas.



Fig 1. Tropical shearwater fledgling discovered on ground at Malololelei, Upolu Island around the 24 Feb 2023

Objective:

Baseline information on seabirds is urgently needed, particularly to determine presence of remnant populations of petrels and shearwaters to enable management actions to be developed for their protection, enhancement and/or restoration to these islands.

Overall project activities:

1. Consult with traditional community owners to gain support and arrange access to the islands. Discuss Traditional Knowledge of seabirds. Access was arranged with the community owners and to provide boat transport to and from the island. Taking their expert advice, we were unable to land on Nuúlua Island in October 2022 but were able to land for a few hours on the 15 April 2023.
2. Undertake a review of all previous surveys, reports and traditional knowledge; provide a summary. (To Be Completed by MNRE). Table of seabirds previously recorded from the literature in Appendix 1.
3. Undertake baseline surveys of seabirds on two of the four Aleipata Islands: Nu'utele, Nu'ulua . Confirming species present and approximate population sizes, where possible. (This report)
4. Introduce and train MNRE staff in survey and monitoring techniques for seabirds and how to set up remote monitoring equipment. In October 2021 SPREP hosted a Seabird and biodiversity monitoring training seminar for MNRE and SCS staff. Chris Gaskin (NNZST) provided training on seabirds of the region and monitoring techniques.
5. Assess the risk and impact of invasive species such as pigs, rats and yellow crazy ants on seabird populations. (This report)
6. Note presence of other threatened species such as friendly ground dove and manumea. (This report)

Seabird survey Nu'utele Island 24-26 October 2022; 13th April 2023

24-26 October

Team Lead: Czarina Stowers (MNRE)

Team members: Chris Gaskin (NNZSBT); Karen Baird (SPREP); Aloma Black and Paulo Vili (SCS); Fialelei Enoka, Agape Timoteo and Fini Male (MNRE)

Logistics.

The Team departed in three vehicles to the Aleipata Islands Community early on Monday 24th October. On arrival the Alia was loaded with equipment, and it was agreed that only one trip would be needed to take all passengers. No-one from the community was available to accompany the survey team.

The vessel used for transport to the island is a local alia, a double-hulled aluminium craft around 6m in length commonly used vessel in Samoa for fishing and transport to islands. Driving the alia through the reef requires excellent communication between the crew using hand signals to direct the skipper who cannot see through to the bow due to the design of the Alia.



Fig 2. Loading alia at Aleipata Islands Community jetty.



Fig 3. Fales at Vini flats, Nu'utele



Fig 4. Potential seabird burrow on Nu'utele



Fig 5. Open forest on crater rim, Nu'utele

The landing site is on the north-western end of the island on a flat tongue of land extending from the base of the steep sides of the crater known as Vini flats. Nuútele Bay may be more difficult due to the shallow shelving nature of the reef and potential for the vessel to become grounded. The camp site is a mere 15 meters from the beach and consists of two well-built fale. They need some maintenance work, particularly one fale which has some rotten floor planks. However, these were very welcome due to the big downpours of rain we experienced.

Description of Nuútele

Nuútele (108ha) rises to just over 215m at its highest point on the crater rim. The island is an ancient tuff cone. The eastern side of the island has eroded leaving a horseshoe shaped bay – Nuútele Bay. Behind the beach is an area of flat land before rising steeply to the crater rim. This flat land formerly held a leper colony. Vini flats consist of disturbed forest including coconut palms and gardens. A rough track climbs directly and steeply to the crater rim. This track is extremely slippery in wet conditions, which we experienced.

Park *et al* 1993, describe three types of forest – littoral, coastal and lowland. The coastal forest is unique and restricted to tuff cone volcanoes. (Whistler 1983, Park *et al* 1993).

Coconut tree covered flats dominate the stretch along the Vini coastline and back approximately 10m towards the slopes before transitioning to common coastal and lowland/valley forests comprised primarily of *Dysoxylum* species (*D. samoense*, *D. maota* and *D. huntii*). Common coastal and lowland species such as *Morinda citrifolia* (nonu), *Hibiscus tiliaceus* (fau), *Neisosperma oppositifolium* (fao), *Terminalia catappa* (talie) and *Flueggea flexuosa* (poumuli) occupied the space between *Dysoxylum* trees to create dense forest.

The vegetation type shifts once ascending the steep slopes to the island summit, but the *Dysoxylum* trees continued to dominate. Large banyan trees (*Ficus prolixa*) were scattered throughout the sloping forest which provide useful footholds and support for climbing. The vegetation dominance shifts from *Dysoxylum* to *Calophyllum inophyllum* (fetau) and *Manilkara dissecta* (pani) as you climb towards the ridge. Ripe mamalupe (*Faradaya powellii*) seeds were found on the canopy floor on the climb up to the summit indicating active bird activity, likely pigeons, in the canopy.

There are several plants of conservation interest. Specimens (seedlings, cuttings, and seeds) of *Psychotria spp.* (matalafi), *Manilkara dissecta* (pani), *Alyxia stellata* (gau) and *Colubrina asiatica* (fisoa) were collected either for their medicinal properties, rarity in distribution/habitat or for further identification. These plants will be propagated at the Vailima Botanical Gardens Rare and Threatened Plant Nursery at Vailima.

Description of Nuúlua.

Nuúlua (ca. 25ha) is also a tuff cone eroded to the east to form a bay. At each end of the beach the rocky ridges are covered in herbaceous strand vegetation and include rock stacks with breeding and roosting seabirds (brown boobies, noddies and terns). The island is about 100m height with similar vegetation to Nuútele, covered in intact littoral and coastal forest. Most of the plants are native although there are a few invasive species. *Pisonia littoralis* forest is a feature of this island especially on the flats and is strongly associated with seabirds as it has specialised sticky seeds which seabirds disperse. They also thrive in high phosphate and nitrate from the presence of seabirds. Whistler (2002) thought loss of seabirds here might lead to the loss of this forest type.



Fig 6. Landing beach, Nu'ulua



Fig 7. Burrows under large tree (fig 9)

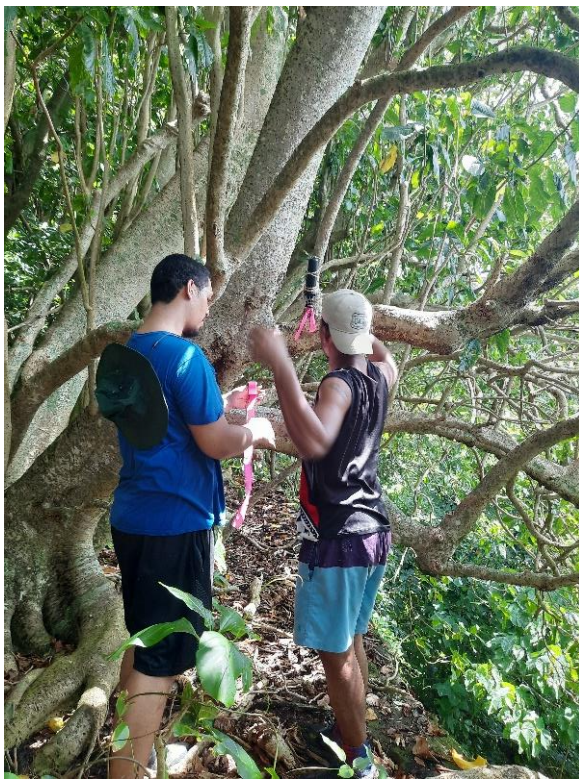


Fig 8. Recorder deployed on edge of escarpment



Fig 9. Large tree with burrows in base

Seabirds survey methods.

After setting up camp on Nu'utele on our first visit in October 2022, the team took the track to the crater rim and continued south around the rim. We searched for seabird burrows on the cliff edges and searched for signs of seabirds breeding in trees from vantage points looking down around the crater rim. Where possible (safe) seabird burrows were checked for activity or occupancy. Where seabirds were observed on trees or on ledges, attempts were made to take counts of numbers of nests of each species observed.

We had intended to stay up on the crater rim after dark and use playback calls and spotlights to search for incoming birds, however the heavy rain would have made that impossible as well as negotiating the slippery wet and steep track back to camp at night hazardous.

On day two, five acoustic recorders were deployed around the crater rim and further searches for burrows made. The plan is to return every few months to remove SD cards and change batteries.

A team of six returned to Nu'utele Island on the 13 April 2023 for the day. The team were: Karen Baird (SPREP), Vatapiua Maiava and Fini Male (MNRE), Paulo Vili (SCS), and Ingrid Hutzler and Peter Pay (Birds NZ). There was insufficient time on the second trip to undertake tree nesting seabird counts as we were only on the island for a day to change batteries and SD cards.

On the 14 April we were able to land on Nu'ulua for 3 hours. Landing is very difficult as there is only one place to land on the beach where there are no rocks and swells make it hazardous. We traversed the top of the island investigating burrows and placing two recorders around the rim.

Results.

Nu'utele Is.

Procellariiforms. No petrels or shearwaters were seen or heard on the island on either of the two trips. Several sites where potential burrows were found have been noted (see map for Nu'utele). Burrows were inspected for smell and testing with long sticks and a burrowscope. No evidence of seabirds was found, i.e. smell, feathers or faecal material, or dead chicks or eggs. Burrows over the edge of the rim on steep ground under tree roots appear typical of birds such as wedge-tailed shearwaters. They were difficult to inspect due to the steep and hazardous locations. Away from the edge under forest, several potential burrows were also found. These also showed no evidence of seabirds, but shape and size as well as mounded soil at the entrance does suggest they could also be seabird burrows (Fig 4). The open forest and soft ground appear ideal for seabirds. (Fig 5). Other possibilities are large coconut crabs although no evidence of crabs was found and burrow shape would normally be rounder rather than oval in shape, and not so horizontal. Samoan team members did not think crabs would be found high on the island. Also refer to report for the seabird survey at sea 2-3 November 2022, where wedge-tailed shearwater/ta'i'o (*Ardenna pacificus*) were seen in good numbers and several tropical shearwater/ta'i'o were seen at sea, suggesting that breeding is likely somewhere in Samoa. Note breeding of tropical shearwaters is now likely to be occurring on Upolu Island due to recent discovery outlined above. Due to the finding of a fledgling but continued probable adult activity also suggests more than one colony or an extended breeding season.

SD cards and batteries were changed on 13th May 2023. SD cards were full. No seabird calls were detected on the SD cards from the period October 2022 – December 2023, after which SD cards were full. One recorder did not appear to be working. Very poor weather conditions lots of rain and wind could have masked seabird calls, however the return visit also did not indicate any seabird activity in the burrows that were investigated.

White-tailed tropic bird/Tava'e (*Phaethon lepturus*)

Several observed on both days when observing from southern rim of crater into Nu'utele Bay, flying over canopy. Likely to be breeding.

Red-footed booby/Fua'o (*Sula sula*)

92+ pairs estimated in two locations. Tall trees on the southern end of Nu'tule Bay on slopes supported the largest number of nests 82+ counted from vantage point 1 (see map). Large fluffy chicks were present, although eggs would have been difficult to observe from the distance we were at, so they may also have been present as breeding seasons are often extended for this species (note this also seems to coincide with red-footed boobies observed nesting around the outer crater slopes of Apolima Island a week later, from a vessel). A further 10+ nests were counted on a southern tip of the island. Red-footed boobies were also seen flying into the trees on the ridge above camp, but breeding wasn't confirmed there, but likely.

Brown booby/Fua'o (*S. leucogaster*)

A promontory extends from the south end of the crater rim which can be accessed after an enormous fetau tree (*Calophyllum inophyllum*) is reached on the rim. Brown boobies were found nest building on the rocky high point towards the end. We counted 7 birds and at least 3 nests. Not wanting to disturb the birds we did not investigate further. (Figs 5 and 6). On the return trip on 13th May one chick at this location was observed ready to fledge.

Greater frigatebird/Atafa (*Fregata minor*)

Early morning on 25 October 11 were observed flying into the island over Vini Flats. Several were also observed flying over trees at the northern end of Nu'utele Bay and one female GFB observed sitting in trees near a large red-footed booby chick. It seems likely they are breeding there but unconfirmed. GFB were also observed patrolling above the camp site where boobys were coming in. This is not surprising as they are a known kleptoparasite.

Brown noddy/Gogo (*Anous stolidus*)

Brown noddies were observed in numbers flying over the canopy in Nu'utele Bay as well as on rocky slopes from vantage points along the crater rim. On low scrubby bushes above the rock platform below vantage point 1, seven nests were observed, although more are likely.

Bridled tern/Gogo (*Onychoprion*)

A pair of bridled tern landed on rock platforms below lookout 1. They appear to be nesting but hard to confirm at the distance from the lookout.

White tern/Manusina (*Gygis alba*)

Several seen over forest in Nu'utele Bay. Likely to be breeding.

Other bird species, Nu'utele

No formal counts of land birds were undertaken. However, species seen were recorded. Shy ground dove (*Gallicolumba stairi*) were seen on the flats on both visits.

Eastern reef heron/Matu'u (*Egretta sacra*)

Wandering tattler/Tuli (*Tringa incana*)

Pacific pigeon/Lupe (*Ducula pacifica*) Several were seen especially when observing over Nu'utele Bay forest canopy.

Blue-crowned lory/Segavao (*Vini australis*)

Flat-billed kingfisher/Ti'otala (*Todiramphus recurvirostris*)

White-rumped swiftlet/Pe'ape'a (*Aerodamus spodiopygius*)

Samoan broadbill/Tolaifatu (ula) (*Myiagra albiventris*)

Samoan whistler/Vasavasa (*Pachycephala flavifrons*)

Polynesian triller/Miti tai (*Lalage maculosa*)

Samoan triller/Miti (*Lalage sharpei*)

Wattled honeyeater/Lao (*Foulehaio carunculata*)

Cardinal honeyeater/Segaseaga ma'u (*Myzomela cardinalis*)

Polynesian startling/Fuia vao (*Aplonis tabuensis*)

Samoan starling/ Fuia (*Aplonis atrifusca*) These birds appear to fly over to Nu'utele to roost with flocks arriving late in the afternoon and departing early morning.

Invasive species.

Rats. An attempt was made to eradicate polynesian rats in 2009, however subsequent surveys found that they were still there. 7 rats were seen in the evening and early morning.

Yellow crazy ants. These were common in the fales. Samples were taken for verification of species.

Pigs. Although none were seen there was plenty of pig rooting sign on the island including on Vini flats and on the ridge.

Nuúlua Island.

Brown booby's were nesting on open promintories at either end of the beach as well as a large rock stack. We estimated over 200 pairs with young ranging from large fluffy chicks to near fledging.

We ascended the island following the summit ridge. Tree nesting seabirds were well distributed around the island on the ridges and flats, although we didn't get time to explore the flats. Seabirds included red-footed booby, brown noddy (had chicks near fledging), white tern, long tailed tropic bird and frigate birds. Friendly ground dove were noted as well as blue-crowned lory and other common forest birds.

Two large burrows were found under a large tree with feathers inside. These look about the size and colour of wedge-tailed shearwater and were collected. A recorder was placed at this location. There were also lots of small holes likely to be various sizes of coconut crabs which are common on the island. 2 small dark feathers were also collected from a second burrow. A second recorder was placed on the edge of an escarpment over the forest above the beach. (See Map 2)

No evidence of pigs was seen.

A plant list was also collected on the island as visits are infrequent to this difficult to access islands. Appendix 1)

Discussion and recommendations.

Nu'utele and Nu'ulua are the most important offshore islands in Samoa for biodiversity. They are part of the Aleipata Marine Protected Area which is a partnership between the Government of Samoa and all the Aleipata District villages. Polynesian rats clearly remain a concern for the biodiversity of the island including seabirds. If burrowing seabirds do remain on the island then rats are likely to be contributing to their low numbers or possible extirpation in the near future. Pigs are also a significant concern for seabirds as they are capable of digging out of burrows or taking chicks of surface nesting birds.

The five acoustic recorders which are now on Nu'utele and two on Nu'ulua will need to have their batteries and SD cards replaced every few months. Ideally they should be on the island for twelve months to cover all potential breeding times of seabirds. SD cards lasted for two months on Nu'utele. Ideally we need to return twice more to the islands, one more SD card replacement and then retrieval to get best coverage.

Given the very close proximity of American Samoa and the presence of petrels there which are actively being researched it is also recommended that some collaborative projects are developed where expertise from researchers in American Samoa can be shared with Samoa's fledgling seabird research community. This could include visits by Samoan researchers to American Samoa to participate in research and vice versa. Further funding is required to continue seabird research in Samoa.

A priority goal of the Aleipata MPA Management plan includes the eradication of rats and restoration for endangered birds including seabirds. Seabirds such as boobys, terns and noddies and frigatebirds are significant to the Aleipata communities. Harvesting of birds, bats and turtles has been banned. Eradicating rats from Nu'utele is a high priority. Confirmation of rat-free status of Nu'ulua is also a high priority.

One of the objectives of this survey was also to discuss local knowledge of seabirds with the Aleipata Communities. Seabird ID booklets have been developed by CG which can be used for discussions with community members especially elders and fishers who may have knowledge of nocturnal calls of seabirds around the islands indicating presence of petrels. A separate application for funding has been made to support this work and to investigate possible breeding locations of the TS on Upolu.

At sea surveys are an important method for determining what seabirds may still be breeding in Samoa. It is also recommended that further at sea surveys are conducted at various times of the year.



Fig 10. Brown booby's starting to nest on southern promontory of Nu'utele I.



Fig 11. Birds were observed bringing nesting material. Nest material.



Fig 12. Pig rooting on Vini Flat, Nu'utele I.



Fig 13. Investigating seabird burrows, Nu'utele I.

Future surveys and funding.

Aa outlined above we need to undertake two more survey trips to the Aleipata Islands to change SD cards and batteries and finally retrieve recorders. We would like to apply to the BirdsNZ Watson Trust Pacific Island Bird Conservation and research Fund for additional funding to allow us to complete these surveys. This would be to cover a trip to each Island to change SD cards and batteries and then a final trip to retrieve recorders. Total estimated cost would be \$NZD2000.

Appendix 1. Plant list from Nu'ulua 13th April 2023

1. Fasa (*Pandanus tectorius*, screwpine)
2. Fao (*Neisoperma oppositifolium*)*
3. Tausuni (*Heliotropium arboreum*, tree heliotrope)*
4. Futu (*Barringtonia asiatica*, fish poison-tree)
5. Fagaio (*Sterculia fanaiho*)
6. Fau (*Hibiscus tiliaceus*, Beach hibiscus)
7. Magau (*Garuga pacifica*)
8. Asi (*Syzygium clusiifolium*)
9. Auauli (*Diospyros samoensis*, Samoan ebony)
10. Laupata, Papata (*Macaranga harveyana*)
11. Fisoa (*Colubrina asiatica*)
12. Lau'ate'ate (*Wollastonia biflora*, Beach sunflower)
13. Ala'a (*Planchonella garberi*)
14. Olamea (*Aidia racemosa*)
15. Nonu (*Morinda citrifolia*)
16. Maota (*Dysoxylum samoense*)*
17. Fu'afu'a (*Kleinhovia hospita*)
18. Fuesina (*Vigna marina*, Beach pea)
19. Laugapāpā (*Asplenium nidus*, Birds nest fern)
20. Laumagamaga (*Blechnum orientale*)
21. Milo (*Thespesia populnea*)
22. Talie (*Terminalia catappa*)
23. Lau ti (*Cordyline fruticosa*)
24. Suni tai (*Clerodendrum inerme*)
25. Mati (*Ficus uniauriculata*)
26. Matalafi (*Psychotria insularum*)*
27. To'ito'i (*Scaevola taccada*)
28. Gau (*Alyxia stellata*)
29. Falagā (*Barringtonia samoensis*)
30. Toi (*Alphitonia zizyphoides*)
31. Pu'a Vai (*Pisonia grandis*)
32. Falaga (*Barringtonia samoensis*)*

*flowering or fruiting during visit

Appendix 2.
Seabirds previously recorded from Aleipata Islands.

Seabird species	Nu'utele Island	Nu'ulua Island	Namu'a Island	Fanuatapu Island
Wedge-tailed shearwater/Taio (<i>Puffinus pacificus</i>)	Park <i>et al</i> (1992) (unconfirmed seabird burrows)			
Tropical shearwater/Taio (<i>P. herminieri</i>)	Park <i>et al</i> 1992 (unconfirmed seabird burrows)			
Greater frigate bird/Atafa (<i>Fregata minor</i>)	Whistler 1983	Whistler 1983		
Lesser frigatebird/Atafa (<i>Fregata ariel</i>)		Park <i>et al</i> 1992 small numbers		One male
White-tailed tropicbird/Tava'e (<i>Phaethon lepturus</i>)	Parrish and Shirley (2012)			
Red-footed booby/ Fua'ö (<i>Sula sula</i>)	Whistler 1983 40 pairs (Park 1992) <i>ca.</i> 50-100 pairs June 2000/2003 (Parrish and Shirley, 2012)	Whistler 1983 <i>ca.</i> 250 pairs (Park <i>et al</i> 1992) <i>ca.</i> 200-250 pairs June 2000/2003 (Parrish and Shirley, 2012)		Whistler 1983 (unconfirmed chick)
Brown booby/ Fua'ö (<i>S. leucogaster</i>)	30 pairs (Park <i>et al</i> 1992)			
Masked booby/Fua'ö (<i>S. dacylatra</i>)		One bird amongst 30 brown boobies (Park <i>et al</i> 1992)		
Common brown noddy/Gogo (<i>Anous stolidus</i>)	Whistler 1983 <i>ca.</i> 100 pairs Park <i>et al</i> 1992 <i>ca.</i> 50 pairs July 2000, common, breeding June 2001; <i>ca.</i> 100 pairs July 2003; 2006 and 2009 presence noted (Parrish and Shirley, 2012);	Whistler 1983 20+ July 2000, common, breeding June 2001; <i>ca.</i> 220 pairs July 2003; 2006 and 2009 presence noted (Parrish and Shirley, 2012)	<i>Ca.</i> 50 pairs July 2003	<i>Ca.</i> 200 pairs July 2003
Blue-grey noddies/Laia (<i>Procelsterna cerulea</i>)	Whistler 1983 Small numbers nesting not confirmed (Park <i>et al</i> 1992) One pair July 2000 nesting? (Parrish and Shirley, 2012)	Whistler 1983 One pair June 2001 (Parrish and Shirley, 2012)		Two pairs not confirmed nesting (Park <i>et al</i> 1992)
Black Noddy/ Gogo'uli (<i>A. minutus</i>)	Not known breeding	Not known breeding	Not known breeding	Not known breeding
White tern/Manusina (<i>Gygis alba</i>)	Observed by Park <i>et al</i> 1992 Max 5 observed (Parrish and Shirley, 2012)	Observed by Park <i>et al</i> 1992	5 observed June 2001 (Parrish and	

			Shirley, 2012)	
Bridled tern/ Gogo'uli (Onychoprion anaethetus)	Observed flying to islands (Tarburton 2001)			

References:

Atherton, James and Jeffries, Bruce (editors). 2012. Rapid Biodiversity Assessment of Upland Savai'i, Samoa. Secretariat of the Pacific Regional Environment Programme.

Atherton, James and Tipama'a, Faleafaga Toni. Review of the Status of Knowledge of Samoan Avifauna O Le Siosiomaga Society Incorporated and BirdLife Pacific Partnership.

Murphy, Robert Cushman Murphy and Snyder, Jessie Pennoyer. 1952. The "Pealea" Phenomenon and other notes on Storm Petrels. American Museum Novitates December 8, number 1596

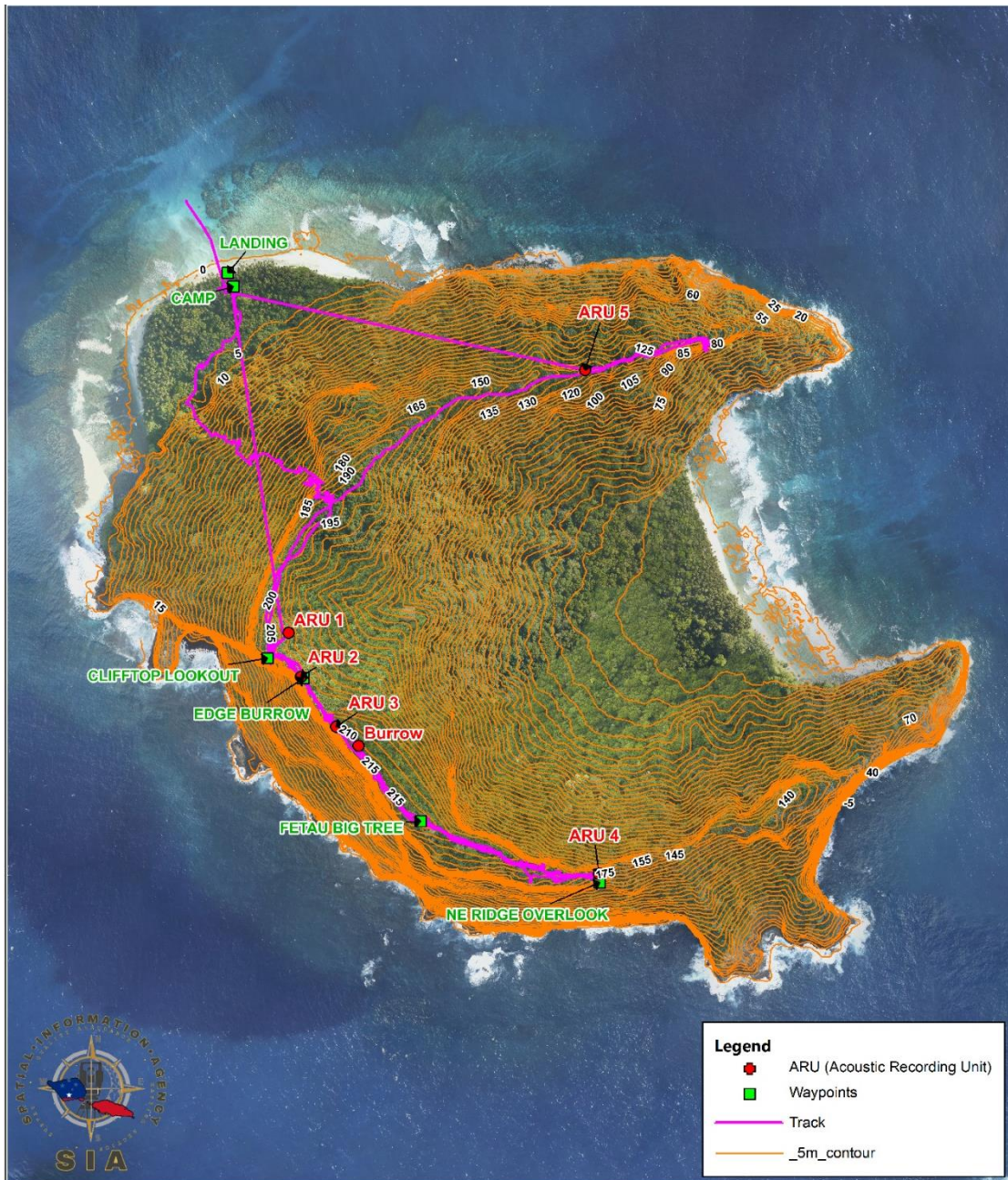
Park, G.; Hay, R.; Whistler, A.; Lovegrove, T. 1992. The national ecological survey of Western Samoa. The conservation of biological diversity in the coastal lowlands of Western Samoa. New Zealand Department of Conservation, Wellington, 196p

Parrish, Richard and Sherley, Greg H. 2012. Birds of the Aleipata Islands, Samoa. Notornis 59:153-162

Tarburton, Michael K. 2001. Observations on the status of the landbirds, wading birds and seabirds of Samoa. *Emu*, 101, pages 349-360.

W. Arthur Whistler, 2002. The Samoan Rainforest. A guide to the Vegetation of the Samoan Archipelago. Published by Isle Botanica, 2814 Kalawao Street, Honolulu, Hawaii 96822 USA

Map 1. Nu'utele Island



NAME	LAYER	ELEVATION	time
LANDING	Waypoint	58.9715	2022-10-23T21:22:22Z
CAMP	Waypoint	15.7705	2022-10-23T21:23:41Z
CLIFFTOP LOOKOUT	Waypoint	211.198	2022-10-23T23:53:06Z
EDGE BURROW	Waypoint	208.481	2022-10-24T00:29:33Z
FETAU BIG TREE	Waypoint	220.642	2022-10-24T00:55:41Z
NE RIDGE OVERLOOK	Waypoint	183.845	2022-10-24T01:34:05Z

NAME	LAYER	ELEVATION	time
ARU 1	Waypoint	195.886	2022-10-24T22:12:22Z
ARU 2	Waypoint	182.489	2022-10-24T22:31:52Z
ARU 3	Waypoint	202.991	2022-10-24T22:48:48Z
ARU 4	Waypoint	184.864	2022-10-24T23:27:30Z
Burrow	Waypoint	215.323	2022-10-25T00:27:08Z
ARU 5	Waypoint	140.56	2022-10-25T02:06:10Z

Map 2. Nu'ulua Island

