# RAPID BIODIVERSITY ASSESSMENT (BIORAP) OF UPLAND SAVAI'I, SAMOA

## MAY 2012

## SYNTHESIS REPORT

### KEY FINDINGS AND RECOMMENDATIONS

MNRE

CRITICAL ECOSYSTEM PARTNERSHIP FUND

SPREP
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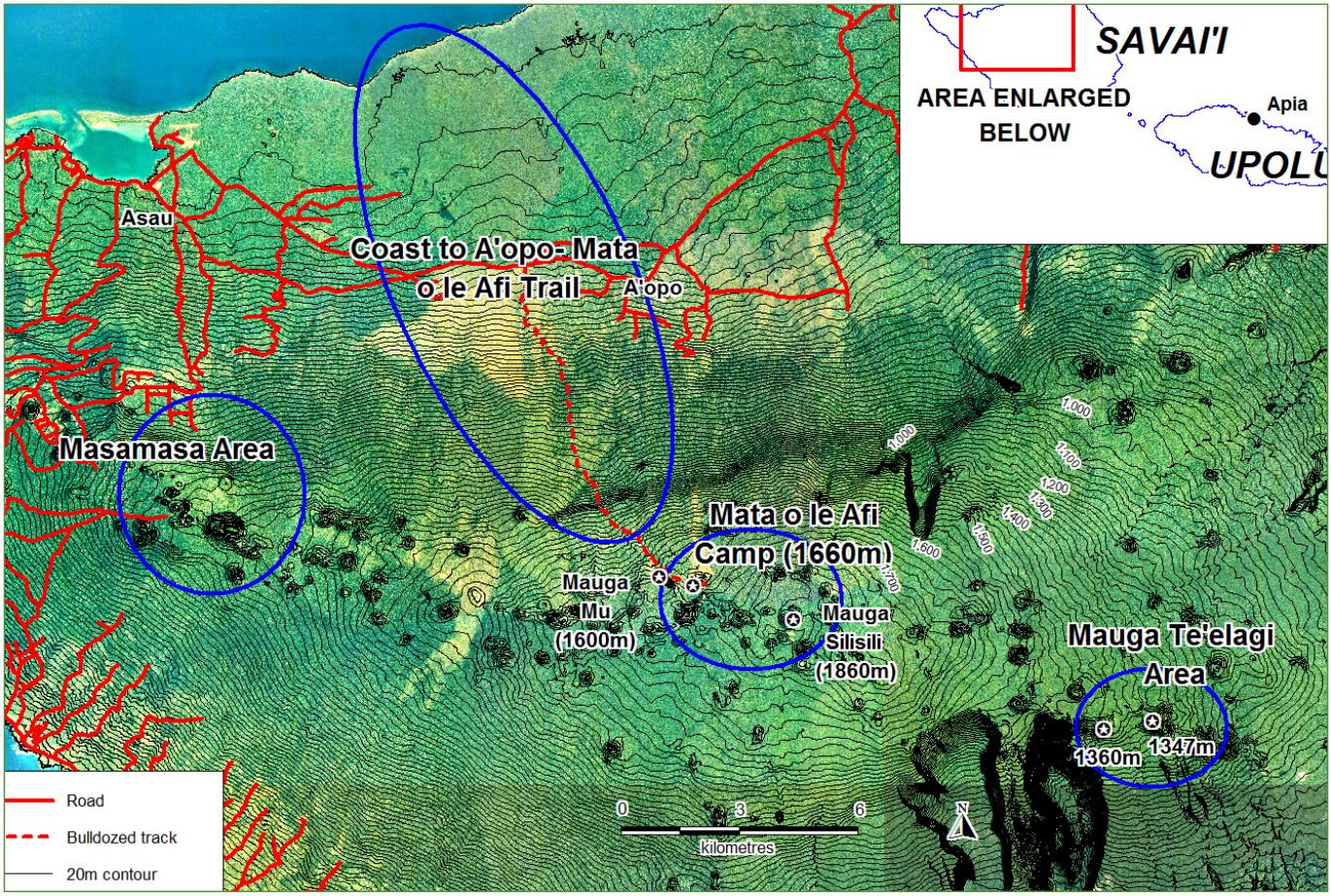


Figure 1: Upland Savai'i survey sites. Blue circles represent survey areas.

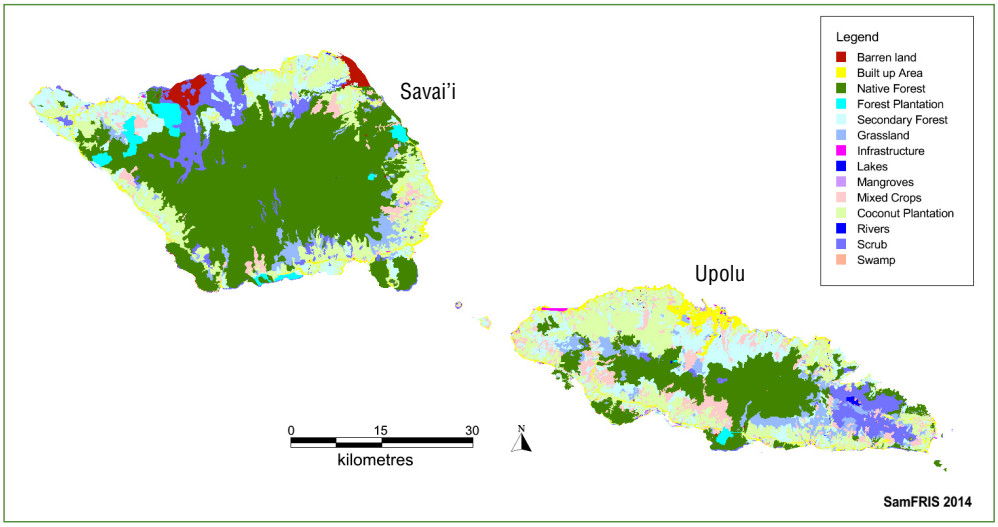


Figure 2: Samoa National Land Cover Map (2013) showing the large area of forest (dark green) remaining on Savai'i.

## Savai'i Snapshot

The independent state of Samoa comprises two large islands, Upolu and Savai'i, and eight small islets covering a total land area of 2,842 square kilometres. Savai'i is the largest island with an area of 1,700 square kilometres.

The Savai'i uplands hold the largest remaining area of native forest in Samoa (Figure 2), and have numerous volcanic craters containing permanent or seasonal wetlands. Covering an area of 727 square kilometres, it is the largest area of continuous tropical forest in Polynesia. The forest is relatively intact due to its remoteness and its distance from the coastal villages meaning that forest clearance for access roads and plantations have not penetrated very far.

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# THE BIORAP

## What

A BIORAP is a biological inventory programme undertaken in marine and/or terrestrial environments, and is designed to rapidly assess the biodiversity of highly diverse areas. Options to manage threats and protect biodiversity of national or international significance are recommended to governing communities.

## Where and When

The BIORAP took place in selected areas of the upland ecosystems of Savai'i, Samoa during 20–31 May, 2012. Figure 1 shows the main area sampled by all specialist teams. In addition, the bird team visited an area to the west around Masamasa and the reptile team surveyed a transect from near Mt Silisili to the coast.

## Who

The Secretariat of the Pacific Regional Environment Programme (SPREP) recruited a team of 16 conservation specialists from a diverse range of international institutions to work in partnership with Samoan Government staff, to participate in the survey.

## Why

The information gathered provides a scientific basis for empowering communities, relevant government departments, and other partners to make informed conservation management and planning decisions to ensure the long-term conservation of biodiversity, and the essential ecological services it provides.

During the BIORAP, community involvement and participation in conservation management was strengthened and local staff and scientists were trained in biodiversity survey techniques, and to develop management policies and identify sustainability options.

## Survey Context

The Savaii uplands were included in a 1996 survey – '*The Conservation of Biological Diversity in Upland Ecosystems of Samoa*' – six years after Samoa was devastated by Cyclones Ofa (1990) and Val (1991). This survey concentrated on the eastern part and established vegetation plots at eleven sites, undertook bird counts at five sites and did some preliminary sampling of invertebrates. It concluded that the surveyed site was nationally significant for conservation and recommended linking this to adjoining lowland forests and thereby conserving a large range of Samoa's ecosystems and species.

The 2012 BIORAP built on this earlier survey and provided a more comprehensive assessment including reptiles and an increased focus on invertebrates. It aimed to cover more sites in the western part of the uplands and succeeded in visiting several remote volcanic craters with the assistance of helicopters from the New Zealand Defence Force.

# KEY FINDINGS

The Savai'i upland forests are nationally and internationally significant because of their large area, their relatively intact condition and limited invasion by pest and weed species. With more than 450 square kilometres of montane forest, and 80 square kilometres of globally threatened cloud forest, along with the numerous volcanic craters and lava flows, the upland forests of Savai'i are unique by any measure and worthy of special conservation effort to ensure that their natural values are retained.

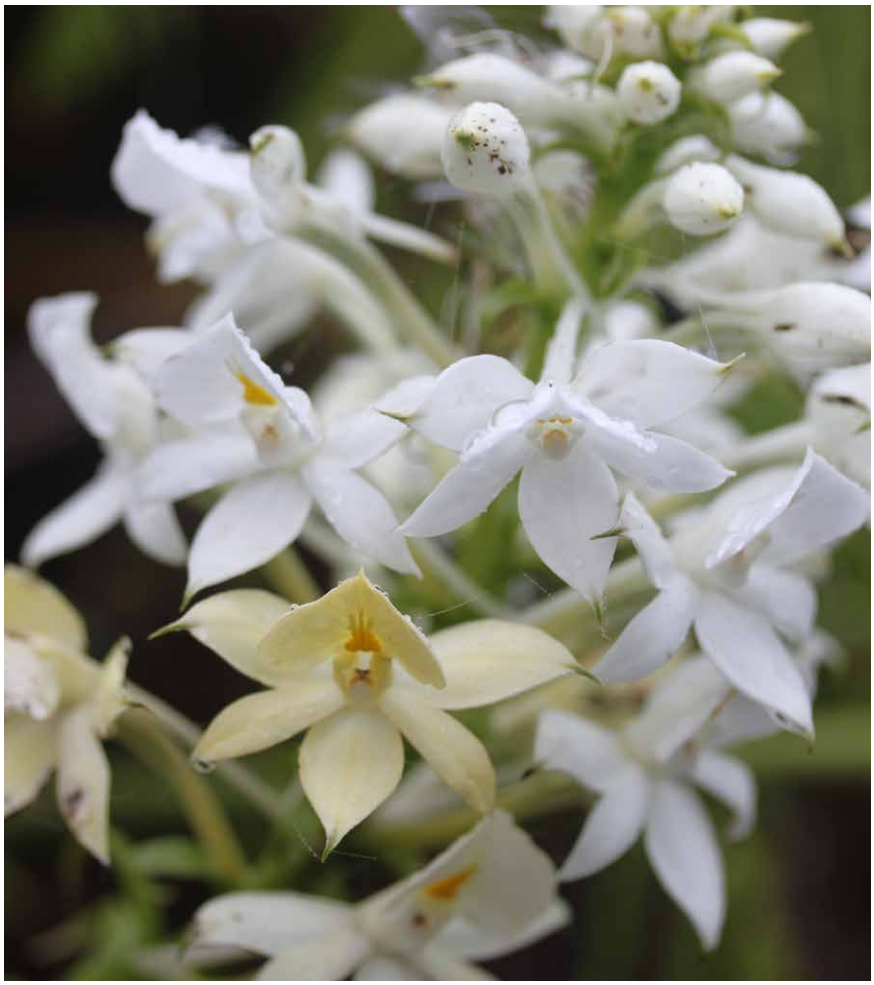
Several species recognised as globally threatened on the IUCN Red List are found in the upland Savai'i forests including four birds and one mammal, the Samoan flying fox (*Pteropus samoensis*). In addition new un-named species of land snails and moths.

There are threats to the uplands particularly from informal roads penetrating high into the interior and invasive species that move along these.

## Savai'i Cloud forest

This special, magical habitat is found only above 1,500 metres elevation where the forest is often covered in cloud. The cool, moist conditions mean that the trees are generally small and covered in epiphytic plants including ferns, orchids, mosses and lichens. The cloud forest is virtually untouched by man, only visited by the occasional pig hunter, and contains a high rate of endemism with half the dominant tree species studied there being only found in Samoa.

Photo: A. Whistler.



## PLANTS

More than 200 vascular plant species were recorded in the upland area above 1,000 metres elevation, representing about a quarter of the Samoan flora, including 71 endemics. The survey found four rare plants one of which (*Calanthe whistleri*) is probably endangered, and two orchids not previously found in the country which may be new species.

Vegetation was found to be healthy and had recovered from cyclones Val and Ofa. Of particular significance was the cloud forest (see box) found only at the highest elevations on Savai'i and nowhere else in the country.

*Calanthe whistleri* photographed on Mauga Mu. Photo: A. Whistler.

## REPTILES

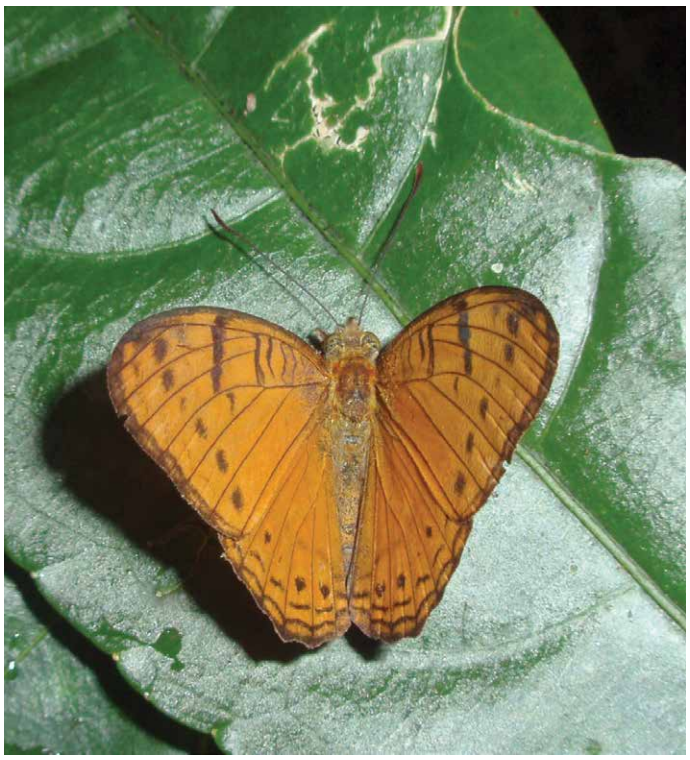
Along a transect from Asau on the coast to Mt Silisili, eleven species of reptiles were recorded including the snake-eyed skink (*Cryptoblepharus poecilopleurus*), which was detected on Savai'i for the first time. The Pacific black skink (*Emoia nigra*) was a notable absentee. No reptiles were found above 1320 metres elevation.

Snake-eyed skink (*Cryptoblepharus poecileopluris*). Photo: C. Brown.

## MOTHS AND BUTTERFLIES

Surveys of moths and butterflies indicated that the Savai'i highlands were relatively unspoilt with a biodiversity and a diversity of forest types once typical of high oceanic islands throughout the tropical Pacific. In the upland survey, 135 taxa across 21 families were recognised, including several new species. Butterflies are not usually associated with uplands and only two species were recorded. The big-eyed blue (*Nacaduba dyopa dyopa)* was found in forest clearings and the Samoan ranger (*Phalanta exulans)* was common everywhere during the expedition.

The large majestic Pepe ae (Samoan swallowtail butterfly *Papilio godeffroyi*) was not recorded and is sadly thought to be extinct in Samoa (while still existing in American Samoa).




Above: Pepe ae, the Samoan Swallowtail Butterfly. The last verifiable record in Samoa is from Palauli in 1979. Photo: B. Rhode.

Left: Samoan Ranger butterfly *Phalanta exulans*.
The only butterfly breeding in the cloud forests above 1300 metres elevation. Endemic to Upolu and Savai'i. Photo: E. Edwards.

## LAND SNAILS

The land snail survey yielded exciting results with many new species found. A total of 50 native land snail species, and one introduced species were recorded. Of the 50 native species, only 14 species had been previously found and given a species name. Ten of these are known to be endemic to Samoa.

The other 36 native snail species, comprising 72% of the upland land snail fauna, are unnamed, and had not been recorded previously from Savai'i or elsewhere. All of these unnamed species were probably Samoan endemics, and it is likely that many, if not all, are restricted to the uplands of Savai'i. They include species in general not previously recorded from Polynesia.

Ma'oma'o (captured on Upolu). Photo: D. Butler.

## BIRDS

No trace of the Puna'e or Samoan woodhen (*Pareudiastes pacificus*) was found, which tends to confirm the view that this species, whose last confirmed sighting was in 1873, is extinct. Only a single possible sighting of the endangered Manumea or tooth-billed pigeon (*Didunculus strigirostris*) was made, raising concern that its situation may now be critical. In addition, no Tuaimeo or friendly ground-doves (*Gallicolumba stairii*) were seen and only small numbers of the endangered Ma'oma'o or mao (*Gymnomyza samoensis*) were found at inland craters.

One positive finding was good numbers of the Matapaepae or Samoan white-eye (*Zosterops samoensis*), which is endemic to the Savai'i uplands. One seabird, a Tahiti petrel (*Pseudobulweria rostrata*), was found at an inland crater, which is the first record for this species in Samoa, and it seems likely that the uplands with their numerous inaccessible craters may be a significant refuge for burrow-nesting seabirds.

## INVASIVE SPECIES

Invasive weeds were most evident on a bulldozed road towards Mata o le Afi where two species, *Clidemia hirta* (Koster's curse) and *Mikania micrantha* (mile-a-minute vine) are of particular threat. Interestingly, even the hard to access craters right in the interior had some weeds present. Rats (*Rattus* spp.) were widespread and wild cats, feral pigs and cattle were encountered at some sites.

Higher elevations (above 560 metres) appeared free of invasive ants, whereas in Hawaii, with a similar ecology, invasive ants are greatly impacting on high elevation ecosystems. However, yellow crazy ants (*Anoplolepis gracilipes*) were found to be occurring in very high numbers below 560 metres on this side of Savai'i and in these areas only a few species of lizards can co-exist with them.

Spread of weeds on bulldozed track from A'opo village. Photo: D. Butler.

# RECOMMENDATIONS

As well as overall high ecosystem values, the findings of this BIORAP survey identified or re-confirmed the critical importance of the biodiversity and ecosystems of the Savai'i uplands for some groups (e.g. land snails) and the urgent need for follow-up activities to manage and mitigate threats to their conservation. It also emphasised the significance of lowland forests, for birds and reptiles in particular.

Key recommendations included:

## CONSERVATION OF UPLAND AND ADJACENT LOWLAND FORESTS

- **Review different approaches to conservation** applied in Samoa and the wider Pacific to come up with effective approaches.
- **Discuss and reach agreement with local communities** how to manage the uplands sustainably.
- **Utilise other projects** to undertake research and further the conservation of the Savai'i uplands.
- **Implement conservation education and awareness** programmes with Savai'i communities.
- **Investigate the potential of World Heritage or Biosphere Reserve status** to support conservation of the upland forests.

## AWARENESS AND ENFORCEMENT OF LEGISLATION

- **Raise awareness** among village communities on the purpose of environmental laws and activities that are regulated.
- **Enforce environmental laws** such as those banning the harvest of native birds and flying foxes and regulating developments such as access roads.
- **Regulate the use of access roads** that enter the relatively untouched environment of the uplands of Savai'i.
- Encourage A'opo village to ban access to the Mata o Le Afi road to all vehicles and road making machinery above 1000 metres elevation, with access to foot traffic only.

## MANAGE INVASIVE SPECIES

- **Conduct biosecurity training with local communities** to obtain support for preventing the introduction or spread of invasive species.
- **Control and/or eradicate weeds** growing along the bulldozed road to Mata o le Afi.
- **Monitor the extent of invasive ant colonies** along access routes to the uplands.

## INCREASE KNOWLEDGE OF BIODIVERSITY

- **Carry out follow-up surveys** in areas not visited e.g. around Lake Mafane, Lake Mataulano, Mauga Maugaloa and Mulimauga.
- **Focus further surveys on volcanic craters** with diverse habitats.
- **Focus surveys on specific species or taxonomic groups**, e.g. tooth-billed pigeon, seabirds.
- **Record the traditional knowledge of village people** on their relationship and experiences with their environment and natural resources.

## MANAGE ECOTOURISM

- **Prepare and implement a sustainable development plan for the ecotourism** development of upland Savai'i.
- **Manage ecotourism** to prevent damage to the vulnerable upland forests and lava flows. Identify consistent visitor fees, mark and bench trails, minimise biosecurity risks, train guides, and establish a camp site at Mata o Le Afi that prevents damage to the lichen on the ash plain.

## MANAGE HIGHLY THREATENED SPECIES

- **Increase efforts to conserve the tooth-billed pigeon.**
- **Assess the benefits of local seasonal suppression of rats and cats** to benefit birdlife including the mao.


## ACKNOWLEDGEMENTS

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Synthesis compiled by R&D Environmental Ltd.


For detailed information and results please refer to the full BIORAP report *Rapid Biodiversity Assessment of Upland Savai'i, Samoa* available on the SPREP website.

For more information on the methods refer to the *Guidelines for Undertaking Rapid Biodiversity Assessments in Terrestrial and Marine Environments in the Pacific* (SPREP & Wildlands, 2014).

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Front cover images from left to right: Red-headed parrotfinch (R.Stirnemann), Endemic Samoan skink (C.Brown), Endemic moth (E.Edwards). Background image: The pristine forests of Upland Savai'i (S.Chape).

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