

NIUE'S NATIONAL INVASIVE SPECIES STRATEGY AND ACTION PLAN

2013–2020



**DEPARTMENT OF
AGRICULTURE, FORESTRY
AND FISHERIES**



**DEPARTMENT OF
ENVIRONMENT**



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Covering a large area around the village of Alofi, taro vine (*Epipremnum pinnatum*) poses a major threat to the Huvalu Conservation area. Training and practice using water in preparation for targeting isolated infestations of taro vine.

FOREWORD

Fakalofa lahi Atu

The people of Niue value both the terrestrial and the marine environment. It is their livelihood and the need to protect and conserve it is of paramount to its people. It is also important the respective ecosystems are maintained and sustained for our future generations. However the threat poses by the introduction of alien invasive species is threatening the very existence of the Niue people. Our one island is very vulnerable and susceptible to any invasion of any alien species therefore we as a society with Government have a vital role in ensuring that we do not introduce any invasive species to our environment. Everyone has a role to play in our fight against invasive species

Invasive species does not distinguish between countries boundaries and within our local communities which means that the international and the local communities do need to work together. Our ability to deal with invasive species relies on the help of our government to provide the link between international organisations and local communities to build networks and partnerships. This will help us build the foundations needed to generate support, build capacity and develop legislations, policies and protocols. With these core pillars forming the foundation we will ensure that we have the best structures in place to manage invasive species.

This Strategy and Action Plan is a roadmap to ensure we took a consolidated effort to target the threat invasive species has on our unique and vital environment.

We all have a role to play in this Action Plan in ensuring that our livelihood stands to continue for our future generations.

Kia Monuina

A handwritten signature in blue ink, appearing to read 'Talagi', enclosed within a large, loopy oval flourish.

Hon. Billy Graham Talagi

Minister of Environment
Government of Niue

KEY CONCEPTS AND ACRONYMS

Biocontrol or biological control	Controlling an invasive species by introducing a natural enemy, such as an insect or fungus, that specifically attacks the target species and does not attack other native or economically important species.	ERP	Emergency Response Plan
Biodiversity	The variety of living organisms on the earth, including the variability within and between species and within and between ecosystems.	GEF-PAS Inv	The Global Environment Facility Pacific Alliance for Sustainability. United Nations Environment Programme: Prevention, Control and Management of Invasive Alien Species in the Pacific Islands
Biosecurity	Preventing the spread of invasive species across international or internal borders.	GISD	Global Invasive Species Database (maintained by ISSG)
Control	Reducing the population of an invasive species.	GISIN	Global Invasive Species Information Network
Eradication	removal of the entire population of an invasive species.	HPWRA	Hawai`i-Pacific Ecosystems at Risk
Introduced species	Plants, animals and other organisms taken beyond their natural range by people, deliberately or unintentionally.	IBPoW	Island Biodiversity Programme of Work
Invasive species	Introduced species that become destructive to the environment or human interests; can also include some native species that increase in number and become destructive following environmental changes.	IAS	Invasive Alien Species
Native species	Plants, animals and other organisms that occur naturally on an island or in a specified area, having either evolved there or arrived without human intervention.	IS	Invasive Species
Risk assessment	Evaluation of the risk that a new introduced species will become invasive with damaging consequences, prior to its introduction	ISSG	Invasive Species Specialist Group of the Species Survival Commission of the IUCN
Surveillance	Monitoring to detect the arrival of new invasive species.	IUCN	International Union for Conservation of Nature
CABI	Commonwealth Agricultural Bureaux International	NBC	Niue Broadcasting Corporation
CBD	Convention on Biodiversity	NBSAP	National Biodiversity Strategy and Action Plan
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	NISSAP	National Invasive Species Strategy and Action Plan
DAFF	Department of Agriculture, Forests and Fisheries	PestList (PLD)	Pacific Islands PestList Database
DOE	Department of Environment	PIER	Pacific Island Ecosystems at Risk – for plant risk assessment information
ED	Education Department	PII	Pacific Invasives Initiative
EDRR	Early Detection and Rapid Response	PILN	Pacific Invasives Learning Network
		PIP	Pacific Invasives Partnership
		PIRNC	Pacific Islands Roundtable for Nature Conservation
		Plant Pono	Hawai`i-Pacific Ecosystems at Risk website for plant risk assessment information
		PoWPA	Programme of Work on Protected Areas
		SPC	Secretariat of the Pacific Commission
		SPREP	Secretariat of the Pacific Regional Environmental Programme
		SSC	Species Survival Commission of IUCN
		UNEP	United Nations Environment Programme

1. INTRODUCTION

The vital importance of invasive species to Niue

Invasive species are a major global threat to biodiversity and Pacific Islands are particularly vulnerable due to their isolation and relatively recent human occupation. Their native species often cannot cope with predation or competition from new arrivals. Niue already suffers from the impact of invasive species that have arrived in the country. However there are many more devastating species that are not present but found in other countries of the region and every effort needs to be made to prevent their arrival.

Niue's native animals, birds and forests, its fish, marine invertebrates and coral reefs, underpin much of life on Niue, providing food and other resources. They are also vital to tourism which is seen as a key sector for the nation's economic development.

The invasive species found on Niue threaten the native biodiversity, agricultural production and human wellbeing and this strategy addresses the control or eradication of the worst of these. Rodents (two species of rats and mice) and feral cats are likely to threaten the extinction of native birds (e.g. the hega or blue-crowned lory) and reptiles (e.g. the olive small-scaled skink) as well as impacting on forest growth and human health. Feral pigs damage forests and plantations and feed on native invertebrates. Several pest plants, or weeds, threaten native plants and forest quality and impact on the agricultural sector requiring the extensive use of herbicides. Invasive yellow crazy ants threaten native invertebrates including the uga or coconut crab. Insect pests affecting food crops include three fruit flies (*Bactocera passiflorae*, *B.kiriki*, *B.xanthodes*) that have some economic impact through restricting export of fruit. No detailed surveys have been undertaken for marine invasives.

Niue currently has several species of mosquito including the introduced *Aedes aegypti* which is one of the main carriers of dengue fever. One predicted consequence of climate change (global warming) could be that mosquitoes and the diseases they carry may spread further south within the Pacific so there may be increased risks to human health.

There are many examples from other island countries of invasive species that have had devastating and very costly consequences. The brown tree snake is thought to have caused the extinction of 10 native landbird species on Guam leaving only two (Rodda & Savige 2007). Imagine if Niue similarly lost over 80% of its landbirds – it might just be left with the heahea and miti. The taro leaf blight reduced annual export returns for this crop in Samoa from around WS\$10 million to c.WS\$150,000 (US\$60,000) over a couple of years (Hunter et al. 1998). Imagine if a new disease wiped out Niue's taro crop. The yellow-crazy ant has killed an estimated 10-15 million of the famous red crabs on Christmas Island in the Indian Ocean in recent years (O'Dowd et al. 2003) – imagine if it had the same impact on the uga which is quite possible. The little fire ant threatens tourism on several Pacific islands.

In 2004 the IUCN produced an updated publication of a selection of '100 of the World's Worst Invasive Species' (Lowe *et al.* 2004). Niue already has at least 11 of the species on this list (4 mammals, 2 ants, 5 plants) so has plenty of work to do to manage these, but there are a vast number more out there ready to invade if Niue does not maintain strong border control.

Invasive species are everyone's responsibility

The movements of people, and their goods and supplies, are the key ways that invasive species reach a country. So the behaviour of individuals like you is the key to their management. You need to avoid bringing 'at risk' goods into the country (fruit, plant material including seeds, soil (even on boots), etc.). If you see a plant overseas that you would like to grow in Niue, identify it, then ask DAFF Quarantine first. They will do a 'risk assessment' to decide if it is safe to bring in later. If you are importing a container of goods, or deck cargo such as a vehicle or timber, check it very carefully when you get it home and alert DAFF Biosecurity if you find any live animals/insects, or their eggs. Keep an eye out in your village, plantations and forest for any unusual animals or plants, for trees with leaves being eaten or dying over large areas – you may be the first to spot the arrival of a new plant disease or insect pest. Detecting this early is the key to eradicating it and potentially saving Niue millions of dollars.

Invasive species are clearly also an international issue with an emphasis on preventing them moving from one country to another. So there are a number of international and regional organisations undertaking coordinating roles, a number of international regulations in force, and countries that trade with each other work in close cooperation.

Niue's biodiversity at risk

Niue because of its isolation and limited habitats has few endemic species – i.e. ones found only in this country. However those it does have are of global importance as if they are lost from Niue then they are completely extinct. Of the vertebrates there are two marine endemic species recorded, the flat-tail sea snake (*Laticauda schistorhynchus*) and combtooth blenny (*Ecsenius niue*), and two endemic sub-species among the birds, Miti/ Polynesian starling (*Aplonis tabuensis brunnescens*) and Heahea/Polynesian triller (*Lalage maculosa whitmeei*).

Invertebrates endemic to Niue include a recently described butterfly, the Niue Blue *Nacaduba niueensis*, a rattlebox moth *Utetheisa maddisoni*, a leafhopper *Empoasca clodia*, a planthopper *Macrovanua* (or *Vanua*) *angusta*, a weevil *Elytrurus niuei*, a scale insect *Paracoccus niuensis*, a land snail *Vatusila niueana*, a crab *Orcovita gracillipes*, a cave-dwelling crustacean *Pugiodactylus agarthus*, an ostracod crustacean *Dantya ferox*, and a periwinkle *Cenchrites* (or *Tectarius*) *niuensis*. The internationally recognised 'The Plant List' accepts a screwpine (*Pandanus niueensis*) as endemic to Niue but in practice it is indistinguishable from fa (*Pandanus tectoris*). A form of *Psychotria insularum* may also be different than that occurring elsewhere. (Source: *Living National Treasures* <http://lntreasures.com/niue.html>).

Niue's native biodiversity is clearly of huge importance to the country and gives it much of its identity. The species of most importance for conservation include:

- those that are rare and threatened with extinction in Niue such as the hega
- those that are traditionally harvested for food and cultural purposes e.g. on land: the peka, lupe, uga, and various plants and in the sea: pelagic and coastal fish, and invertebrates
- those that play vital roles in ecosystems such as the main forest trees and the lupe and peka which disperse their fruit
- those that provide food and livelihoods – e.g. agricultural crops
- those that support tourism and are enjoyed by visitors, e.g. corals, reef fish, forest trees, whales and dolphins, birds and lizards.

Priority invasive species for management on Niue are largely those that impact on these important species and the habitats they live in. An emphasis is placed on minimising their effects on protected areas such as the Huvalu Conservation Area, and marine reserves.

For more detailed information on the biodiversity of Niue and its conservation refer to the resource information in Niue's revised NBSAP 2013–2020 (under development).

Process of NISSAP development

A National Action Plan for Invasives Species was first adopted in 2001, the same year as Niue's first National Biodiversity Strategy and Action Plan (NBSAP) which devoted one of its seven themes to invasive species. The National Action Plan was reviewed and updated by an Invasive Species Committee in March 2005.

Production of the NISSAP is an activity funded within the GEF-PAS regional invasives project '*Prevention, control and management of invasive alien species in the Pacific Islands*' being implemented by UNEP with SPREP as the executing agency. During its formulation a work plan and timetable was developed that includes activities to be carried out in Niue and these have been carried forward into the Action Plan here.

The development of the NISSAP began with a review of existing information conducted by the Invasive Species Specialist Group (ISSG 2013). Consultations were held in Niue in October 2013 during which the actions in the NBSAP and 2005 plan were reviewed. A national workshop was held on 9th October and working meetings held with the Department of Environment staff and Quarantine staff of the Department of Agriculture, Forests and Fisheries (DAFF). This draft NISSAP was finalised in November 2013 after further working group discussions and its Action Plan was reviewed at a national workshop on Wed 13th November.

The NISSAP takes account of the regional guidelines produced by SPREP and SPC whose goal is: 'To assist Pacific Island countries and territories in planning the effective management of invasive species, thereby reducing the negative impacts of invasives on their rich and fragile native heritage, communities and livelihoods' (SPREP 2009). The Action Plan is organised according to the three thematic areas of the Guidelines: Foundations, Problem Definition, Prioritisation, and Management Action.

Linkages of the NISSAP to other strategies

'Alien and Invasive Species' was one of seven themes in Niue's original NBSAP (Government of Niue 2001) and will be treated similarly in the second NBSAP (2014-2020) (under development) with actions reproduced from the NISSAP.

Niue's current National Strategic Plan (2009-2013) has a reference to invasive species. 'Biodiversity' is listed as one of seven strategies within 'Environment', which in turn is one of six National Development Pillars. One of the Biodiversity targets is to 'Reduce invasive species (including feral pigs) by 15% by 2013'.

A new Niue Island Strategic Plan (2014-2018) is under development and the Department of Environment will advocate for the importance of invasive species management when it has input.

Invasive species can have impacts on agricultural, forestry and fisheries sectors, may spread or have increased impacts as a result of climate change, and are at higher risk of entering the country during the response to a natural disaster such as a cyclone. So it is hoped that the NISSAP will be referred to during the development of strategies and plans within these sectors.

2. GUIDING PRINCIPLES

The 'precautionary principle' should be applied – where there is not enough information to predict whether a species will become invasive or not, it should be assumed that it will have a damaging impact and action should be taken to stop it establishing or spreading.

Preventing the arrival of introduced species is more effective and cheaper than trying to manage them when after they arrive. So an emphasis should be placed on effective border control.

Eradication is more effective and cheaper in the long run than permanent control of an invasive species so should be attempted where feasible. Eradication is most effective if a new arrival is detected early while in small numbers so surveillance is important.

Species that cannot feasibly be eradicated should be considered for ongoing control, particularly biological control. This control may be aimed at keeping them out of important sites for native flora and fauna, e.g. protected areas, or restricting them to very low numbers there.



Well trained specialist pig hunting dogs were brought to Niue to improve the success of local hunters.

3. PATHWAY ANALYSIS

This section identifies the pathways via which invasive species might reach Niue or travel within the country. Risks are increased through a current programme aimed at increasing tourist numbers and a new shipping service that visits a significant number of other countries.

By Air

Niue is served by a single airline, Air New Zealand, flying direct from Auckland once a week through November to March and twice a week during the main tourism season of April to October. Planes are only on the ground for 2 hours before departing again. New Zealand maintains a strict biosecurity regime which has limited the establishment of invasive species in that country so there are limited risks from any stowaways on board. It is thus travellers and their luggage that present a possible threat which is addressed by quarantine inspections on arrival. Key 'at risk' items for accidental introductions are well known, e.g. fruit, anything holding soil, and the most likely deliberate introductions would be seed of other plant material for ornamental or agricultural use.

Mail/courier services to Niue are provided by air and sea and are obvious routes for the entry of plant seeds.

By Sea

Commercial shipping

A new commercial shipping service serving Niue was established in July 2013 by NZ-based Matson Shipping replacing a direct New Zealand-Niue service run by a different company. A vessel (currently MV Liloa) is currently scheduled on a monthly run from Auckland, NZ through Fiji, Samoa, American Samoa, Cook Islands, carrying containers and deck cargo.

Whereas direct shipping from New Zealand carries fewer risks, this altered service that stops and loads cargo from these other countries en route to Niue could potentially carry invasive species that pose very significant threats to Niue. Not only that, but some of these species have definitely been carried by boat to new countries in recent years. These include cane toads and Indian brown mongoose found in Fiji that have been detected over the past five years in Samoa, Indian myna birds that were taken from New Zealand to Tokelau, and a range of invertebrates including African land snails.

Most of Niue's imports arrive in containers loaded in New Zealand so the main increased risk for these is that invasive species may be brought into Niue on the outside of these containers. Vehicles, timber and other building materials are currently shipped in as deck cargo and provide a higher risk with more places that invasive species or their eggs or seeds can be concealed. Niue also accepts goods in containers from several other countries including Japan, Singapore and Australia provided that they are fumigated with methyl bromide prior to shipping.

Previously there was very limited opportunity for invasive species to reach Niue directly from the vessel itself as it anchored 50-100 metres offshore and cargo was transferred to the wharf via a barge. The exceptions would be birds (e.g. myna), some flying insects and perhaps marine species. However the vessel now ties up to the wharf using two ropes, to minimise damage to the reef from its anchors,

Visiting Yachts

Niue hosts c200 visiting yachts annually (Niue Yacht Club website www.nyc.nu) during a season that runs from April to November. The Yacht Club maintains 14 moorings and other yachts occasionally anchor but none have lines attached to the shore. Many of the yachts have been described as ‘puddle jumpers’ (e.g. 26 of 26 on Aug 2010 www.nyc.nu) who ‘*came into the Pacific Ocean as early as last October, and have been “jumping” from one South Pacific location to the next*’. A significant number come from the USA through the Panama Canal, then via Tahiti, Cook Islands, Palmerston Atoll, to Niue.

There is generally not direct contact between these yachts and the shore to facilitate the transfer of terrestrial invasive species, though on one recent occasion a catamaran from Europe was damaged when striking the reef and lifted onshore and sold. So the risk is largely from mobile species, birds, flying insects, rats (by swimming) and marine invasives from hull infestations.

Yachts also visit Beverige Reef, described as ...‘*a great place to stopover on your way to or from Niue*’ (www.nyc.nu). Whether they pose an invasives risk to marine biodiversity there is uncertain depends on whether they are carrying at risk species on their hulls and where and for how long they anchor. A marine survey of this reef has been advocated and this should include a search for invasives.

Other External Pathways

Natural disasters

Natural disasters such as cyclones may directly carry new invasive species to Niue, but their major threat is an indirect one through the consequent relief operation. Large of supplies and relief materials are likely to enter the country over a short period from a variety of different countries, at a time that border control facilities and procedures have broken down. While humanitarian needs are of obviously the priority, disaster management planning needs to emphasise biosecurity to avoid the recovering population being also faced with a long-term threat to their economy or environment.

‘Natural’ pathways

New organisms can also arrive in the ways that they have done so forever unaided by people; by flying to Niue, being carried here on the wind, swimming here or ‘rafting’ here on floating vegetation. All Niueans need to keep an eye out for any unusual species and assess any found for the risk they pose. As an example, a single spur-winged plover (*Vanellus miles novaehollandiae*) spent over a year at Makefu recently having flown to Niue. This is not considered an invasive species.

Internal Pathways

On a single, small island like Niue internal pathways are only relevant to species for which eradication or control programmes are in place. In these cases it is important to prevent any new populations being established by blocking specific possible pathways which will be identified in programme plans. As an example it is possible that Niue may attempt to restrict the spread of yellow crazy ants which could be moved around in soil, plants or building materials from one site to another.

4. ROLES & RESPONSIBILITIES

The Department of Environment (DOE) is the lead agency for the implementation and review of the NISSAP and the delivery of the GEF-PAS Regional Invasives Project in Niue. The draft Environment Bill 2013 includes in the DOE's functions: *'to design and implement with other departments programmes for nature conservation'* which must include the management of invasive species.

The Plant Protection and Quarantine Division, DAFF is the main partner, responsible for border control and management of agricultural pests. Its mission statement is: *'To enhance national economic development by effectively managing the spread of pests and diseases on Niue and by facilitating increased agricultural trade through appropriate bio-security protocols.* (DAFF 2009).

Fisheries Division and Plant Protection and Quarantine Division, DAFF, will play partnership roles for marine invasive species.

The draft Biosecurity Bill 2013 provides for the establishment of a Niue Biosecurity Service within the implementing department, currently DAFF. The Niue Public Service Commission is required to appoint a Director of Biosecurity and 'such Biosecurity Officers as may be necessary for the purposes of this Act, provided that a Manager of Biosecurity is appointed as the technical section head of the Niue.'

A National Invasive Species Coordinator in the DOE has been funded for 2013-2016 through the GEF-PAS Regional Invasives Project with the primary role of implementing and reporting on that project. It is proposed that this position becomes a core Government role once the project is finished.

There is currently discussion about the merging of DOE, DAFF and Niue Meteorological Service into a single Department. Responsibilities for implementing this NISSAP will clearly change if this happens.

A multi-agency Pacific Invasives Learning Network (PILN) team will be re-established to join the regional programme coordinated by SPREP incorporating those with direct involvement with the management of invasive species.

National oversight of invasive species management will be included within the responsibilities of a National Invasive Species Committee.

SPREP and SPC are the two key agencies to provide regional coordination and support for the management of invasive species with impacts on native biodiversity, and agricultural and fisheries sectors, respectively. SPC also supports border control programmes. Annex 1 provides further details of their roles and identifies other agencies and initiatives that support invasive species work in the region.

5. CURRENT & PAST PROGRAMMES

Border Control & Quarantine

DAFF Plant Protection and Quarantine Division check passengers arriving on all commercial flights based on an Arrivals Card that requires declaration of all food items and also other quarantine risk items such as farm equipment, sports equipment, biological specimens and building equipment.

Quarantine Staff are present at the Post Office when mail arrives and is to be cleared. All packages are inspected externally and if there is an indication they may carry at risk material (e.g. seeds) they are opened for a thorough examination. If packets of seed are found the species are checked against import guidelines, and if not permitted they are destroyed by means of incineration.

Commercial Shipping and Yachts

Below are the procedures used by the Niue Quarantine Office with the clearance of incoming yachts and ships.

Inspect 'Customs Crew Search List' for regulated goods. Hand over to the captain a Niue Island Plant Quarantine Regulations 1985 NOTICE TO MASTERS. This is general quarantine information for captain.

Inspect ship's stores, galley, refrigerators, freezers and crew's cabins these goods and determine action to take. Depending on the risk of items:

- Prohibited – secured and must remain on board
- Regulated – package items may be given restricted clearance to land
- Non-regulated – no action

Check the sea vessel and if any of the areas are infested with pests, appropriate action will be determined such as:

- Plants with pests – destroy
- Fruit and vegetables with pests – destroy
- Infested stores (grain etc) – place infested stores in plastic bag and spray stores.

Other actions may include:

- Collecting of specimens for identification
- Inspect garbage drums and ensure they are on deck or in an enclosed space, tightly covered and leak-proof (in some countries this is the responsibility of the health authorities and is only subject to audit by Biosecurity officers).
- Look for live animals and secure them. Arrange for daily examination of animals.
- Inspect for dunnage and ensure it remains on board.
- Inspect rat guards
- Complete Documentation with the captain of vessel filling in a Masters Certificate and declaration.

Once quarantine officer is satisfied with the Yacht, Clearance is then given. Same procedures apply to cargo ships and cruise ships. IF not satisfied, no clearance would be given and yacht/ship is to leave Niue waters immediately.

As for ballast water, check log book. Most yachts don't have ballast water but only large vessels. IMO(international maritime organization) regulation is that they carry a log book at all times with its accurate recordings. If log coincides with the rule of discharge, clearance would be given. Discharge guidelines of water intake and discharge at different parts of the voyage are in the IMO Manual.

Control of Pest Insects

DAFF currently monitor for fruit flies assisted by SPC and the most recent survey was completed in May 2013. Results are awaited once all species are identified.

Control of Pest Plants

The main activities carried out by Plant Protection and Quarantine Division with assistance from SPC have been control efforts on Wedelia (*Sphagneticola trilobata*) (Singapore daisy), *Mimosa diplotrica* (giant sensitive weed) and *Antigonon leptopus* (chain of love). There were 3 sites that were identified for the *Mimosa*, 3 sites for the chain of love and 30+ sites for Wedelia. All the sites were marked and various control methods were used to try and control these weeds including slash & burn and herbicides glyphosate (Round Up™) and Gramoxone (Paraquat™). These efforts did largely contain and confine the weeds to that particular area but not eradicate them there. A renewed effort is under consideration in partnership with the Department of Environment within the GEF-PAS Regional Invasives project.

Lantana was targeted for biological using a beetle imported from Fiji and there is clear evidence of success as plant numbers have been greatly reduced and the few survivors are unhealthy and not very productive. Finally, trials were also carried out on methods to control *Epipremnum pinnatum* cv 'Aureum' (Scinapsis) and some work undertaken on Honolulu Rose *Clerodendrum chinense*.

One of the current activities implemented at the moment is the department's efforts to eradicate a newly introduced species, the fireworks tree (*Clerodendrum quadriloculare*) known to be invasive in Micronesia. Three areas have been identified and the division is working closely with the land owners to eradicate these plants. There has been a wide spread awareness program to alert all residents to be aware of this invasive plant and avoid taking it back to their gardens.

Feral pig control

The management of feral pigs (*Sus scrofa*) is a long-standing issue that was included in the NBSAP (Government of Niue 2001). Landcare Research, NZ were commissioned to write an options paper in 2004 (Parkes *et al* 2004) and plans are being developed for a control programme within the GEF-PAS Regional Invasives project.

Control of crown of thorns starfish

The crown of thorns starfish (*Acanthaster planci*) is a predator of corals that occurs naturally in Niue. Monitoring is undertaken to detect any periodic population explosions, as recorded elsewhere, which might require control measures to protect the reefs. Individual starfish are routinely removed from diving sites.

Education and awareness

The DAFF has implemented consultations throughout the island, going from village to village educating the people on various subjects which includes:

- Quarantine export/import procedures
- Plant Protection issues which deals with invasive
- Sustainable land management issues
- Forestry Management Practices
- Livestock Production strategies
- Crop Research Programs which includes crop extension activities
- Educational programs for both schools is part of the activities stipulated in the GEF-PAS Invasives project document.



Sea freight is a primary means of the accidental introduction of new invasive species.

6. LEGISLATION & INTERNATIONAL CONVENTIONS

The following Acts and Regulations include provisions relating to invasive species management:

AGRICULTURE QUARANTINE ACT 1984

AGRICULTURE QUARANTINE REGULATION 1985

Establishes the border control and quarantine system and the roles of quarantine officers, and associated regulations.

ANIMAL QUARANTINE (DISEASE CONTROL) REGULATIONS 1991

Provides measures for managing diseases or pests of livestock in the country.

AGRICULTURAL QUARANTINE (PREVENTION OF ANIMAL DISEASE) REGULATIONS

Provides measures to manage importation of animals to prevent introduction of new pests & diseases.

PLANT QUARANTINE REGULATIONS

Provides measures to control the importation of plant material.

DOGS ACT 1966

An Act that establishes a registration system for dogs and allows the destruction of un-registered animals.

DOMESTIC FISHING REGULATIONS 1996

Identifies three species deemed to be destructive organisms which cause harm to Niue's reefs and can be removed from the reef and destroyed:

- (a) Crown of Thorns star fish (*Acanthaster lancei*);
- (b) Japanese star fish; and
- (c) Long Spined coral boring sea Urchin (*Echinoidea Diadema* sp.)

MOSQUITO CONTROL ACT 1980

This Act requires people to take action to minimise breeding areas for mosquitoes around their land and dwellings.

PESTICIDES ACT 1991

An Act that regulates the importation and sale of pesticides, including the establishment of a Pesticides Board to oversee the importation of pesticides.

PIG CONTROL ACT 1998

An Act that requires owners of pigs to keep them confined or tethered to prevent them 'wandering at large'.

ENVIRONMENT ACT 2003

An Act that establishes an Environment Department one of whose functions is the protection of indigenous flora and fauna.

WILDLIFE ACT 1972

An Act that allows Cabinet to declare any species of animal to be an absolutely protected species or a partly protected species.

Under Development

ENVIRONMENT BILL 2013 (WHICH WHEN ENACTED WILL REPEAL THE ENVIRONMENT ACT 2003).

Maintains Department and responsibilities as in 2003 Act and adds the key management tool of Environmental Standards.

BIOSECURITY BILL 2013

This defines the biosecurity functions of the Government as:

- (a) to protect Niue against the entry of regulated pests and diseases affecting animals, plants, human beings and the environment;
- (b) to carry out surveillance and monitoring of pests and diseases in Niue and assess the status of regulated pests and diseases;
- (c) to prevent the establishment and spread of regulated pests and diseases and the release of organisms that might adversely affect animals, plants, human beings and the environment in Niue;
- (d) to eradicate, contain or control the movement of regulated pests and diseases that are already present in Niue;
- (e) to prevent the introduction and spread of regulated pests and diseases not already present in Niue;
- (f) to facilitate the safe importation of animals and plants and their products, and related equipment and technology;
- (g) to facilitate the export of animals and plants and their products in accordance with the requirements of the receiving countries; and
- (h) to facilitate international cooperation to prevent the spread of pests and diseases affecting plants, animals, human beings and the environment.

LAW OF THE SEA – RELATED REGULATIONS

The Forum Fisheries Agency are assisting in drafting legislation that will include rules relating to the management of ballast water, an important pathway for marine invasive species.

International Conventions & Agreements

CONVENTION ON BIOLOGICAL DIVERSITY (ACCEDED FEB 1996)

This is the key convention relating to the conservation of flora, fauna and ecosystems. It requires countries to develop a NBSAP and specifically to 'prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.'

INTERNATIONAL PLANT PROTECTION CONVENTION (IPPC) (ACCEDED OCT 2005)

The IPPC is an international agreement on plant health developed in 1951 and overseen by the Food and Agriculture Organisation (FAO). Its objectives include:

- protecting sustainable agriculture and enhancing global food security through the prevention of pest spread
- protecting the environment, forests and biodiversity from plant pests
- facilitating economic and trade development through the promotion of harmonized scientifically based phytosanitary measures
- developing phytosanitary capacity for members to accomplish the preceding three objectives.

UNITED NATIONS CONVENTION ON THE LAW OF THE SEA (UNCLOS)

UNCLOS includes (Part V) prescription of exclusive economic zones (EEZs) stretching to 200 nautical miles from its coast over which a country has special rights over the exploration and use of marine resources. Part XII contains provisions for protection and preservation of the marine environment including minimising pollution and preventing the introduction of invasive species.

CARTAGENA PROTOCOL ON BIOSAFETY (JULY 2002)

This protocol to the Convention on Biological Diversity aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology. The Parties undertake to ensure that the development, handling, transport, use, transfer and release of any LMOs are undertaken in a manner that prevents or reduces the risks to biological diversity, taking also into account risks to human health. While LMOs are different from invasive species similar processes of risk management, border control and quarantine apply.



Surveys for yellow crazy ants and other invasive species around and within the Huvalu Conservation Area are essential activities to inform protection of Niue's biodiversity.

7. GOAL & OUTCOMES

Goal: To protect the rich and fragile natural heritage of Niue and the livelihoods of Niueans from the impacts of invasives species through a co-operative effort.

Themes

The strategy follows the Regional Guidelines (SPREP 2009) with three themes as follows:

Theme A: Foundations

Managing invasives species is a huge task that will only be effective if based on strong foundations. It requires:

- **Support** – from Government, village communities, and funders
- **Capacity** – including strong institutions, individuals with sound management and technical skills, and regional networks
- **Legislative framework** – appropriate laws, regulations, policies, protocols and procedures.

Theme B: Problem definition, prioritisation and decision-making

There are a large number of invasive species present in Niue and many more outside its borders, and resources to tackle them are always limited. There needs to be systems in place to make decisions on how to allocate resources based on the best possible information on the distribution, numbers and likely impacts of these species.

Theme C: Management Action

Management begins with preventing the arrival of new invasive species; then tackles the eradication or control of those already present, and finally any restoration work needed on sites where they have been removed.

Outcomes

Outcomes are derived from the GEF-PAS Regional Invasives Project Document which in turn is based on the guidelines.

Theme A: Three outcomes are identified to ensure that the impacts of invasive species are understood and actions to manage them supported; to develop the necessary capacity; and to establish the appropriate legislative and operational framework.

Theme B: Three outcomes are identified to establish baseline information and monitor change, establish systems for risk management and prioritisation, and update knowledge and develop new techniques.

Theme C: Three outcomes are identified to prevent the arrival of new invasive species in Niue and quickly detect and respond to those that arrive; to eradicate or control existing invasive species; to carry out restoration following invasive species removal.

8. ACTION PLAN

OUTCOMES & ACTIONS	ACTIVITIES	TARGET	MEANS OF VERIFICATION	MONITORING FREQUENCY	RESPONSIBILITY	FINANCING
GUIDELINES – THEMATIC AREA A: FOUNDATIONS						
A1. GENERATING SUPPORT						
OUTCOME 1.1: THE IMPACTS OF PRIORITY INVASIVE SPECIES ON BIODIVERSITY, ECONOMIES, LIVELIHOODS AND HEALTH, ARE WIDELY UNDERSTOOD AND ACTIONS TO MANAGE AND REDUCE THEM ARE SUPPORTED.						
Action 1.1.1 Increase public awareness on invasive species through media, workshops, and school presentations: key messages to include feral dogs and cats, feral pig management, invasive species risks and impacts.	Promote invasive species awareness at World Environment Day (WED).	Awareness materials available each WED	Participation in June 2014, 2015, 2016, 2107, 2018, 2019, 2020	Annually	DOE DAFF	GEF-PAS 2013-16 GOVT
	Provide fortnightly updates on invasive species projects on national radio.	Departmental Radio Programmes	Fortnightly programmes	Annually	DOE DAFF BCN	GOVT
	Hold biosecurity workshop(s) for Village Councils.	Village Councils aware of biosecurity risks	Workshops held 2014	Once – end of 2014	DOE DAFF	GEF-PAS
	Produce a leaflet/poster, identifying the range of potential invasive species in the region, the risks they could pose to Niue's environment, agricultural, fisheries, forestry and tourism sectors, and the pathways (e.g. shipping and air) through which they could arrive.	Leaflet/poster produced	Leaflet/poster produced in first quarter of 2014	Once – end of 2014	DOE DAFF	GEF-PAS
	Include Invasive Species Issues in School Curricula – Niue Primary and High School.	Invasive Species to be taught as a topic sometime during the year	Invasive Species to be taught at school by year 2015	Annually	DOE DAFF ED	GEF-PAS
	Educate the public in ways to eliminate feral cats and encourage owners to prevent cats going feral.	Departmental radio programmes	Fortnightly programmes	Annually	DoE DAFF	GOVT
	Prepare information on those marine invasive species identified by reviews as most likely to reach and have serious impacts in Niue, and make this available to those in a position to detect these (i.e. dive companies, tourists snorkelling, those harvesting on reefs, etc).	Marine interested organisations and individuals made aware of potential marine invasive species that may be present in our marine environment	Information made available annually	Annually	Fisheries DoE	GOVT
1.1.2 Government support for invasive species management is improved and the importance of IS environmental, social and economic impacts is more widely understood.	Ensure that the significant threat posed by invasive species is recognised in Niue's Integrated Strategic Plan (NISP) 2013-20 and reflected in its objectives/actions. Encourage the inclusion of invasive species in high level discussions with aid donors.	Include invasive species in the NISP 2013-20	Invasive species target included in the NISP 2013-20	2014 for new NISP	DoE DAFF	GOVT

OUTCOMES & ACTIONS	ACTIVITIES	TARGET	MEANS OF VERIFICATION	MONITORING FREQUENCY	RESPONSIBILITY	FINANCING
1.1.3 Funding is provided to carry out the identified plan of activities	Develop new long-term funding mechanisms to ensure the implementation of this strategy following the end of the GEF-PAS Regional Invasives Project in 2016	Government or a Regional Organisation to commit and provide some funding to carry out the management of invasive species after the GEF-PAS Project in 2016	Long-term funding is approved and available following the end of the GEF-PAS Regional Invasives Project in 2016	Annually from 2016	DAFF DoE	GOVT DONORS

A2. BUILDING CAPACITY

OUTCOME 1.2: THE INSTITUTIONS, SKILLS, INFRASTRUCTURE, TECHNICAL SUPPORT, INFORMATION MANAGEMENT, NETWORKS AND EXCHANGES REQUIRED TO MANAGE INVASIVE SPECIES EFFECTIVELY ARE DEVELOPED.

1.2.1 A national invasive Species Coordinator is appointed and a multi-sectoral national invasive species committee is formed and operating with ongoing support from PILN.	Establish a position to coordinate activities under Niue's GEF-PAS invasive species project	Job description	Job description approved Coordinator position filled Coordinator effectively coordinating project activities	2013	Niue Govt. DOE SPREP	GEF-PAS 2013-16
	Fund an Invasive Species Coordinator as a core position of the DOE following the completion of Niue's GEF-PAS invasive species project.	Job description	Job description approved Coordinator position filled Coordinator effectively coordinating invasive species activities	2016	DoE	GOVT
	Secure funds to recruit individuals to fill all positions in current Plant Protection and Quarantine Division structure	Funding secured through Government or overseas donor	Staff appointed	2014	DAFF	GOVT
	Review workloads of invasive species staff in DOE and DAFF in light of changing threat levels – e.g. through a significant increase in tourist arrivals	Review carried out.	New positions created if required	Annually	DoE DAFF	GOVT
	Re-establish the national multi-sectoral PILN team	Identify appropriate team members Advise PILN Coordinator	Team members identified PILN Team operating	2014	DAFF DoE	GOVT
	Ensure that invasive species are included in the responsibilities of a high-level multi-sectoral national committee	Identify appropriate committee ¹	Team members identified Multi-sectoral national committee operating	2014	DAFF DoE	GOVT

¹ The same committee that takes on responsibility for the National Biodiversity Strategy and Action Plan would be appropriate

OUTCOMES & ACTIONS	ACTIVITIES	TARGET	MEANS OF VERIFICATION	MONITORING FREQUENCY	RESPONSIBILITY	FINANCING
1.2.2. A high quality National Invasive Species Strategy and Action Plan is established.	Prepare a National Invasive Species Strategy and Action Plan (NISSAP)	NISSAP harmonised with the Guidelines for Invasive Species Management in the Pacific.	NISSAP stakeholder meetings NISSAP completed NISSAP endorsed by Government	Oct-Nov 2013 Dec 2013 First quarter 2014	DoE DAFF	GEF-PAS
	Develop within the NISSAP a plan to monitor its effectiveness	Monitoring Plan within the NISSAP	Technical Working Group develop monitoring plan Monitoring processes in place and being implemented	First quarter 2014	DAFF DoE	GOVT
	Review action plan annually and revise NISSAP in 2020	Revised NISSAP	NISSAP reviewed Revised NISSAP completed Revised NISSAP endorsed by Government	Review annually Revise 2020	DoE DAFF	GOVT
	Commission an independent review of the NISSAP in 2017	Review completed	Review report received. Recommendations acted on.	2017	DoE	GOVT DONOR
1.2.3 Training/ capacity needs are identified and training programs for key invasives management issues are developed and implemented.	Identify gaps in the capacity currently available to implement the components of this NISSAP and strengthen capacity where needed	List of available and required skills Capacity Development Plan	Training needs analysis Training Plan	First quarter 2014	DAFF DoE	GEF-PAS
	Biosecurity training for staff in DOE, DAFF and others. Explore options for bringing untrained staff up to standard as soon as possible through placements, attachments of experienced staff from overseas agencies, etc.	All staff are well trained to deal with biosecurity matters	Biosecurity training held annually	Annually	DAFF DoE SPC	GEF-PAS
1.2.4 Niue's invasive species management facilities and equipment are reviewed, development plans are produced and facilities improved.	Build quarantine facility for inspection and housing of organisms suspected of being invasive and items carrying them. Obtain necessary equipment	Facilities built. Equipment sourced and inventoried	Facilities and equipment available for biosecurity purposes	2014	DAFF	GOVT, GEF-PAS
	Review the list of chemicals (e.g. herbicides, rodenticides) registered for invasive species management in Niue. Identify other chemicals that would enhance this management and arrange for their registration and import.	List developed	List completed and reviewed; new chemicals identified. Process to register and import new chemicals completed	List done Dec 2013, reviewed every two years 2014	DOE, DAFF SPREP	GOVT

OUTCOMES & ACTIONS	ACTIVITIES	TARGET	MEANS OF VERIFICATION	MONITORING FREQUENCY	RESPONSIBILITY	FINANCING
1.2.5 Review and compile a Niue IAS bibliography, a database for IAS information, and add data to PESTLIST database	Disseminate and use the review completed by ISSG Provide update/correction of information to ISSG as necessary	Updated ISSG Review	ISSG Review disseminated to stakeholders New information sent to ISSG	Dec 2013 Annually	DoE DAFF	GOVT, GEF-PAS
1.2.6 Regional invasives services are used to strengthen the capacity of Niue for planning, implementing, monitoring and evaluating its invasive species activities.	Continue to engage regional invasives organisations in Niue's invasive species management activities (e.g. capacity development, surveys, project planning and implementation)	Records of regional invasives organisations input into invasive species management in Niue	Regional invasives organisations engaged in invasive species management in Niue	Annually	DOE, DAFF SPREP SPC Other regional organisations	GOVT

A3. LEGISLATION, POLICY AND PROTOCOLS

OUTCOME 1.3: APPROPRIATE LEGISLATION, POLICIES, PROTOCOLS AND PROCEDURES ARE IN PLACE AND OPERATING, TO UNDERPIN THE EFFECTIVE MANAGEMENT OF INVASIVE SPECIES.

1.3.1. Invasive species legislation, regulations or protocols are consolidated, harmonised and rationalised to improve IS management effectiveness.	Completed development of Biosecurity Bill and enact	Biosecurity Bill/Act	Biosecurity Bill/ Act passed by Government	2014	DAFF DoE	GOVT, GEF-PAS
	Develop a new Operational Manual and other policies/procedures following adoption of the Biosecurity Bill	Operational Manual Review Policies and Procedures	New Operational Manual completed Policies and Procedures reviewed	2015 Annually from 2016	DAFF DoE	GEF-PAS
	Carry out awareness raising programme regarding the Biosecurity Bill once it is passed into legislation	Departmental fortnightly radio programme	Fortnightly programmes	Annually	DAFF DoE	GOVT, GEF-PAS
	Ensure that EIA's address the issue of minimising the spread of invasive species	All EIA's have a section on invasive species	Check content of all EIA's	Annually	DoE	GOVT

OUTCOMES & ACTIONS	ACTIVITIES	TARGET	MEANS OF VERIFICATION	MONITORING FREQUENCY	RESPONSIBILITY	FINANCING
GUIDELINES – THEMATIC AREA B: PROBLEM DEFINITION, PRIORITISATION AND DECISION-MAKING						
B1. BASELINE AND MONITORING						
OUTCOME 2.1: SYSTEMS ARE IN PLACE TO GENERATE BASELINE INFORMATION ON THE STATUS AND DISTRIBUTION OF INVASIVE SPECIES, DETECT CHANGES, INCLUDING RANGE CHANGES AND EMERGING IMPACTS.						
2.1.1. Surveys or monitoring systems are implemented to document the status and/or impact of invasives on native biodiversity in marine and terrestrial sites (including protected areas) of Niue. Results are included in databases.	Develop and establish long term monitoring and GIS for areas with important native biodiversity that may be impacted by invasives	Collect data needed for GIS	GIS for areas with important native biodiversity that may be impacted by invasives is available	2014	DoE DAFF DJLS	GOVT GEF-PAS
B2. PRIORITISATION						
OUTCOME 2.2: EFFECTIVE SYSTEMS ARE ESTABLISHED AND IMPLEMENTED TO ASSESS RISK AND PRIORITISE INVASIVE SPECIES FOR MANAGEMENT.						
2.2.1 Establish risk assessment systems for proposed new introductions and established invasives	Review existing risk assessment procedures. Identify and address gaps Use existing Weed Risk Assessments (e.g. PIER, Plant Pono) Use networks to find or develop risk assessments for other species	Risk assessment review	Existing information used for risk assessment (Online Risk Assessment databases e.g. GISD, PIER, CABI,...) SOP (Standard Operating Procedure) produced	2014	DoE DAFF	GEF-PAS
	Review information obtained from surveys of marine invasives in ports and harbours in the region to identify species that might be most likely to reach Niue. Review pathways through which marine invasives would be likely to reach Niue and the species that could be carried on these pathways.	Review carried out. Review carried out	Report completed Report completed	2014 Annually		

OUTCOMES & ACTIONS	ACTIVITIES	TARGET	MEANS OF VERIFICATION	MONITORING FREQUENCY	RESPONSIBILITY	FINANCING
B3. RESEARCH ON PRIORITIES						
OUTCOME 2.3: KNOWLEDGE IS UPDATED FOR PRIORITY INVASIVES, INCLUDING SPECIES BIOLOGY AND IMPACTS, AND DEVELOPMENT OF EFFECTIVE MANAGEMENT TECHNIQUES.						
2.3.1. Investigate the biology, ecology and control methods of priority invasive species in order to support effective management.	Collate relevant information on the biology and ecology of priority invasive species and best practice management methods.	Information on IS collated and available	IS information available	2014	DAFF	GOVT, GEF-PAS
	Review existing pig management strategy, identify achievable management goals, and redesign program					
GUIDELINES – THEMATIC AREA C: MANAGEMENT ACTION						
C1. BIOSECURITY						
OUTCOME 3.1: MECHANISMS ARE ESTABLISHED TO PREVENT THE SPREAD OF INVASIVE SPECIES ACROSS INTERNATIONAL BORDERS AND QUICKLY DETECT AND RESPOND TO THOSE THAT ARRIVE.						
3.1.1. Inspection and treatment procedures are improved to reduce the risk of new invasive species threats to Niue.	Identify potential invasive species threats, based on pathway analysis and risk assessment(s), coming from other countries and develop appropriate pre-border and at-border interventions for priority invasive species	List of threats from pathways section of the ISSG Review with their risk assessment and possible interventions	List drafted List finalised	Annually	DoE DAFF	GOVT, GEF-PAS
	Train quarantine staff in identification of potential new invasive species Prepare awareness material (e.g. posters) to help both frontline quarantine staff and business sectors (e.g. tourism, importers) Investigate ways to improve the enforcement of existing legislation to include invasive species	Staff performance reports Posters and leaflets Review of enforcement of existing legislation and revision where necessary	Text agreed Design approved Material produced TOR for review prepared	Annually	DAFF	
	Identify and address issues associated with ballast water and hull-fouling of commercial and recreational vessels at port and main vessel routes	Report of issues and solutions	Issues identified Report drafted Report finalised	2014		
	Ensure that an EIA is conducted before any live animal imports to the Quarantine Farm.	Carry out EIA	EIA's completed	Annually as required		

OUTCOMES & ACTIONS	ACTIVITIES	TARGET	MEANS OF VERIFICATION	MONITORING FREQUENCY	RESPONSIBILITY	FINANCING
3.1.2. Measures are in place to control the spread of invasive species within Niue	<p>Carry out activities including awareness programmes to reduce the risks of in-country movement of invasive species subject to control or eradication programmes. (Movement of soil likely to be a key issue for ants and weed seeds)</p> <p>Target heavy machinery, etc involved in road construction and maintenance</p> <p>Carry out regular monitoring at distribution centres for plants (e.g. Vaipapahi and Mutalau SLM farms) to identify invasive species at risk of distribution (e.g. yellow crazy ants, weeds) and take measures to prevent this.</p>	Materials produced linked to management programmes	TV and radio programmes and pamphlets.	Annually	DAFF DoE	GOVT
3.1.3. Early detection and rapid response (EDRR) procedures are established for priority potential invaders (species to be identified based on a pathway review and their potential impact).	Adapt the generic SPC Emergency Response Plan (ERP) to address threats to the natural heritage and livelihoods of the people of Niue	ERP and procedures	ERP drafted	2014	DAFF Quarantine	GOVT
	Identify potential invaders associated with the new (2013) shipping route: NZ, Fiji, Samoa, Am Samoa, French Polynesia, Cook Islands, Niue, and ensure these are addressed in plan/procedures.	Research about potential invaders that may impact Niue from the new shipping route	ERP endorsed	Late 2013	DAFF Quarantine	GOVT
	Review pathways identified for IS to reach Niue (as section 3 of this plan) and carry out risk assessments for any new pathways as they arise.	Pathways identified reviewed and risk assessments carried out	List of potential completed and available	Annually	DAFF Quarantine	GOVT
	Investigate the possibility of having a store of equipment (traps, baits, etc.) ready for implementation of the ERP	Identify and Purchase equipment needed for ERP	Pathways identified	Annually	DAFF Quarantine	GOVT
	Maintain and enhance current monitoring programmes for the early detection of fruit flies within the Pacific Fruit Fly Project coordinated by SPC	Review current monitoring programmes to determine any enhancements that can be made	Risk Assessments carried out	Annually	DAFF Quarantine, SPC	GOVT SPC
Carry out periodic surveys of mosquitoes to detect any new arrivals that are potential carriers for new diseases such as malaria	Surveys reported on	Every 3 years		DAFF SPC	GOVT	
Engage expert support to carry out a survey for marine invasives around the Niue port.	Survey to be carried out for marine invasives around the Niue port	List of marine invasives around the Niue port completed	2014 onwards	DAFF – Quarantine and Fisheries	GOVT DONOR	

OUTCOMES & ACTIONS	ACTIVITIES	TARGET	MEANS OF VERIFICATION	MONITORING FREQUENCY	RESPONSIBILITY	FINANCING
C2. MANAGEMENT OF ESTABLISHED INVASIVES						
OUTCOME 3.2: THE IMPACTS OF PRIORITY ESTABLISHED INVASIVE SPECIES ARE ELIMINATED OR REDUCED BY ERADICATING OR CONTROLLING THE TARGET SPECIES.						
3.2.1. Best practices are determined and implemented for invasive species management.	Begin pilot management projects for priority invasive species in priority sites to be selected after biodiversity surveys are completed and management plans have been prepared	Prioritisation Report Management plans for selected priority sites Funding Strategy Feasibility Studies	Plans written Plans implemented Progress reported	2014	DoE DAFF	GOVT GEF-PAS
	Implement revised pig management programme	Project Design Documents Operational Plans Progress reports	Completed plans and reports.	2015	DoE DAFF	GEF-PAS
3.2.2 Priority invasive species are eradicated (completely removed) from Niue where feasible.	Review past/existing programmes for the control or eradication of Singapore daisy (<i>Wedelia trilobata</i>), chain of hearts (<i>Antigonon leptopus</i>), Honolulu rose (<i>Clerodendrum chinense</i>), giant sensitive plant (<i>Mimosa diplotricha = invisa</i>) and <i>Scindapsis aureus</i> . Identify potential for eradication or ongoing control.	Prioritisation Report Feasibility Studies (FS) In-depth planning and implementation of eradications where feasible Survey on the abundance and range of fireworks Monitoring Plan	Control or eradication of the listed invasive species is reviewed Prioritisation Report and FS completed Plans written and implemented Survey completed and eradication of fireworks.	2014 Early 2014	DAFF DoE DAFF DoE DAFF	GEF-PAS GOVT DONOR GEF-PAS GOVT
	Survey the extent of bronzed-leaved <i>Clerodendrum</i> or 'fireworks' (<i>Clerodendrum quadriloculare</i>) and then carry out eradication and monitor. (1 site Hakupu, 2 in Tuapa) (Awareness raising and work with landowners)	List of plants known to be invasive Survey current range of the yellow crazy ant	Survey completed and eradication of fireworks. Monitor after eradication	2014	DoE DAFF	GOVT GOVT
	Review the list of plants 'known to be invasive and [of] particular concern on Niue' in Space <i>et al.</i> (2004) and identify any other candidates for eradication.	Feasibility study on the possible eradication or control of yellow crazy ants at key forest areas	List of plants known to be invasive Monitor after eradication	2014	DoE DAFF	DONOR GEF-PAS
	Carry out a survey to identify the present range of the yellow crazy ant (<i>Anoplolepis gracilipes</i>). (Subject to identification). Assess feasibility of eradication or control to prevent invasion of key forest areas e.g. Huvalu forest.	Feasibility study for ten other priority weed or vertebrate control or eradication targets	Survey completed on the current range of the yellow crazy ant Feasibility study completed	2014	DoE DAFF	GOVT GEF-PAS
	Conduct a pilot feasibility study for ten other priority weed or vertebrate control or eradication targets.	Develop feasibility study into the eradication of rats on Niue	Feasibility study on ten priority weed or vertebrate invasive species completed	2014	DAFF DoE	GEF-PAS DONOR
	Investigate the feasibility of eradicating rats on Niue.	Develop list of prioritised eradications to be undertaken	Feasibility study completed Eradicate prioritised targets	2014	DoE	DONOR
	Undertake prioritised eradications.					

OUTCOMES & ACTIONS	ACTIVITIES	TARGET	MEANS OF VERIFICATION	MONITORING FREQUENCY	RESPONSIBILITY	FINANCING
3.2.3. Bio-control agents are developed and released for appropriate target invasives.	Identify existing bio-control agents (from the 2010 Pacific Bio-control Workshop Report) for priority invasive species in priority sites identified in the national action plan	Prioritisation Report Review of potential bio-control options	Bio-control agents identified for priority species	2014	DAFF	GOVT
3.2.4. Invasive species are contained within limited areas or controlled at high biodiversity sites.	Control invasive species identified in feasibility study.	Identify invasive species needed to be controlled from the feasibility study	Invasive species identified in feasibility study is controlled	Early 2014	DAFF, DoE	GOVT
	Carry out localised rat and feral cat control using best practice if areas of high priority for the conservation of rare fauna (e.g. hega (<i>Vini australis</i>) and olive small-scaled skink) are identified.	Formulate a plan to carry out control on localised rat and feral cat	Localised rat and feral cat control carried out at areas of high priority identified	2014	DAFF, DoE	GEF-PAS
	Control numbers of feral dogs through enforcement of Niue Dog Ordinance and Niue Impounding Ordinances if they become a problem.	Enforce Niue Dog Ordinance and Niue Impounding Ordinances	Number of feral dogs clearly controlled	Annually	DAFF, Police Dept	GOVT
	Continue to monitor crown-of-thorns starfish and control if numbers increase to the point that important biodiversity or harvested species are threatened.	Monitor crown-of-thorns starfish	Continuous monitoring of crown-of-thorns during the year	Annually	Fisheries Niue Dive	DONOR GOVT

C3. RESTORATION

OUTCOME 3.3: FOLLOWING INVASIVE SPECIES MANAGEMENT THE BEST METHODS ARE DETERMINED AND IMPLEMENTED TO FACILITATE EFFECTIVE RESTORATION OF NATIVE BIODIVERSITY OR RECOVERY OF OTHER VALUES.

3.3.1. Restore sites and biodiversity after invasive species management occurs.	Evaluate the need to re-plant areas in which weed control occurs and undertake as appropriate.	Identify areas after weed control to be re-planted	Areas where weed control occurs is re-planted	Annually as appropriate	DAFF, DOE	GOVT
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9. MONITORING & EVALUATION

The National Invasive Species Coordinator will review work plan achievements annually in close liaison with DAFF Plant Protection and Quarantine and report progress to National Steering Committee.

An independent review will be implemented at the mid-term of this Strategy in 2017.



Cameras used to monitor feral pig presence.

REFERENCES

- DAFF. 2009. Corporate Plan 2009–2013.
Department of Agriculture, Forestry and Fisheries, Alofi, Niue.
- Government of Niue. 2001. National Biodiversity Strategy and Action Plan. 69pp.
- Hunter, D., Pouono, K. & Semisi, S. 1998. The impact of Taro Leaf Blight in the Pacific Islands with special reference to Samoa.
Journal of South Pacific Agriculture 5: 44-56.
- ISSG. 2013. *Compilation and Review of Invasive Alien Species Information for Niue*. Unpubl. report for the Department of Environment. Invasive Species Specialist Group, Pacific Regional Office, Auckland, NZ.
- Lowe, S.; Browne, M.; Boudjelas, S. & De Poorter M. 2004. *100 of the World's Worst Invasive Species: A selection from the Global Invasive Species Database*. Updated & Reprinted 2004. ISSG, Auckland, New Zealand.
- O'Dowd, D.J., Green, P.T. & Lake, P.S. 2003. Invasional 'meltdown' on an oceanic island. *Ecology Letters* 6: 812-817.
- Parkes, J.; Yockney, I & Ikitoelagi.M. 2004. *Options to manage feral pigs on Niue Island*. Landcare Research Contract Report LC0405, Lincoln, New Zealand.
- Rodda, G.H. & Savidge, J.A. 2007. Biology and impacts of Pacific Island invasive species. 2. *Boiga irregularis*, the brown tree snake (*Reptilia: Colubridae*). *Pacific Science* 61: 307-324.
- Space, J.C.; Waterhouse, B.M.; Newfield, M. & Bull.C. 2004. *Invasive Plant Species on Niue following Cyclone Heta*. Unpubl. Report to Government of Niue and UNDP. UNDP NIU/98/G31. 76pp.
- SPREP. 2009. *Guidelines for invasive species management in the Pacific: a Pacific strategy for managing pests, weeds and other invasive species*. SPREP, Apia, Samoa. 20pp.

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Annex 1: Priority terrestrial invasive species for management in Niue

SPECIES	STATUS	MANAGEMENT PROPOSED
MAMMALS		
Feral pig (puaka) (<i>Sus scrofa</i>)	Widespread and a threat to native forests and agricultural plantations	GEF-PAS funded project at planning stage.
Ship rat (<i>Rattus rattus</i>)	Widespread – all habitats – higher numbers in forest than Polynesian rats	Control if areas of high priority for the conservation of rare fauna impacted by rats are identified.
Polynesian rat (kuma) (<i>Rattus exulans</i>)	Widespread – all habitats.	Control if areas of high priority for the conservation of rare fauna impacted by rats are identified.
Feral cat (<i>Felis catus</i>)	Widespread and numerous, including being commonly seen in forest habitats away from villages.	Raise public awareness to reduce source of feral animals from family cats.
PLANTS		
Singapore daisy <i>Wedelia trilobata</i>	Located at a small number of sites and subject to periodic past eradication efforts.	Review progress to date and survey to identify remaining populations. If eradication is considered achievable, establish a programme to complete this.
Chain of hearts (<i>Antigonon leptopus</i>)	Located at a small number of sites and subject to periodic past eradication efforts.	Review progress to date and if, as likely, eradication is considered achievable, establish a programme to complete this.
Honolulu rose (<i>Clerodendrum chinense</i>)	Located at a significant number of sites (most villages) and subject to periodic past control efforts.	Review past control programmes and current distribution. Then consider further control efforts to prevent spread to key habitats.
Giant sensitive plant (<i>Mimosa diplotricha = invisa</i>)	Located at a small number of sites and subject to periodic past eradication efforts.	Review progress to date and if, as likely, eradication is considered achievable, establish a programme to complete this.
<i>Epipremnum pinnatum</i> (= <i>Scindapsus aureus</i>)	Increased in distribution since Cyclone Heta (2004) and now potentially a more significant threat to forest areas.	Survey current distribution and trial new control methods. Determine whether eradication or control to keep important habitats free of the plant is the appropriate action.
Bronzed-leaved Clerodendrum (<i>Clerodendrum quadriloculare</i>)	Recently arrived ornamental found at two sites.	Complete current eradication programme.
Mile-a-Minute (fue saina) <i>Mikania micrantha</i>	A widespread weed of agricultural plantations that requires significant management by farmers	Liaise with regional programmes developing biological control for this species.
Merremia (fue vao) <i>Merremia peltata</i>	A widespread vine, considered to be a native species, which can smother large areas of forest.	Liaise with regional programmes developing biological control for this species.
Hawaiian wood rose <i>Merremia tuberosa</i>	An introduced vine recorded at a few sites and considered particularly aggressive on Niue.	Survey to identify its distribution before determining and carrying out appropriate management.
INVERTEBRATES		
Yellow crazy ant (<i>Anoplolepis gracilipes</i>)	An African/Asian species that is currently spreading in Niue and a threat to invertebrates including crabs.	Survey to identify current distribution and investigate control options to prevent spread to key forest areas.
Fruit flies (<i>Bactocera passiflorae</i> , <i>B.kiriki</i> , <i>B.xanthodes</i>)	There are fruit fly species present here in Niue.	Continue to monitor population and distribution here in Niue and investigate control methods for future management.
Yellow fever mosquito (<i>Aedes aegypti</i>)	An African species that is widespread in the Pacific and carrier of dengue fever.	Continue with and enhance current programme to restrict numbers under Mosquito Control Act.

PRIORITY TERRESTRIAL INVASIVE SPECIES FOUND IN NIUE



Feral Pig @sms.si.edu



Ship Rat @Kiwicare.co.nz



Polynesian Rat @zoochat.com



Feral Cat @pestsmart.org



Singapore Daisy @toptropicals



Chain of Hearts @keyserver.lucidcentral.org



Honolulu Rose @cookislands.bishopmuseum.org



Epipremnum pinnatum @wildlifeofhawaii



Merremia peltata @faunaandfloraofvietnam.blogspot



Giant Sensitive Plant @michibikuhikari.blogspot



Bronzed-leaved Clerodendrum



Mile-a-Minute @cookislands.bishopmuseum.org



Hawaiian Woodrose *Merremia tuberosa* @wildlifeofhawaii.com



YCA @www.alexanderwild



Fruit Fly (*Bactrocera kirkii*) @insectimages.org



Fruit Fly (*Bactrocera passiflorae*) @forestryimages.org



Fruit Fly (*Bactrocera xanthodes*) @spc.int



Yellow Fever Mosquito @nbcсандiego

Annex 2: Regional and international organisations and databases related to invasive species management

(Sources: ISSG (2013) and Kingdom of Tonga's draft NISSAP (2013)).

SECRETARIAT OF THE PACIFIC COMMISSION (SPC)

SPC helps Pacific Island people respond effectively to the challenges they face and make informed decisions about their future and the future they wish to leave for the generations that follow. Go to the website for a description of the core business of each of SPC's Divisions and more detailed information about how they can help.

SECRETARIAT OF THE PACIFIC REGIONAL ENVIRONMENT PROGRAMME (SPREP)

SPREP works towards a Goal that, by 2015, all Members will have improved their sustainable management of island and ocean ecosystems and biodiversity, in support of communities, livelihoods, and national sustainable development objectives, through an improved understanding of ecosystem-based management and implementation of National Biodiversity Strategic Action Plans.

The SPREP Biodiversity and Ecosystem Management Strategic Priority will be delivered through four main priority thematic areas: Invasive Species, Island and Oceanic Ecosystems, Threatened and Migratory Species, and Regional and International Instruments

PACIFIC ISLANDS ROUNDTABLE FOR NATURE CONSERVATION (PIRNC)

Formed in 1997 at the request of Pacific Island Countries and Territories, PIRNC serves as a forum whereby organisations working on nature conservation in the Pacific can improve their collaboration and coordination to increase effective conservation action. In particular it is the coordination mechanism for the implementation of the Action Strategy for Nature Conservation in the Pacific Island Region 2008-2012. The Action Strategy was endorsed by SPREP members, and highlights the priority concerns for conservation in the Pacific region as well as outlining a roadmap for achieving the key goals. It is to be reviewed in December, 2013.

PIRNC has a number of Working Groups, one of which addresses invasive species; the Pacific Invasives Partnership (PIP). PIP is the umbrella regional coordinating body for agencies working on invasive species in more than one country of the Pacific and promotes coordinated planning and assistance from regional and international agencies to meet the invasive species management needs of the countries and territories of the Pacific.

Two regional programmes operate with the guidance and support of PIP:

PACIFIC INVASIVES INITIATIVE (PII)

PII builds the invasive species management capacity of Pacific island countries and territories by providing technical support, training, assistance with proposal and project design, and links to expertise.

PACIFIC INVASIVES LEARNING NETWORK (PILN)

PILN is a professional network for invasive species workers in the Pacific and organises skills and learning exchanges, workshops and meetings, and facilitates multi-sector invasives teams in countries.

INTERNATIONAL UNION FOR THE CONSERVATION OF NATURE (IUCN)
– OCEANIA REGIONAL OFFICE

IUCN Oceania is working with like-minded organisations to contribute to the conservation of species and ecosystems in the Oceania region. Increasing awareness about the importance of species and the threats they are facing is crucial. The concept of “Investing in Nature” is central to this approach: too often, humans take other species and their day-to-day uses for granted. It is vital that investments in natural resources promote sustainable long-term use, management and conservation of the species we utilise in our everyday lives.

HAWAI`I-PACIFIC WEED RISK ASSESSMENT

Hawai`i-Pacific Weed Risk Assessment (HPWRA) provides a free service. Professional botanists use published information to predict whether plants have a low-risk or high-risk of becoming invasive in Hawai`i or similar Pacific islands. The information is available on the Plant Pono website. (HPWRA receives funding from the Hawai`i Invasive Species Council and Plant Pono received funding for website development from the Kaulunani Urban and Community Forestry Program).

INTERNATIONAL UNION FOR THE CONSERVATION OF NATURE (IUCN), SPECIES SURVIVAL COMMISSION (SSC), INVASIVE SPECIES SPECIALIST GROUP (ISSG)

The Invasive Species Specialist Group (ISSG) aims to reduce threats to natural ecosystems and the native species they contain by increasing awareness of invasive alien species, and of ways to prevent, control or eradicate them. ISSG is a major source of information on invasive species either through the Global Invasive Species Database (GISD) or by direct contact.

GLOBAL INVASIVE SPECIES DATABASE (GISD)

The GISD focuses on alien species known to have negative impacts on native biodiversity and ecosystems. It features over 850 species profiles of some of the most harmful species. While there are taxon and geographical biases on selection of species (due to funding sources and priority themes) that are featured on the GISD, the Oceania region is well represented with a large number of harmful species listed. Other information extracted from the GISD included information on taxonomy, species organism type, common names, habitat type, biome, biostatus information and information on pathways of introduction and spread of these species.

PACIFIC ISLAND ECOSYSTEMS AT RISK (PIER)

The PIER database is focused on plant species that are known to have been introduced to the Pacific region including the Pacific Rim. Information extracted from PIER included biostatus of alien species at island level, common names in Pacific languages, habitat information and most importantly links to risk assessments conducted for the Pacific region.

CABI INVASIVE SPECIES COMPENDIUM (ISC)

CABI ISC is an encyclopaedic type of database on invasive alien species that impact biodiversity and livelihoods. CABI maintain compendia on Crop Protection, Forestry, Aquaculture and Animal Health and Production. The CABI ISC lists invasive species that impact biodiversity as well as pests of crops and pathogens. The focus for this project was on species that are known to impact biodiversity and ecosystems.

FISHBASE & SEALIFEBASE

FishBase and SeaLifeBase are databases focused on all fish species known to science. Data and information included in FishBase includes ecological information, information on traits and distribution at country and ecosystem level including in the introduced range of fish species in the aquatic system (both marine and freshwater). SeaLifeBase consists of similar information on marine species.



Training and mentoring in accepted standards of arichemical management and focusing on safe, effective and efficient methodologies is a pre-cursor to successful weed management.



**DEPARTMENT OF
AGRICULTURE, FORESTRY
AND FISHERIES**



**DEPARTMENT OF
ENVIRONMENT**