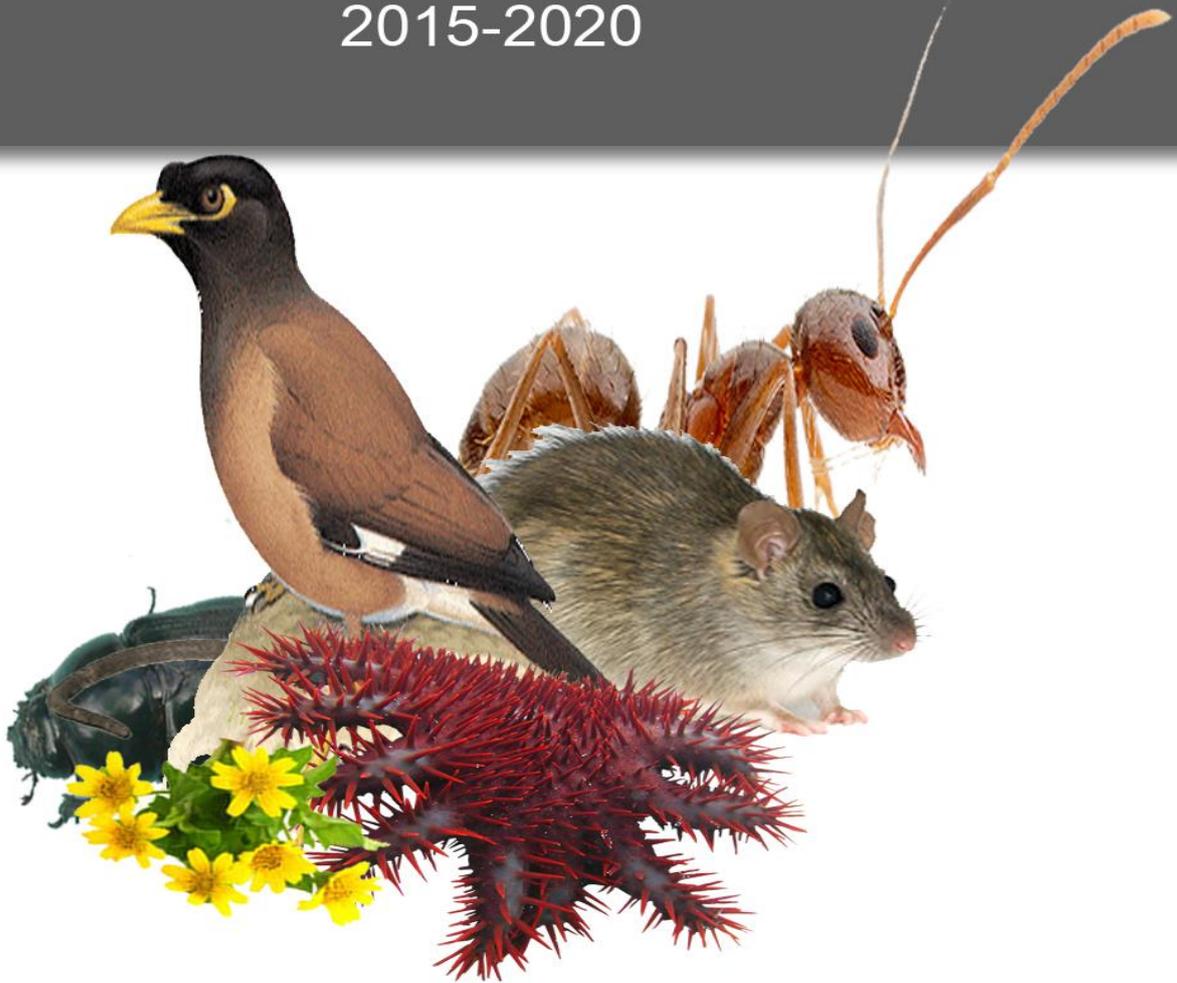




# KIRIBATI

## National Invasive Species Strategy and Action Plan 2015-2020



## Contents

FOREWORD .....	3
ACKNOWLEDGEMENTS .....	4
TABLE OF CONTENTS .....	4
KEY DEFINITIONS.....	4
ACRONYMS .....	5
1.0 INTRODUCTION .....	6
1.1 Kiribati - an Island Nation .....	6
1.2 Natural Land Values of Kiribati.....	7
1.3 Invasive Species .....	9
1.4 Impacts of Invasive Species in Kiribati .....	10
1.5 Potential impacts of other Invasive Species in Kiribati .....	12
1.6 Why a NISSAP is needed .....	14
2.0 GOAL, THEMES AND OUTCOMES .....	15
3.0 MANAGING INVASIVE SPECIES .....	16
3.1 Invasion Pathways .....	16
3.2 Roles and Responsibilities .....	17
3.3 Legislation and Policy.....	18
3.4 Managing Invasive Species is Everyone's Responsibility .....	22
4.0 RECENT AND ONGOING MANAGEMENT PROGRAMMES .....	22
4.1 Restoration of the PIPA .....	22
4.2 Management of IAS in Kiritimati .....	23
4.3 Management of IAS in the Gilbert Islands .....	24
5.0 THE KIRIBATI ACTION TABLES .....	26
A1 Generating Support .....	26
A2 Building Capacity.....	29
A3 Legislation, Policy and Protocols.....	31
B1 Baseline and Monitoring .....	32
B2 Prioritisation .....	33
B3 Research on priorities .....	34
C1 Biosecurity.....	35
C2 Management of established invasives .....	39
C3 Restoration.....	42
Appendix 1 Species mentioned in the text.....	44
Appendix 2 NISSAP workshop stakeholders .....	46
Appendix 3 Activities funded by GEF-PAS 5 for Kiribati.....	<b>Error! Bookmark not defined.</b>

## FOREWORD

It gives me great honour on behalf of the Government of Kiribati, to endorse this Strategy and Action Plan for the management of invasive species. The Kiribati National Invasive Species Strategy and Action Plan (K-NISSAP) address many invasive species issues Kiribati as a whole.

The great outputs of Kiribati National Invasive Species Strategies and Action Plan 2015-2020 are intensively gear to the Kiribati Integrated Environment Policy with a sustainable Environment's vision *"The People of Kiribati continue to enjoy a safe and healthy environment that is resilient to the impacts of global climate change and supports livelihoods, human health and sustainable development"*

The Guidelines for Invasive Aliens Species Management in the Pacific describes invasive species as "Introduced species that become destructive to the environment or human interests; can also include some native species that proliferate and become destructive following environmental changes caused by human activities." Invasive species can negatively impact native ecosystems and the species they contain. These impacts may disrupt the ecosystem processes, degrade habitats, reduce biodiversity and introduce diseases to flora and fauna thus require intense conservation and management to accomplish the government sustainable vision from devastating impacts of Invasive Species.

Pathways to Kiribati through International flights, foreign and domestic vessels provide the great possibilities of many IAS poised to enter Kiribati including mongoose, other rats, weeds and ants that have catastrophic impacts on biodiversity, economic growth and health.

PIPA is the largest marine protected area in the world (total area 408,250 km<sup>2</sup>). The total land area is around 25.51 km<sup>2</sup> with 8 scattered islands cater for the highest diversity of flora. The increase of current shipping routes to Kiritimati from Tarawa normally passed Kanton (PIPA based) increased risks of IAS associated with number of movement of people and cargo act as pathways for species introduction especially from neighbouring and trade countries including Fiji, Hawaii and Asian countries, by either intentionally or accidentally.

The formulation of K-NISSAP is the incorporated document of the two existing Strategies and Action Plan-SAP for Gilbert group and Phoenix and Line group respectively through the consultative workshop with key stakeholders and coordinated by Environment and Conservation Division under Ministry of Environment, Lands and Agricultural Development. GEF provide provision of financial assistance through UNEP implementing agency and technical support from SPREP. The integrated strategy insights actions required, delegated responsibilities to relevant government divisions and budgets for external funder.

Government of Kiribati is looking forward for the collaborative work between key ministries, non-governmental organisation, church groups and local communities to implement plans and prioritized actions in order to cease, minimize and manage the negative impacts of Invasive species through the goals and aims of Kiribati National Invasive Species and Strategy and Action Plan 2015-2020.

---

Honourable Minister- Tiarite Kwong  
Minister for Environment, Lands and Agricultural Development.

## ACKNOWLEDGEMENTS

The revision and updating of Kiribati National Invasive Species Strategies and Action Plan-KNISSAP 2015-2020 is genuinely the outcome of collaborative effort by ECD as an implementing agency through the technical guidance of SPREP and UNEP. We would sincerely like to thank GEF PAS for its ongoing and prompt financial support for Kiribati through the regional initiative and provision for reviewing and updating this strategic and action plan. MELAD is grateful to acknowledge Dr Ray Pierce of the EcoOceania Pty Ltd in Australia for facilitation, guidance and drafting of this document through consultative workshops with Invasive Alien Species Committee-IASC at Tarawa and Kiritimati. We sincerely grateful for other recent IAS feasibility studies and management of existing invasive species from other external institutions including CEPF, PII, Packard, NZAID, NZDOC, Darwin/RSPB, and Dr Gruber, that provide baseline information and flagged the importance of this document. We would express gratitude to MELAD and Linnix's admin for the great administrative supports during course of this consultative process. In addition, we thank our line ministries and representative in providing intense legislative information for strenuous enforcement and management and particularly engage and exercise the workplan in different expertise and technical areas. Last but not least, we are tremendously grateful to all IASC during three day workshops (details in Appendix 3) for their contributions which are helpful insight practical action plan matrix for the next 5 years. Without contributions and collaborative works, this document would not be an achievable one.

## KEY DEFINITIONS

**Alien (introduced) species:** species that have been transported by people to a new place

**Biocontrol:** carefully planned control of an invasive species using one or more natural control agents

**Biodiversity:** the diversity of life on earth or a location within, e.g. biodiversity of Kiribati

**Biosafety:** preventing the spread of invasive species and genetically modified organisms

**Biosecurity:** preventing the spread of invasive species

**Biota:** plants, animals, fungi, micro-organisms.

**Control:** managing a population of an invasive species, e.g. containment, trapping feral cats, etc.

**Ecosystem:** living organisms (plants, animals, fungi, micro-organisms, etc.) and their physical environment

**Eradication:** the total removal of an invasive species population from a site

**Genetically modified:** organisms whose genetic compositions have been altered artificially

**Indigenous or native species:** organisms that occur naturally in a place, e.g. all the Kiribati seabirds

**Invasive species:** introduced species (and rarely native species like crown-of-thorns starfish) that become destructive to the environment, species, or agriculture, etc.

**Monitoring:** regular consistent surveys which are usually undertaken to measure trends in native species populations

**Pathway:** The route and means by which IAS could invade Kiribati, e.g. mongoose and other IAS travelling from Hawaii or Fiji in containers on cargo ships is one potential pathway

**Pest:** Often used to mean the same as IAS, but usually refers to Agricultural IAS

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

**Restoration (ecological restoration):** the process of recovering the naturalness of a site, such as in the PIPA islands, often beginning with the eradication of one or more invasive species

**Risk assessment:** evaluation of the potential risk of a species invading

**Rodent:** a rat or mouse

**Source:** the origin or potential origin of IAS that could invade Kiribati, e.g. Fiji and Hawaii.

**Surveillance:** repeated surveys to determine if invasive species have arrived.

**Terrestrial:** on land c.f. marine.

## ACRONYMS

ALD	Agriculture and Livestock Division of MELAD
AusAID	Australian Assistance for International Development
CDRC	Curriculum Development and Resources Centre
CI	Conservation International
CITES	Convention on Trade in Endangered Species
CXI	Kiritimati, Christmas Island
ECD	Environment and Conservation Division
EDRR	Early Detection and Rapid Response
EEZ	Exclusive Economic Zone
ERP	Emergency Response Plan
FAO	Food and Agriculture Organisation
FD	Fisheries Department
GEF-PAS	The Global Environment Facility Pacific Alliance for Sustainability
GISD	Global Invasive Species Database (ISSG)
IAS/IS	Invasive alien species or sometimes invasive species if it is a native species
IASC	National Invasive Species Committee of Kiribati
IBA	Important Bird Area of BirdLife International
IMO	International Maritime Organisation
ISSG	Invasive Species Specialist Group of Species Survival Commission of IUCN
IUCN	International Union for the Conservation of Nature
KBA	Key Biodiversity Area of Conservation International
KDP	Kiribati Development Plan
KIEP	Kiribati Integrated Environment Policy
KPA	Kiribati Ports Authority
KPS	Kiribati Police Services
LMO	Living modified organism
LRD	Land Resources Division of SPC
MCTTD	Ministry of Communication, Transport and Tourism Development
MELAD	Ministry of Environment, Lands and Agricultural Development
MFMRD	Ministry of Fisheries, Mineral and Resource Development
MOE	Ministry of Education
NBSAP	National Biodiversity Strategy and Action Plan
NZAID	New Zealand Agency for International Development
PIER	Pacific Islands Ecosystems at Risk (plants)
PII	Pacific Invasives Initiative
PILN	Pacific Islands Learning Network
PIO	PIPA Implementation Office
PIP	Pacific Islands Partnership
PIPA	Phoenix Islands Protected Area

PIPAMC	Phoenix Islands Protected Area Management Committee
PNG	Papua New Guinea
SPC	Secretariat for the Pacific Community
SPREP	Secretariat for the Regional Environment Programme
UNCBD	United Nations Convention on Biological Biodiversity
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
WCU	Wildlife Conservation Unit, Kiritimati
YCA	Yellow crazy ant

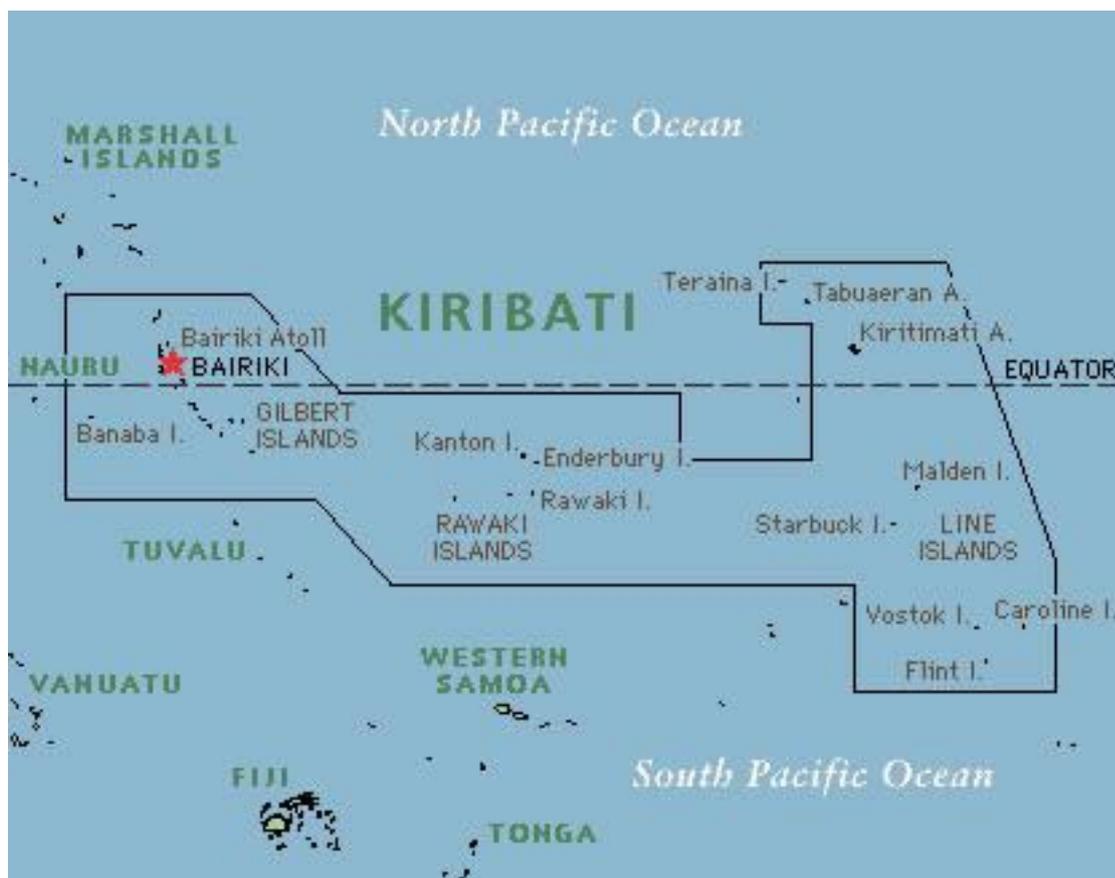


Figure 1 – Map of Kiribati showing location of Gilbert, Phoenix and Line Is.

## 1.0 INTRODUCTION

### 1.1 Kiribati – an island nation

Kiribati is a central Pacific nation comprising 33 islands and atolls in three isolated archipelagos - the Gilbert Islands in the west immediately north of Tuvalu and centred on longitude 170-175°E, the Phoenix Islands north of Samoa and Tokelau at longitude 170-175° W and the Line Islands between Hawaii and Tahiti at longitude 150-160° W (Fig 1). The islands of Kiribati are at the summit of ancient, raised sea-mounts projecting upward about 5000 m from the seabed of the Pacific Plate. Many islands are closed atolls with relatively small lagoons of super-saline water, particularly in the PIPA and Line Islands. Most other

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

islands however possess large open lagoons which are open to the sea in one or more places. Most islands rise to only a few metres of height above the ocean and so are vulnerable to sudden increases in sea-level (KIEP 2013).

The Gilbert Islands comprise 16 atolls and one raised island (Banaba, to the west) with the largest atolls being Nanouti and Tarawa. The Phoenix Islands comprise 8 islands of which Kanton is the largest at c.1100 ha and is the only inhabited PIPA island and home to fewer than 50 people. The Line Islands also comprise 8 islands and atolls, the largest being Kiritimati with an area of c.370 km<sup>2</sup> and an increasing human population approaching 10,000. Although the EEZ of Kiribati is a staggering 3.5 million km<sup>2</sup>, the land area is barely 800 km<sup>2</sup>, nearly half of which comprises Kiritimati (KIEP 2013).

The climate of Kiribati is moderated by the ocean currents and easterly trade winds that blow steadily throughout the year. The wet season occurs in November-April throughout, but the northern Gilberts experience more rain (up to 3 metres) than the other two Groups. Annual rainfall is highly variable, however, and greatly influenced by the El Nino Southern Oscillation. On some PIPA atolls there can be entire years with virtually no rain (PIPA 2009), while at Kiritimati rainfall extremes can be c.200 and 2500 mm (Scott 1993). Storms occur throughout Kiribati, but there are virtually no cyclones except for their infrequent occurrence, e.g. in the southern Line Islands at 10-12° S (Falconer 2004). Storm surges sometimes inundate much of the land as occurred at Kanton in the early 1940s. Temperatures are moderated by the sea-breezes and display low daily variation, e.g. at Kiritimati the average daily range is from 24 to 30° C (Scott 1993), with slightly higher ranges at the Gilberts (Pacific Climate Science Programme).

Upwelling currents near the atolls bring nutrient laden cooler waters to the surface supporting a rich abundance of marine and reef life (PIPA 2009). This in turn benefits an abundance of local seabirds with at least 21 species nesting on the Kiribati atolls, while many more occur as seasonal visitors or passage migrants from temperate and arctic regions.

The human population of Kiribati is nearly 110,000, about half of which is present on South Tarawa. The Kiritimati population of c.10,000 people is steadily increasing due largely to immigration from the Gilbert Islands.

## 1.2 Natural land values of Kiribati

### Vegetation and flora

The flora of Kiribati has been shaped through combinations of oceanic influence, drought adaptation and a long history of human modification. There are no endemic species and fewer than 100 native species, including mangroves in the Gilbert Islands. Some of the low-rainfall atolls, e.g. Rawaki and Birnie in the Phoenix Islands, can support as few as c.10 plant species. These latter islands are classic “desert islands, where the flora is dominated by extensive areas comprising little other than Te Wao (*Portulaca lutea*) and *Boerhavia* spp. (refer Appendix 1 for details of species names). Zones of grasses e.g. Te Utuete (*Lepturus*) and succulents like Te Boi (*Sesuvium*) often occur around the edge of the lagoons, but woody species are sometimes scarce or absent.

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

Other atolls throughout Kiribati typically have significant stands of woody trees and shrubs including Te Kaura (*Sida fallax*), Te Mao (*Scaevola taccada*) and Te Ren (*Tournefortia argentea*), often in association with the hemiparasitic vine Te Ntenenei (*Cassytha filiformis*). Occasionally there are other tree species such as Te Buka (*Pisonia grandis*), Te Uri (*Guettarda speciosa*), Te Kaina (*Pandanus tectorius*), Te Noni (*Morinda citrifolia*) and Te Kanawa (*Cordia subsordata*), especially on the higher rainfall islands. Te Ni or coconut trees have been planted on most Kiribati islands but combinations of severe droughts and salt water stress has caused them to struggle or even die out on some, e.g. in the PIPA. Even on Kiritimati a severe drought in c.1900 decimated the coconut plantations.

As is the case throughout the Pacific, larger islands support many exotic species and others that may have been moved to varying degrees by sea-farers, beginning hundreds of years ago (Whistler 1992). Included here are Te Ni (*Cocos*) and Te Burukam (she-oaks, *Casuarina equisetifolia*) which occur in all three groups, while others such as Te Ango (*Premna serratifolia*) now dominate the South Tarawa landscape. Invasive species, e.g. Lantana (*Lantana cantareus*), Singapore daisy (*Wedelia trilobata*) and sweet-scent (*Pluchea odorata*) all pose a more recent and serious threat to the ecosystems and natural character of the islands.

### Fauna

The terrestrial fauna of Kiribati is dominated by species associated with the ocean. Most species of “land crab”, for instance, have marine development and dispersal phases, including in the coconut crab. Meanwhile green turtles come ashore briefly when females lay their eggs in sandy shores just above the high tide line in suitable sites throughout Kiribati. The lizards (skinks and geckoes) of Kiribati are regarded as “tramps” because they are all widespread species that can travel and colonise new islands by hitching a ride on floating driftwood and other flotsam or on vessels and aircraft.

By far the most conspicuous fauna group ashore are the seabirds comprising at least 21 breeding species. These include petrels (6 species), frigatebirds, boobies and tropicbirds (7 species), and terns and noddies (8 species). The petrels are best represented at the PIPA and Kiritimati with 6 and 5 species respectively. These include most of the world’s largest populations of the Te Ruru or Phoenix petrel and Te Bwebwe Ni Marawa or White-throated storm-petrel both of which have an IUCN classification of Endangered. The frigatebirds, boobies and tropicbirds are represented throughout the nation but globally important populations of all these birds occur in the PIPA and Line Islands. The terns are all common species beyond Kiribati except for Te Raurau or blue noddy which is confined to the central Pacific where the PIPA and Kiritimati support globally important populations.

Shorebirds include many migrant species from their breeding grounds in Alaska, but only a few are common in Kiribati, notably Te Kewe or bristle-thighed curlew which is a Vulnerable species, while Te Kun or Pacific golden plover, Te Kirikiri (wandering tattler) and Te Kitibwa (ruddy turnstone) make up the balance. The sea coasts of Gilbert Islands also support a breeding population of Te Kaai (Pacific reef heron).

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

Land-birds are now relatively few in Kiribati. The only common native species are Te Bitin (Pacific pigeon) of the Gilbert Islands, long-tailed koel (a migrant from New Zealand to the Gilberts and southern PIPA) and the only endemic bird, Te Bokikokiko or Christmas Island reed-warbler, which is now confined to Kiritimati and Washington Islands. Introduced species include Te Kura (Rimatarā Lorikeet) present on Kiritimati and common on Washington Island and which is an IUCN Vulnerable species, plus rock pigeon at Kiritimati and Tarawa. Many vagrants have been detected from time to time, including waterfowl, gulls, waders and two invasive myna species and Eurasian tree sparrow in the Gilbert Islands.

### 1.3 Invasive Alien Species

There have been three waves of IAS arriving in Kiribati, the first having been during the Austronesian colonisation of the Pacific and subsequent crossing back and forth of the Pacific by Polynesian and Micronesian seafarers over hundreds, perhaps thousands of years. The most impacting IAS to arrive in this period was the kimoa or Pacific rat, which, together with direct predation by humans, would have eliminated many Kiribati fauna species. Most of these lost species would have been birds such as rails, doves, lorikeets, kingfishers and warblers (Wragg and Pierce unpub.).

The next period of invasive species impact was a period of about 100 years during the European colonial period of 1850s to the 1970s when European IAS were accidentally or deliberately introduced to Kiribati and many other countries. The most impacting to arrive in this period were two additional rodents – the black rat and house mouse - together with house cats and European rabbits. Rabbits were introduced to Rawaki by guano collectors and reached high densities on the island where they decimated the vegetation. Cats were introduced to islands often as domestic cats to control kimoa, but they soon became feral and impacted on ground-nesting birds throughout Kiribati, e.g. Kiritimati and Malden in the Line Islands, Kanton, Manra, Orona and formerly Enderbury, in the PIPA, and several of the Gilbert Islands. During this period cane toads (*Rhinella marina*) were introduced to two of the Gilbert Islands, Kuria and Abemama.

The final and very serious period of impact is upon us right now with many destructive IAS having arrived in Kiribati in recent years aided by advances in modern transport and the increasing demand for resources and supplies. New IAS arrivals have included the Asian rat (*Rattus tanezumi*) in 2001 which invaded McKean Island in the PIPA courtesy of a wrecked Korean fishing vessel from which the rats proceeded to decimate the island's seabird population (Pierce 2010). Other serious IAS to arrive recently include two species of mynas at Betio in the 2000s, yellow crazy ants at Kiritimati in or just before 2011 and many weed species, including lantana throughout Kiribati, and Singapore daisy (*Wedelia trilobata*) in Tarawa. Some species, e.g. black rat, have probably had multiple invasions at some islands, e.g. Kiritimati, due to poor biosecurity and insufficient concern in the past.

A recent desktop review by ISSG (Pagad 2014) shows that an estimated 202 alien/introduced species that are known to have invasive and potentially invasive features have been recorded in Kiribati. Of these 175 are plant species, and 27 are animal species. Most of these species occur in the terrestrial system (185), followed by terrestrial/freshwater (11), 2 each in freshwater and marine, and 1 each in marine/brackish and terrestrial/brackish. These include

many of the more common groups of plants and animals the latter including mammals, reptiles, birds, fish, snails (molluscs), crustaceans, insects of many classes, gymnosperms, monocot angiosperms and dicot angiosperms.

## 1.4 Impacts of Invasive Species in Kiribati

Impacts of IAS in Kiribati range from total ecosystem impacts to quite specific impacts on one or more native species. A classic example of a total ecosystem impact is that of the European rabbits introduced to Rawaki in the PIPA where they grazed most species of plants to ground level and totally eliminated some others. The removal of the rabbits in 2008 has resulted in the recovery of a number of plant species. One species, Te kaura (*Sida fallax*) was noted only as a few seedlings at the time of the rabbit removal, but is now present in stands of hundreds of tall shrubs and they are being used again for nest sites by frigatebirds and other seabirds as the plants regenerate (Pierce 2013).

Other species that can have ecosystem impacts include many weed species, e.g. lantana and Singapore daisy which are becoming established in Kiribati and are spreading rapidly. They have probably been deliberately introduced as ornamental flowering plants, but both readily escape and can smother the ground storeys of gardens and natural communities alike and can prevent native plants from germinating or growing. Meanwhile Te Burukam can become dominant and change the whole structure of vegetation as is occurring near Base Camp and Poland at Kiritimati.

Examples of specific impacts are those of each of Pacific rats, black and Asian rats and cats, all of which impact on birds and lizards to different degrees. The different IAS scenarios at the PIPA and Kiritimati have enabled a close understanding of each species impact (Table 1.4) with cats and rats having the greatest impact on seabirds, particularly the threatened species Te Ruru and Te Bwebwe Ni Marawa. The removal of these IAS from islets in Kiritimati has resulted in safe and secure breeding grounds and productive populations for these seabird species.

Table 1.4 – Severity of impacts of some IAS on threatened and globally important bird populations in Kiribati - derived from studies in PIPA and Kiritimati (modified from Pierce et al 2013). “High” impact is unsustainable in long term, “Catastrophic” impact is unsustainable in both short and long term.

Species	Kimoa/Pacific rat	Black/Asian rat	Feral cat
Te ruru	Moderate to high	Catastrophic	Catastrophic
Te bwebwe	Catastrophic	Catastrophic	Catastrophic
Shearwaters	Usually high	Catastrophic	Catastrophic
Tropicbirds	Low	High	Catastrophic
Boobies, frigatebirds	Low	Moderate	Moderate to locally catastrophic
Terns	High	High to catastrophic	High to catastrophic
Te raurau	Catastrophic	Catastrophic	Catastrophic
Te bokikokiko	Moderate?	Potentially catastrophic	Moderate?

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

Sometimes impacts of IAS can be indirect and their true effects only revealed by research or management with associated monitoring being in place. Te Bokikokiko on Kiritimati is an example of this where removal of rats from motu in the central lagoons has resulted in an increase in the warblers visiting the motu where they also sometimes nest. The removal of rats has resulted in more food availability (geckoes, insects) for Te Bokikokiko and they can now safely feed on the ground too without being harassed by rats.

Impacts of other IAS are sometimes not fully understood. The yellow crazy ant (YCA *Anaploepis gracilipes*) is a case in point as it is well known to seriously impact on native ant communities by competing for food resources, but its impacts on birds and lizards, etc., are poorly known. In some situations such as in the Tokelau Islands and Hawaii, it is clear that YCAs can have an impact on seabird nesting success locally, both tree-nesting and ground-nesting species. Overall, YCAs should probably be regarded as ecosystem pests and it is vital that we prevent their invasion and quickly eradicate any that might arrive. Many weeds arriving at Kiribati, e.g. *Pluchea odoratis* at Kiritimati, could also be a potential ecosystem weed and needs specialist assessment and advice.

Fortunately Kiribati is free of many agricultural pests, but some such as taro beetle, which is present at South Tarawa, and scale insects impact on crop production. The giant African Snail has been recorded only once - at Betio container terminal (Burangke Tebeibeti, pers. comm.). *Tilapia* have been introduced for aquaculture, but these damaging fish need to be replaced with genetic forms that are less impacting. *Gambusia affinis* are also present.

The local impacts of marine IAS are poorly known, but the native crown-of-thorns starfish *Acanthaster planci* is present throughout Kiribati. It is likely that many foreign IAS have arrived via ballast water and hulls at sea-ports such as Betio, but targeted surveys appear to be lacking and require IAS inventories and pathway analyses. .

<b>REPORT THESE VERY DANGEROUS INVASIVES IMMEDIATELY</b>	
	<p><b>Brown or Norway Rat</b></p> <p>A very large rat and an excellent swimmer, it would access all of the motu at Kiritimati and elsewhere and destroy the seabird colonies.</p> <p>These rats occur throughout the inhabited Pacific including at Fiji and Honolulu and could easily hitch-hike in food cargoes, containers, etc.</p>
	<p><b>Grey mongoose</b></p> <p>A predator of rodents, birds, chickens and lizards. If it arrived at Kiritimati, the mongoose would be able to reach all closer motu at Kiritimati for example and destroy the seabird colonies.</p> <p>The mongoose is common at Fiji and Honolulu and could easily hitch-hike on ships to Kiribati. Alarmingly, in recent years individuals have found their way to Samoa and New Caledonia</p>
	<p><b>Wedelia – Singapore daisy</b></p> <p>This creeping vine can totally smother gardens, coconut regrowth and native vegetation.</p> <p>It has been introduced to Tarawa in recent years and must be eradicated.</p>

### 1.5 Potential Impacts of other Invasive Species that could arrive

The Pacific nations collectively harbour large numbers of IAS (IUCN/ISSG database), many of which could invade Kiribati. This is aggravated by the fact that the two main trading partners of Kiribati – Hawaii and Fiji – are the “IAS capitals” of the Pacific. These two countries hold such devastating IAS as mongoose, Norway rat, little fire ant, yellow crazy ant, giant African snail, cane toad, red-vented bulbul, common myna, jungle myna, Singapore daisy, lantana, agricultural pests e.g. taro beetle and coconut beetle, mosquitoes, and very

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

many others (refer Pagad 2014 for complete list). Pacific rim countries, e.g. Australia and USA, have other highly destructive invasives including red-imported fire ant (RIFA). All Pacific countries currently have less surveillance of departing cargo, etc. compared with their surveillance for what arrives. Consequently the risks of IAS getting on board vessels and planes to Kiribati are extreme.

Any of the first group of IAS listed above (mongoose, Norway rats, fire ants and yellow crazy ants) would have a totally devastating impact on Kiribati seabirds – the lagoon motu of Kiritimati for instance would mostly be well within the swimming range of the mongoose and Norway rat, especially the latter which is an expert swimmer. Both these IAS have serious impacts on wildlife and only the mongoose-free islands in Fiji support the most sensitive of that country's birdlife. Meanwhile the fire ants and YCAs could hitch-hike to the motu and have an equally devastating impact as has occurred in other invaded countries.

The fire ants together with the weeds would also have significant ecosystem impacts in Kiribati as well as making life miserable for humans. Fire ants (as with YCAs) impact on other ants and so the natural process of fertilisation for ecosystems and gardens alike would be compromised. The weeds have a smothering effect, impacting on gardens and plantations with garden plants being smothered and plantation regeneration affected.

Meanwhile gardens and agriculture could be impacted by any new fungi, insects and diseases that might be transported to Kiribati. Taro beetles are found only on S Tarawa so internal biosecurity is important, while coconut beetles would have serious impacts if they arrived, damaging the quality and quantity of flowering and fruit produced.

There are also potential health risks associated with many newly-arriving IAS, including species of *Aedes* mosquito which could carry and transmit dengue, Zika and other fevers affecting people.

<b>REPORT THESE VERY DANGEROUS ANTS IMMEDIATELY</b>	
	<p><b>Yellow crazy ant</b></p> <p>These ants and other invasive ants such as little and red-imported fire ants destroy native ants and other insects and also lizard and bird populations. YCAs are 4-5 mm long yellow-brown coloured with erratic movements.</p> <p>YCAs are common in Fiji and Honolulu and have recently invaded Kiribati where an eradication programme is underway.</p>
	<p><b>Little fire ant</b></p> <p>These small stinging ants are orange-red to light brown in colour and the workers are only 1.5 mm in length</p> <p>Little fire ants occur in Honolulu, Fiji and many other places and could easily invade Kiribati</p>
	<p><b>Red imported fire ant</b></p> <p>These very destructive ants are 3-6 mm long and are reddish coloured.</p> <p>They have invaded several Pacific rim countries including the Brisbane area in Australia, and could easily establish in other countries including Kiribati</p>

## 1.6 WHY A K-NISSAP IS NEEDED

About every year one new species of IAS reaches Kiribati. Recent dangerous examples are the Singapore daisy in Tarawa and the yellow crazy ant at Kiritimati, both of which will have enormous impacts on Kiribati biodiversity and economies if they establish, while the Eurasian Tree Sparrow has reached Tarawa in 2016. Careful planning is needed to work towards their eradications. Every year other IAS species gain a stronger hold in Kiribati with examples being lantana and black rat at Kiritimati. Collectively, these IAS will impact across the spectrum of biodiversity, agriculture, tourism and human health. Without checks in place,

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

other IAS can easily invade Kiribati particularly from our main trading partners in Fiji and Honolulu – species like mongoose, Norway rat, invasive ants, giant African snail and many weed species would devastate the livelihood of Kiribati.

Kiribati is currently addressing many of these issues, some of them outstandingly well, e.g. in the PIPA and on some of the Kiritimati motu. Resources are limited however, and we need to ensure that our efforts are well-directed and effective towards achieving a sustainable livelihood for people and environmental values. To this end the K-NISSAP identifies the knowledge pillars on which a sustainable livelihood can be built. It examines the threats to Kiribati and the pathways by which new and existing IAS can invade different parts of Kiribati. A key component of the K-NISSAP are tables that identify a number of activities spanning awareness, education, research, capacity, biosecurity, management and the technical and training needs that are needed to achieve this. These tables also identify the potential sources of funding and technical support for moving ahead effectively in the management of IAS in Kiribati. In so doing it contributes towards the goals of other strategic plans, including in maintaining healthy and vibrant ecosystems, sustainable development agriculture and community livelihoods in Kiribati.

## 2.0 GOAL, THEMES AND OUTCOMES

A Global Environment Facility (GEF) funded project is currently being implemented in Kiribati entitled the “Prevention, Control and Management of Invasive Alien Species in the Pacific Islands” (SPREP 2011). This is a multi-country project and also includes Niue, Federated States of Micronesia, Cook Islands, Marshall Islands, Papua New Guinea, Palau, Tonga, and Samoa. Activities within the framework of this project include the conservation of priority species and ecosystems and the management of invasive alien species.

Key deliverables identified by the Government of Kiribati are as follows:

- appointment of national IAS coordinator
- write and implement NISSAP
- identify training and capacity needs and implement training
- review needs for facilities and equipment
- use regional services for planning and implementing IAS projects
- implement monitoring and surveillance
- improve effectiveness of biosecurity
- early detection and rapid response systems (EDRR) implemented
- best practise systems adopted for priority sites and species
- IAS eradicated from priority sites
- Use UNEP systems of reporting.

The K-NISSAP is the second item on this list of deliverables and has a key role in identifying specific components contained in all of the other deliverables listed above.

## 3.0 MANAGING INVASIVE SPECIES

### 3.1 Invasion Pathways

The effective management of IAS in Kiribati depends on identifying the source and pathways that IAS could use to enter the country or travel within the country. Once details of these pathways are known the government agencies (Section 3.2) and the wider community can combine their efforts to block the IAS pathways. The pathways include international sea and air routes as well as domestic sea and air routes. These are summarised below.

#### International vessels

There are four international ports of entry at Kiribati which in order of traffic volume are: Betio, Kiritimati, Kanton and Fanning. Most vessels are cargo ships or fishing vessels. Betio receives cargo ships (including many with containers) from Fiji, Vanuatu, Samoa, Japan, New Zealand (mainly Auckland) and Australia (mainly Brisbane). Sometimes container cargoes from Japan and other sources travel via transit ports including Brisbane and some ports in Fiji. Kiritimati receives international cargo vessels from Honolulu (MV Kwai) and Fiji, the latter including capacity for containers. No international cargo ships visit Kanton.

Many fishing vessels arrive at Betio and Kiritimati from Korea, China, Taiwan, Hawaii, Ecuador, American Samoa and Fiji, some of which use additional transit ports, including Vanuatu and Solomon Islands, while many have close contact with “mother ships” from similar origins. There is limited contact between these ships and shore but this usually involves crew, and potentially also rubbish, going ashore, while some IAS could fly ashore. As of 1 January 2015 no fishing vessels are permitted to visit the PIPA.

Other international vessels include a small (estimated <20 total annually but growing) number of yachts that visit the four international ports - Kiritimati, Kanton, Fanning and Betio. Tourism vessels in the form of cruise liners frequently visit Kiritimati and then other Line Islands such as Malden, while a few smaller tourist vessels (<5) visit the PIPA each year, but this is likely to increase as the PIPA promotes Kanton as an ecotourism destination. Research vessels occasionally also visit the PIPA (up to 3 annually) and less frequently the southern Line Islands.

#### International flights

Bonriki (Tarawa) and Cassidy (Kiritimati) are currently the only international airports in Kiribati, with Bonriki receiving most of the air-traffic. Bonriki receives Fiji Airway flights from Nadi/Fiji and Our Airline flights from Nadi and Majuro/Marshall (RMI). Cassidy Airport receives weekly international Fiji Airways flights from each of Honolulu and Nadi and also cargo flights (much of it foodstuffs) from Honolulu. There are also frequent transit stops (varying from a few hours to overnight) by small jets traveling between American Samoa and Tahiti.

#### Domestic vessels

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

There are up to 3 or 4 scheduled sailings per annum of cargo and passenger ships between Betio, Kanton and Kiritimati, and the same number returning. A more modern Te Mauri now undertakes nearly all of these sailings replacing the ageing vessels of up to 2014. In the Line Islands the MV Kwai (based in Honolulu) undertakes domestic stops at Washington as well as the international ports of Fanning and Kiritimati. In the Gilbert Islands there are a number and variety of Betio-based domestic vessels that undertake passenger and cargo sailings to the and from the outer islands.

### Future changes

The rise in prominence of the PIPA will see increased visits to Kanton from ships, yachts and aircraft. The runway at Kanton is likely to receive aircraft from Tarawa and Samoa from as early as 2015.

## 3.2 Roles and Responsibilities

Many agencies have roles and responsibilities in Kiribati IAS management. These are outlined below.

### Kiribati Biosecurity, Department of Agriculture (ALD)

The Biosecurity division of ALD plays the lead and key role in biosecurity in Kiribati. It is mandated under the Biosecurity Act (2011) to prevent IAS importation into Kiribati and their spread around the nation. It is also mandated with managing some pests already present in Kiribati, particularly agricultural pests such as whitefly, scale insect and ant incursions. Biosecurity comprises a small group of staff within ALD at Tarawa and Kiritimati and often sharing wider Agricultural tasks at those locations, especially Kiritimati. It links with other MELAD divisions and Council staff in the outer islands of the Gilbert and Northern Line Islands.

### Environment and Conservation Division (ECD)

The ECD is the lead agency for protecting the Kiribati environment. It is mandated under the Environment Act (1999, amended 2007) to manage IAS within Kiribati.

Key roles in relation to IAS are to:

- Coordinate IAS management programmes
- Develop the NISSAP, IAS policies and plans nationally
- Build capacity amongst staff to manage IAS
- Raise awareness of IAS at a community level including schools
- Undertake marine IAS management.

### Wildlife Conservation Unit (WCU)

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

This is a key and long-established branch of ECD located at Kiritimati where it is mandated with wildlife protection under the Wildlife Ordinance (CAP 100). It is responsible for wildlife activities at Kiritimati as well as elsewhere in the Line Islands and at the Phoenix Islands. Key roles are managing IAS, particularly rats and cats, and poaching by humans, to protect the breeding colonies of seabirds at Kiritimati, and participating in biota surveys and IAS management in the PIPA and elsewhere in the Line Islands.

### PIPA Trust

The PIPA Trust is mandated with protecting and managing the PIPA waters and terrestrial biota under the PIPA Regulations 2008 (amended 2014). It is responsible for fund-raising for IAS management at the PIPA and for administering such projects. It is also responsible for Biosecurity at the PIPA.

### Maritime Police

This division of the Kiribati Police supports PIPA and Kiribati generally by undertaking surveillance via radio-telemetry and also vessel patrols mainly in the PIPA. This role has been a key to defending PIPA biosecurity.

### Fisheries Division

Currently this Division appears to have no mandate associated with managing marine invasives in Kiribati, including any measures to prevent ballast water biota entering and enhancing hull-antifouling procedures.

### Local Councils

Feral cats and stray dogs are controlled by Councils on several islands including Kiritimati.

### The Community

The people of Kiribati will be requested by MELAD to report any suspicious-looking plants or animals that could be IAS. To achieve this, some of the activities in Section 4 will specify tasks that will be undertaken by MELAD to raise the awareness of the community regarding potential IAS that could invade Kiribati and to outline the process for reporting anything unusual.

## 3.3 Legislation and Policies

### National Legislation

#### Biosecurity Act 2011

The purpose of this Act is to prevent the arrival of animal and plant pests and diseases into Kiribati; to control their establishment and spread and regulate the movement of animal and plant pest and diseases and of animal and plant products; to facilitate cooperation in respect of animal and plant diseases; and to make ancillary and related provisions.

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

This Act incorporates provisions of the earlier Animal Importation Ordinance and Quarantine Ordinances.

### Environment Act 1999 (2007 amendment)

This Act includes provision for the management of IAS in the country together with provisions to require mitigation for the potential impacts of IAS and other impacts associated with development proposals.

### Fisheries Act 2010 and amendment

This Act has limited powers relating to IAS. However there is a Fisheries Policy pertaining to the management of marine IAS in aquaculture development programmes through importation approval licences.

### Phoenix Islands Protected Area (PIPA) Regulations 2008 (amended 2014)

The PIPA Implementation Office (PIO) is mandated with protecting and managing the PIPA waters and terrestrial biota under the PIPA Regulations 2008 and with its new marine boundaries as in the PIPA (Amendment) Regulations 2014. PIPA is an important World Heritage site and the PIPA Conservation Trust has been established for the long term sustaining of PIPA's pristine environment including IAS management. PIO is responsible for Biosecurity at the PIPA following the PIPA's Guidelines for entering the Phoenix Islands.

### Local government orders and by-laws

Local governments make provision for on-island management of cats and dogs under the local Animal Order, e.g. the neutering of animals at Kiritimati villages.

### Kiribati Key Policy and Strategic Actions Documents

#### Kiribati Integrated Environment Policy (KIEP) 2013

This policy has as its vision "The people of Kiribati continue to enjoy a safe and healthy environment that is resilient to the impacts of climate change and supports livelihoods, human health and sustainable development". It guides MELAD through Acts and Policies including Quarantine Ordinance 1977, Biosecurity Act and the PIPA Regulations 2008, plus the Fisheries Act 2010.

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016 National Biodiversity Strategy and Action Plan 2007-11

A revision to this plan is currently being drafted. This plan is the key guide to ECD in its role of protecting biodiversity and it also provides guidance to Agriculture and Fisheries. There are many supporting documents (e.g. see under PIPA below, note also Kiritimati Bird and Invasive Species Monitoring Plan).

### PIPA management Plan 2010-14 (Revised)

This plan guides the PIPA in its UN obligations towards managing IAS. Several supporting documents that address specific IAS management in the PIPA include PIPA Biosecurity Action Plan (Pierce 2011, revised 2014) and Opportunities for Restoration in the Phoenix Islands (Pierce, revised 2013).

### National Bio-Safety Framework 2010.

The National Biosafety Framework (NBF) is a framework or plan that countries are required to develop to manage the potential environmental risks associated with living modified organism (LMOs). Kiribati has developed its NBF and this was endorsed by cabinet in 2010. However, there is still a need to complete a Biosafety Regulation for the enforcement of regulating the importation and use of LMOs in Kiribati.

### International Conventions and Agreements

#### United Nations Convention on Biological Diversity (UNCBD, Ratified 1993)

This is the key international convention pertaining to protection of ecosystems and species and the management of IAS. It requires all countries to develop a NBSAP while the ensuing Aichi targets include “By 2020 IAS and pathways are identified and prioritized, priority species are controlled, and measures are in place to manage pathways and prevent their introduction and establishment.” The Kiribati NBSAP is still progressing with the final plan anticipated by the end of 2015.

Another protocol stemming from CBD is the Cartagena Protocol on Bio-safety to the CBD which ensures the safe handling, transport and use of living modified organisms (LMOs). Risk management of any LMOs need to address the risks to and safety of biological diversity and human health.

#### World Heritage Convention (WHC)

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

This is the international guiding document for the PIPA, the land and waters of which comprise a World Heritage Area. The WHC requires the country concerned to implement IAS management.

### International Plant Protection Convention (IPPC) 1955

This long-standing agreement on plant health is overseen by FAO and includes:

- Protecting sustainable agriculture and food security by preventing the spread of pests
- Protecting the environment and biodiversity from plant pests
- Encouraging economies and trades via scientifically based phytosanitary measures
- Developing phytosanitary measures for achieving the above three objectives.

### United Nations Convention on the Law of the Sea (UNCLOS)

Part V of UNCLOS pertains to the EEZ of a country stretching to 200 nautical miles offshore in which a country has special rights over exploration and exploitation. Part XII provides for the protection and preservation of the marine environment, including preventing IAS introduction.

### International Convention for the Control and Management of Ships' Ballast Water and Sediments (2004)

This convention was adopted by the IMO requiring ships to have ballast management plans with details all recorded and available for inspection by authorities in countries and ports visited.

### International Convention on the Control of Harmful Anti-fouling Systems in Ships (AFS Convention) (2001)

This is an IMO treaty whereby states agree to prohibit the use of harmful anti-fouling paints and other anti-fouling systems that contain harmful substances.

### Convention on Wetlands of International Importance

Kiribati became a member of this the RAMSAR Convention in 2013. It has identified most of Kiribati's wetlands and associated habitats of international importance and advocates for their protection (Watkins and Batoromaio 2014).

### Convention on International Trade in Endangered Species (CITES 1975)

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

Kiribati is not a signatory to the CITES protocols which control trade in live and dead specimens of threatened species through a strict list and permitting process that is regularly updated. Inspection processes from the Convention would have benefits in detecting IAS movement.

### 3.4 Managing IAS is Everyone's Responsibility

Kiribati is a relatively small country and with so much to lose if new IAS invade the islands. Although border security is mainly the responsibility of Biosecurity and ALD under the Biosecurity Act (and some Fisheries responsibilities), the reality is that currently there are few resources allocated to border and internal biosecurity nationally. Similarly, IAS management across the islands is limited by inadequate operating budgets. Whilst budgets and methods need to be lifted (refer Section 5 Activities), so to do the integrated roles of different divisions under their legislation. For example when does an IAS at border (ALD responsibility) become the responsibility of ECD or a shared responsibility? These matters need clarifying (refer Section 5) as there is clearly a need for an integrated and collaborative approach especially during emergencies. Similarly, the important role of the people of Kiribati generally needs to be highlighted as, without the support of everyone, IAS programmes will fail. The community needs to be asked to look out for anything unusual as this could be the next IAS to invade and damage the biodiversity or economy of Kiribati. They also need to cooperate with the initiatives to manage priority IAS present, including the managing of YCAs at Kiritimati, managing domestic cats and dogs which impact on wildlife, and assisting in managing invasive weeds, e.g. *Wedelia* and lantana.

## 4.0 RECENT AND ONGOING MANAGEMENT IN KIRIBATI

Kiribati has been undertaking several major IAS projects in the PIPA and Line Islands for many years and some new initiatives are beginning across the three island groups. These are summarised below.

### 4.1 Restoration of the PIPA islands

Surveys of terrestrial values in the PIPA islands in 2006 revealed a number of priorities for IAS management that have been implemented in the years since. Key progress has been as follows:

#### Removal of rabbits from Rawaki

Rabbit eradication occurred in 2008 and has been followed by the natural recovery of the ecosystem. Plants such as *Boerhavia* and *Portulaca* are thriving and Te Kaura has recovered sufficiently all of which have enabled seabirds to thrive with more secure and shaded nest sites. This island is the PIPA stronghold for the Endangered Te Ruru and Te Bwebwe Ni Marawa (Pierce 2012).

Removal of Asian rats from McKean Island

In 2001 a fishing vessel ran aground on McKean Island and allowed *Rattus tanezumi* ashore. These rats destroyed many of the seabird populations before they were eradicated in 2008. Now the island and its birds are recovering (Pierce 2012).

Removal of Pacific rats from Birnie Island

The Pacific rats that had been long present on Birnie were eradicated in 2011. Since then terns and noddies have increased and shearwaters have been seen more commonly, suggesting that some natural recolonization is occurring (Pierce et al 2013).

Strengthened Biosecurity

In 2016 a PIPA team including Biosecurity officer will be stationed at Kanton and infrastructural support is to be provided via quarantine shed and equipment. This will help address the risks of new IAS arriving at the PIPA.

Planning for Enderbury restoration

An attempted eradication of Pacific rats at Enderbury in 2011 failed. Operational plans to complete the Enderbury eradication, and also Kanton and the southern three islands have recently been prepared and the PIPA Trust is planning to fund-raise for these operations to proceed.

## 4.2 Kiritimati IAS management

The WCU has been managing IAS to protect bird populations in Kiritimati since the 1970s. Capacity building support from NZ and Australia since 2007 has seen a more focussed approach that has included the following achievements:

Eradication of rats from motu

Over 30 motu in the Central Lagoons area were de-ratted by WCU in 2009-10 with funding and technical support from NZAID. Nearly all motu regularly checked by WCU have remained rat-free. Population responses from birds have been spectacular, particularly from Te Ruru and Taragnogno (Pierce et al 2013).

Surveillance of IAS-free motu

The WCU maintains routine surveillance of rat- and cat-free motu to look for sign of rats, cats, YCAs and poachers. It has an EDRR plan as part of its overall monitoring plan to enable instant response and removal of rats should they reinvade (Pierce 2015).

Kiritimati Biosecurity

The Biosecurity Division maintains its role in checking incoming international vessels and aircraft to minimise the chances of IAS invading. A number of potentially invasive plants and animals have been intercepted. Biosecurity has also maintained a successful system of rat-

## Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

baiting of domestic vessels travelling between Kiritimati, Kanton and Betio. These involve water-proof bait stations and waxed baits initially supplied via a NZAID project.

### Management of Yellow Crazy Ant incursion at Kiritimati

During a surveillance exercise run by Dr Monica Gruber in 2013, an incursion of the very destructive YCA was found at Ronton, Kiritimati. The main incursion area (a warehouse and 3 adjacent properties) was subsequently quarantined by ALD and the YCAs managed collaboratively between ALD and WCU using boiling water, super-saline water, etc. Local agencies were advised to burn rubbish on site rather than risk inadvertent sending of YCAs to the landfill/tip. Attempts to eradicate the ants largely ceased throughout 2014, however an application by Pacific Biosecurity to NZAID for funds to manage the ants using toxins to manage the ants was successful. The next stage of ant removal via baiting is underway in 2015-16 as part of a wider training programme by Pacific Biosecurity.

### Management of feral cats at Kiritimati

Under “Saving the Lines” funding SPREP allocated significant planning, training and equipment for WCU to manage cats in the central lagoons to protect Te Tanguoua colonies. To date (2015) there have been significant problems in getting effective trapping in place and ongoing sustainability (vehicles, operating funds) and other logistic issues.

### Management of lantana at Kiritimati

The WCU has recently begun coordinating a programme of managing lantana in the Ronton area. This involves an Environment Youth Club programme and is planned to continue through 2015.

## 4.3 Tarawa IAS Management

### Tarawa Biosecurity

The Biosecurity Division maintains its key role in checking for IAS on incoming international vessels at Betio and aircraft at Bonriki. There have been many recent IAS interceptions at Tarawa, including giant African snail and several weed species. Recent new initiatives include the operations of a Quarantine laboratory at Betio and planning for quarantine rooms at Bonriki and Betio and other facilities. Biosecurity at Betio maintains an important link in the rat-baiting of domestic vessels travelling between Kiritimati, Kanton and Betio and checking for other IAS including YCAs.

### Tarawa weed management

Space and Amada (2004) surveyed weeds on three atolls including Tarawa. A survey of weeds was planned for 2015.

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

Ballast water training

Staff of ECD's Waste Management Unit have undergone some training in this area recently

Gilbert Islands Surveys

A current (2015) ECD survey of the Gilberts terrestrial biota may enable prioritization of atolls for IAS management.

## 5.0 K-NISSAP ACTION TABLES

The themes for the K-NISSAP action tables follow the format established by SPREP and SPC Guidelines for invasive species management in the Pacific 2011. They are:

### Thematic Area A – FOUNDATIONS

- A1 - Generating support
- A2 - Building capacity
- A3 – Legislation, policy and protocols

### Thematic Area B – PROBLEM DEFINITION, PRIORITISATION AND DECISION-MAKING

- B1 - Baseline and monitoring- includes survey and monitoring results
- B2 – Prioritisation
- B3 – Decisions/Research Priorities - includes research and reviews

### Thematic Area C – MANAGEMENT ACTION

- C1 - Biosecurity action– planning actions, sea-ports and ships, airports and planes (Theme x of SPREP 2009)
- C2 - Managing of existing IAS – includes recent invasions
- C3 – Restoration – if needed

All actions listed are priority actions but the yellow highlighter indicates those projects identified by IASC and CXI stake holders as needing to be implemented urgently or reviewed and revised urgently with targets and dates refined.

## THEME A – FOUNDATIONS

A1 Generating support					
Outcome A1 - Impacts of IAS are widely understood and actions supported					
OUTCOMES	ACTIVITIES	TARGETS AND DATES	VERIFICATION	RESPONSIBILITY	COST AND SOURCE USD
<b>Community awareness</b> on IAS broadened via	Provide information to CDRC on IS lists, bird	IAS materials identified and provided from	Details of material provided reported to	CDRC supported by ECD, ALD, PIPA,	Staff time, poster costs below.

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

targeted programmes and inclusion of IAS in <b>school syllabus</b> from Year5 and 6	posters, brochures, data, K-NISSAP sections, -PIPA and CXI values, publications	2015 onwards and replaced as needed	Director ECD, IASC?	Fisheries	
	Print more posters (PIPA, birds) for schools and design and print Kiribati versions of others (IAS - unusual biota to watch out for, and "Plant me instead")	From 2015 onwards begin process of getting posters in schools; plan poster designs/reprints 2015, and print in 2016	Print listings and distributions reported to Director ECD, IASC?	CDRC supported by IASC, ECD, ALD, PIPA, Fisheries. Also Island Coordinators of District Education	136 schools x \$30 per poster (8 snr sec, 94 primary, junior secondary 24, 10 others)
	Encourage and support schools in undertaking class projects on IAS	Alert schools and public to specific threats and useful projects locally e.g. <i>Wedelia</i> in parts of South Tarawa 2015 onwards, YCAs CXI 2015	Schools provide feedback to IASC on their local surveys	IASC, ALD, CDRC	Brochures, data sheets, school visits, <\$500
	Give school talks on IAS	Set annual targets for no. of schools from 2016, e.g. 10+ per year at Tarawa, 3-5 at CXI	Lists of schools and dates reported to Director ECD, IASC?	CDRC supported by ECD, ALD, PIPA, Fisheries	Staff time, use posters, power-points, etc.
	Integrate with PIPA awareness programmes and support outer islands awareness plan	2015 and annually building programme in later years	List of programmes achieved reported annually to Director ECD, IASC?	Interim coordination by IASC, PIPA advice	Staff time, some materials costs
	Radio interviews on IAS, threats (reporting unusual biota) and management	2015 and building annually; set annual targets, e.g. 5-10 per annum at Tarawa	Annual list of interviews reported to Director ECD, IASC?	Interim coordination by IASC	\$1,000 per annum

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

	Signage, posters, etc. at focal sites	Identify sites and themes 2015; building numbers annually	Details of postings reported to Director ECD, IASC?	Interim coordination by IASC	\$1,000 per annum, potentially more in later years
	Utilize annual occasions and targeted meetings, for displays on IAS, e.g. Independence Day Environment Week, MELAD Week, Fisheries week, World Food Day	2015 and annually; identify themes and needs	Report to Director ECD, IASC?	Interim coordination by IASC	\$10,000+ per annum (potentially GEF-6)
	Develop local awareness messages for specific sites e.g. IAS vulnerability of Te Bokikokiko and Kura at Washington	Identify themes and messages 2015, implement from 2016, ongoing	Reports to ECD, IASC	IASC with help from WCU	As above
	Posters, brochures on invasive ants	Materials for ants provided 2015 onwards	Posters etc. in schools	Pacific Biosecurity (Monica Gruber / Allan Burne) provide posters (electronic and some printed)	MFAT NZ Aid Partnerships fund PF 3 386 for development of materials
	Support performances by key musical artists on IAS messages	Set targets e.g. trial in 2016 and set targets annually	Reports to Director ECD, IASC	Interim coordination by IASC	\$10,000 per annum
IAS awareness raised and biosecurity actions change by <b>domestic traders</b> and registered local vessels distributors and	Meetings on site (at traders) to discuss issues and agree on standard procedures	2015 and onwards; at CXI build on 2014 stakeholder workshops with on-site meetings 1-2 x annually	Report details to Director ALD, IASC?	Interim coordination by IASC	GEF PAS project

warehouses, etc.	Consider the need for rewards and penalties, e.g. publicity, awards, contracts, and implement accordingly	Plan feasibility and design 2015, implement 2016 onwards	Director ALD, IASC?	Interim coordination by IASC	GEF PAS project.
<b>Local counterparts</b> are aware of Kiribati IAS vulnerability and take precautions with cargo preparation	Make contact with counterparts and provide information of IS from countries of origin including ., Fiji, Honolulu, etc. and encourage hygiene	Plan and provide awareness material from 2016 onward, also provide feedback to suppliers	Foreign suppliers etc. indicate precautions to Director ALD	Biosecurity, IASC	Part of awareness package

## A2 - Building Capacity

**OUTCOME 1.2:** The mechanisms to manage invasive species effectively are in place through refined technical skills, infrastructure, technical support, information management and support networks

OUTCOMES	ACTIVITIES	TARGETS AND DATES	VERIFICATION	RESPONSIBILITY	COST AND SOURCE USD
<b>Kiribati IAS Committee and coordinator</b> in place and advise on IAS issues spanning biosecurity and IAS management, well supported by regional partners	<p>Meet to discuss reviews issues, TOR, links with SPREP, etc.</p> <p>Coordinate IAS response</p> <p>Coordinate awareness projects</p> <p>Progress plans for setting up Kiribati NGOs to enable effective link with BirdLife etc</p>	<p>Meet regularly, more frequently in emergencies, events etc., enable sub-groups for direct action, awareness etc.</p> <p>2015 onward</p>	<p>Minutes of meetings sent to Directors</p>	<p>IASC - link with regional partners e.g. SPREP, SPC, BirdLife Pacific, specialists</p>	<p>Staff time plus budget for IAS coordinator salary (GEF-PAS)</p>

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

<p><b>IAS databases</b> and reports collected and maintained at central point(s)</p>	<p>Review and possibly revise format and content of IAS databases and reports and assign staff member to coordinate</p>	<p>Central depository agreed by 2015, some duplication needed at e.g. Betio quarantine office, CXI etc. Electronic copies assessable from environment websites.</p>	<p>Decisions communicated to stakeholders, Directors</p>	<p>ALD, ECD with logistic support from IASC</p>	<p>Limited office costs</p>
<p><b>Biosecurity staff and Invasive Species staff</b> are sufficient in number and adequately trained for effective delivery of their work</p>	<p>Capacity - ensure there are sufficiently trained staff to adequately deal with increased IAS risks</p> <p>Use regional specialists to advise on specific IAS issues</p> <p>Attend workshops on IAS management, attachments where possible to Samoa, NZ, Fiji, Australia etc.</p> <p>Utilize GOK specialists or trained staff e.g. get ballast water training to Ports staff and others from Solid Waste Unit</p>	<p>Review annually how many trained staff are needed at key weak points e.g. Betio, CXI</p> <p>Linkages with SPREP, SPC, other specialists (ants, cats, etc.) increase 2015 onward</p> <p>Training with PILN, USP, SPC, link with PII, etc. workshops, build from 2015</p> <p>More staff trained internally from 2015-16</p>	<p>Report to Minister</p> <p>Schedule of trained staff kept on IAS database</p> <p>Develop link with PILN to capitalize on many training offers</p> <p>Begin with ballast water meeting in house and proceed from there</p>	<p>Director ALD supported by IASC</p>	<p>Base funding for IAS training and PILN</p> <p>Sometimes funded by specialist's organisation, e.g. PILN</p> <p>External funds, e.g. PILN funds attendees to workshops</p> <p>Internal funding</p>
<p><b>Staff</b> are adequately resourced and equipped to do</p>	<p>Determine basic technical equipment and operating needs of</p>	<p>Develop lists 2015 Seek funding 2015-16 Equip officers 2016</p>	<p>Staff have necessary technical manuals, equipment and</p>	<p>Directors ALD, ECD, PIPA, supported by IASC</p>	<p>Existing budgets plus GEF, etc.</p>

effective IAS work	staff and the funding needed to meet this	onward	operating budget to be effective		
Staff are effectively trained in <b>invasive ant management and biosecurity</b>	Ensure active in Pacific Biosecurity's MFAT NZ Aid Partnerships	Training runs 2015–19. 2 X training workshops per year for 5 years. See Project Activity Design for details	See Project Activity Design for details.	ALD CXI, WCU CXI, ALD TRW, ECD TRW with support from Pacific Biosecurity (Allan Bume and Monica Gruber)	MFAT NZ Aid Partnerships fund PF 3 386. Kiribati staff time to attend training (existing budgets)
Staff including Ports staff and stakeholders trained in <b>ballast water</b> and anti-fouling	Review what training has occurred to date and agree on process for internal training	Plan training 2015 Training 2015 or 2016	Share training findings among stakeholders	Biosecurity/Fisheries with support from IASC	May require travel costs for TRW/CXI staff
<b>A3 - LEGISLATION, POLICY, PLANS, PROCEDURES</b>					
Outcome 1.3 - Appropriate legislation, policies, plans and procedures are being used to drive the effective management of invasive species					
OUTCOMES	ACTIVITIES	TARGETS AND DATES	VERIFICATION	RESPONSIBILITY	COST AND SOURCE USD
<b>Biosecurity Act</b> adequately addresses the biosecurity needs of Kiribati	Review Biosecurity Act to ensure that domestic (interisland) issues are addressed, revise regulations and clarify roles and responsibilities	IASC meets to discuss and identify specific amendments to BA 2016	Act amended 2017	Biosecurity, Director ALD	Staff time
<b>Environment Act</b> adequately addresses biosecurity and IAS management needs	Review components of Act, e.g. EIA needs to ensure biosecurity is addressed in detail	IASC meets to discuss and identify specific amendments to EA in 2016	Act amended if needed in 2017	Director ECD supported by IASC	Staff time

<b>Ports Act</b> adequately addresses marine IAS issues and management	Review ballast water and hull anti-fouling needs to ensure biosecurity is addressed	IASC or reps meet with Port and relevant Waste Officer to identify specific needs	Act amended if needed in 2017	Chemical and Waste Management Unit, KPA, supported by IASC	Staff time
<b>K-BSAP</b> effectively addresses biodiversity management needs	Review and revise the K-BSAP	IASC 2016	Plan revised and incorporates priority biodiversity needs in the three archipelagos	ECD/MELAD	Staff time
<b>Biosecurity implementation is effective</b>	Review local action plans biennially, or sooner if required, and update as appropriate	IASC meetings and reviews completed from 2016 onwards	Action plans amended and disseminated to stakeholders	Biosecurity, supported by IASC, WCU (CXI), SPREP, specialists	Staff time
<b>IAS and biosecurity databases</b> are relevant and available to all stakeholders	Review IAS databases and agree on format and what needs to be made available to stakeholders	IASC meetings and reviews completed contemporaneously with action plans above from 2016 onwards	Data bases agreed on and made available to stakeholders	MELAD supported by IASC, SPREP	Staff time

THEME B - BETTER UNDERSTANDING OF THE ISSUES

<b>B1 - Baseline and Monitoring</b>					
<b>Outcome 2.1: Actions are in place to determine changes in IAS status and threats including newly arriving IAS</b>					
OUTCOMES	ACTIVITIES	TARGETS AND DATES	VERIFICATION	RESPONSIBILITY	COST AND SOURCE USD
<b>Invasive ant and other IAS status</b> is known at all sea- and air-ports	Undertake surveillance for YCAs and other invasive ants at all sea ports and airports	Plan developed 2015 and implemented 2016 and onward	Plan details sites, frequency and type of sampling, responsibility, etc.	Agriculture with general MELAD support and advice from Pacific Biosecurity (Monica Gruber / Allan Burne)	Some training covered in NZAID project

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

<b>Kiritimati weeds</b> prioritised and costed for management	Approach SPC for concept approval  Specialist survey of weeds and plan identifies priority management	Discuss concept with SPC 2015 and develop  Survey completed 2016 or 2017 with report on recommended work	Survey plan in place  Recommendations for managing CXI weeds received	ALD with support from IASC, SPC, SPREP  ALD	Staff time ALD  <\$20,000 SPC LRD
<b>Gilberts weeds</b> prioritised and costed for management	Review Space and Amada 2004 report and develop plan for managing Wedelia etc.	Review and plan 2016, and implement management from 2017	Management underway 2017 or earlier	ALD with support from IASG, SPC, SPREP	Unknown as yet, potential community and/or school projects
<b>Kanton weeds</b> prioritised and costed management action	Plan weed survey of Kanton and PIPA staff undertake survey	Plan developed 2016 and implemented 2016-17	Weeds mapped and prioritised for managing	PIPA officer, advisory support from IASC, ALD, SPC, SPREP	Staff time
Potential risks of agricultural pests arriving from source countries understood	Review agricultural IAS resent at Source areas of trading partners countries	2016	Risk species determined, actions identified	ALD with help from SPC, source countries	Staff time
IAS status and feasibility of restoring some <b>Gilbert Islands</b> established	Plan a biota survey and find funder, undertake survey of IS and biota to determine priorities	Survey completed by 2017, eradications from 2018 onward	Survey findings reported to ECD, ALD, IASC; eradication outcomes assessed after one year	Directors ECD, ALD, supported by IASC, specialist advice as needed	Survey costs \$50,000, potentially via KAPIII; management costs to be determined by survey
<b>Marine IAS threats</b> and management needs known	Foster and build on existing support from marine research agencies to implement targeted surveys	Expand current PIPA surveys to include Gilbert and Lines by 2020	Preliminary and/or representative surveys completed	Fisheries and PIPA supported by IASC, regional specialists	International grants via research agencies
<b>B2 – Priorities</b>					

Outcome 2.2 - Effective systems are implemented to assess risk and prioritise invasive species for management					
OUTCOMES	ACTIVITIES	TARGETS AND DATES	VERIFICATION	RESPONSIBILITY	COST AND SOURCE USD
Updated knowledge for managing different <b>marine invasives</b> , including crown of thorns, ballast water and hull biota	Develop or adopt marine management protocols and update via maintaining close links with marine technical advisors	Plans developed and protocols followed 2015; ongoing liaison with experts	Plans and process in place and IASC kept updated	ECD, Chemical and Waste Management Unit, Ports Authority, supported by regional specialists e.g. SPREP	Need to cost this, survey methods may be known
<b>Updated systems</b> for storing data from surveys and reports	Review current systems including consistency for biota generally (CXI examples) and update	Review by 2017 and new systems developed as needed	Data systems in place and being used	IASC in support of ALD, ECD	Staff time, advice from SPREP, SPC
<b>B3 – Research Needs</b>					
Outcome 2.3 - Knowledge is updated for priority sites and invasives, including species biology and impacts, and development of effective management techniques.					
OUTCOMES	ACTIVITIES	TARGETS AND DATES	VERIFICATION	RESPONSIBILITY	COST AND SOURCE USD
Eradication feasibility for IAS on <b>Malden</b> and potentially Vostok is established and costed	Survey Malden biota and IAS, write plan.	Survey completed 2015 Plan drafted late 2015	Report drafted for ECD, IASC	WCU, contract	\$70000 via GEF-PAS for Malden
Improved knowledge of patterns of <b>ecosystem and species recovery</b>	Monitor vegetation, birds, etc. at sites where IAS have been removed	Follow guidelines and timelines, e.g. for PIPA, CXI, ongoing	Monitoring determines whether additional actions are needed e.g. planting tree species and bird translocations	ECD (Kiribati), WCU (CXI), PIPA, supported by regional specialists	Mainly staff time
<b>Knowledge improves of IAS on fishing vessels</b>	Agree with Fisheries and/or SPC on recording, storing and	2015 – agree on process 2016 – implement	Data being collected and added to database, progress reported to	Fisheries, supported by IASC, SPC, SPREP, EcoOceania	Staff time

	analysing IAS data	system	Director Fisheries, IASC		
<b>Knowledge</b> of overseas approaches improves	Foster links with overseas research and management agencies including SPC, ISSG, SPREP, USP, etc	IASC maintains links, ongoing	Advice received on management approaches	Directors ECD, ALD, Fisheries, supported by IASC	Staff time
Feasibility of managing <b>marine IAS</b> known	Invite feasibility studies from interested partners' countries.	Plan developed 2016 and implemented 2017	Survey findings reported to IASC and director Fisheries.	Director Fisheries.	Interested scientific survey group.

### THEME C – MANAGEMENT ACTION

<b>C1 - BIOSECURITY</b>					
<b>OUTCOME 3.1: Effective mechanisms are established to prevent the arrival and spread of invasive species in Kiribati and to detect and respond to any that might arrive</b>					
OUTCOMES	ACTIVITIES	TARGET AND DATE	VERIFICATION	RESPONSIBILITY	COST AND SOURCE USD
General actions (see also Legislation/policy/procedures)					
Include biosecurity projects in <b>GEF-6</b> projects	Agree on which of the urgent actions in this NISSAP table should be offered for GEF-6	Schedule of agreed projects 2015 Implement 2016 onwards	Schedule to Directors ALD, ECD, PIPA	ISAC, Biosecurity, SPREP liaison	GEF-6
Plans for major developments address biosecurity adequately in their <b>EIAs</b>	Review proposals of major developments to ensure they comply with EIA regulations	Evidence of biosecurity in each revised EIA from 2015, ongoing	Final signoff by Director ECD	ECD, IASC, WCU	Staff time, operating
Sea-ports and ships					
<b>Rodents and other IAS excluded from</b>	Implement passenger declaration cards for	Betio-Kanton-CXI cards implemented 2015	Cards in place, reports to Director ALD, IASC	Biosecurity Officer (Betio, CXI), PIPA,	\$1000/annum including Betio-PIPA-CXI vessels

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

<p><b>domestic vessels</b></p>	<p>Betio-CXI and plan same for Gilberts</p> <p>Bait stations placed on ships travelling Betio-Kanton-CXI and bait blocks replenished regularly when vessels dock at Betio, Kanton, CXI, data recorded</p> <p>Discuss rodent control and other needs with captains of Gilberts local vessels and communities where awareness opportunity arises and implement system as above on 5 cargo, c.15 small craft</p>	<p>Gilberts 2016-17</p> <p>Stations and bait in place on all ships 2015, operated as per Action Plans</p> <p>Discussions during 2015 and implement on Gilberts ships 2016</p>	<p>Functioning of bait stations checked by Biosecurity and reported to Director ALD, IASC</p> <p>Report on meeting outcomes to Director ALD, IASC and bait stations subsequently purchased</p>	<p>captains</p> <p>Biosecurity Officers Betio, Kanton, CXI; captains</p> <p>Biosecurity Officer, IASC</p>	<p>Completed 2015, NZAID funded</p> <p>Completed 2015, NZ AID funded. Needs &lt;\$1000 per annum</p> <p>Existing GEF-Pas project, \$20,000 for consultation etc.</p>
<p><b>YCAs eradicated at CXI</b> (see outcome 3.2) and surveillance for all invasive ants in place at all seaports, airports and other vulnerable sites including <b>Fanning and Washington</b> (see also Improving knowledge)</p>	<p>Resurvey distribution of YCAs at CXI</p> <p>Eradication and Monitoring</p> <p>Follow-up surveillance</p> <p>Implement surveys and awareness at other Kiribati sites</p>	<p>Survey/report extent of invasion Feb 2015</p> <p>See outcome 3.2</p> <p>Ongoing</p> <p>All mainland sites 2015;</p> <p>Other sites Fanning/ Washington at earliest opportunity</p>	<p>Visit CXI Feb 2015</p> <p>Report to ALD, Pacific Biosecurity</p> <p>See outcome 3.2</p> <p>Director ALD, IASC</p> <p>Director ALD, IASC</p>	<p>ALD, WCU</p> <p>See outcome 3.2</p> <p>ALD</p> <p>ALD i.e. Biosecurity, but with help from ECD as appropriate e.g. during outer island surveys</p>	<p>GEF-PAS funded</p> <p>See outcome 3.2</p> <p>Staff time ALD, ECD, WCU</p> <p>Staff time ALD, ECD, WCU</p>
<p><b>Rodents</b> managed at Port areas at Betio,</p>	<p>Consult KPA and stakeholders re</p>	<p>Baiting underway: Betio 2015 onward</p>	<p>Kanton and CXI follow local Biosecurity action</p>	<p>Biosecurity Officer</p>	<p>\$2,000 set-up, up to \$500 per annum bait.</p>

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

Kanton and CXI	feasibility; set-up or extend baiting rodents	Kanton 2015 onward CXI 2016? onward	plans to Director ALD, IASC		Consider GEF-PAS funding
<b>Surveillance</b> of Port compounds for IAS, including YCAs, fire ants, weeds, rodents GAS, etc.	Undertake 6-monthly comprehensive and targeted surveys using appropriate lures, etc. Implement emergency responses as needed	Betio 2015 onward Kanton 2015 onward CXI 2016 onward Follow methods described in Biosecurity Action Plans.	Biosecurity reports to Director ALD, IASC	Biosecurity Officer	<\$100/site/annum
<b>Emergency response</b> exercises for rats, LFAs, mongoose etc. are effective at ports	Plan and carry out exercise and adapt Action Plans if needed. Consider using real exercise e.g. Wedelia, YCA	2015 and ongoing every 3-5 years	Report on outcomes and recommendations to Director ALD, IASC	Biosecurity Officer Betio, CXI, PIPA	Staff time
All international vessels <b>quarantined offshore</b> on arriving at Betio, Kanton and CXI before boarding party provides clearance for berthing	Review existing procedures and agree on standard approach	Quarantine process occurs offshore from 2015 onwards	Biosecurity Officer report of new process to Director ALD, IASC	Biosecurity Officer	Existing budgets
Risky cargo processed with new equipment in <b>quarantine sheds</b> at Betio, Kanton and CXI	Betio - agree on site and design CXI-discuss options with KPA and boarding party	Betio - site agreed 2015, established 2016 Kanton set up 2016 CXI – agree 2015 establish 2016	Rodent-proof sheds constructed and used, reported to Director ALD, IASC	Biosecurity Officer	<20 k for facilities, possibly containers, and equipment.
<b>Containers free of IAS</b> at Betio and also CXI KPA	Agree with KPA on suitable site IAS High-pressure --water spray units used to clean exterior of arriving (and	2015 – planning 2016 – in place	Spray unit in place and reported to Director ALD, IASC	Biosecurity Officer	<5,000

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

	interior before lading for outgoing), plan for equipment				
Container holder set up at Betio for exterior inspections and water blasting (and consider other sites later)	Negotiate with KPC on site of container holder and plan for purchase	2015 – planning 2016-17 – purchase if site feasible	Holder in place and operating, reported to Director ALD, IASC	Biosecurity Officer	>10 k
Establish incinerators near the points of entry in Kiribati, e.g. KPA	Decide on optimal sites, talk with authorities, landowner	2015 – planning 2016-17 seek funds, build if sites feasible	Incinerators maintained for effective clean-up	Biosecurity	No budget estimate available yet
Rubbish disposal agreed with aircraft and ship personnel	Decisions communicated to airline, KPA, ships etc.	In place 2015	ALD monitors	Biosecurity	Staff time
<b>Quarantine office</b> and lab at KPA Betio and CXI (which needs an office) and Kanton	Complete planning and purchase of office equipment (and office CXI)	2015 – Betio office secured and equipment purchased 2016 – CXI plans completed	Lab and all necessary equipment being used - Director ALD, IASC	Biosecurity Officer	Office secured January 2015
<b>Satellite VMS</b> recorder on all licensed fishing vessels	Follow surveillance methods of Maritime Police, prosecute offenders	2015 - ongoing	All vessels equipped with GPS, surveillance reports to Directors PIPA, Fisheries, IASC	Fisheries, Police	Staff time
<b>PIPA closed</b> to commercial fishing (many fishing vessels harbour IS)	Follow PIPA protocols for responses to breaches	1 January 2015, ongoing	Satellite data and patrols reveal no/few breaches; report to Director PIPA on effectiveness	PIPA, Police staff	PIPA closed to fishing 1 January 2015
Airports					

<b>Quarantine rooms</b> and office established at Bonriki, CXI and, in future, Kanton	Design and cost rooms, seek funding and implement	Design rooms 2015 Seek funds 2015-16 Implement 2017	Progress on building and use of rooms reported to Director ALD, ISAC	MCTTD, IASC	Determine what is to be paid for by current terminal upgrade, also potential funds GEF6
<b>Xray scanner</b> in place at Bonriki and agree on need for elsewhere i.e. Cassidy Int Airport	Being costed including maintenance, replacement	2015 costings	Needs, priorities and costs determined	Biosecurity	65 k
<b>Equipment</b> , tools and awareness at all airports adequate for job	Plan for equipment needs	2015 planning 2016 seek funds	Priority equipment in place from 2016 onwards	Biosecurity	To be costed
<b>Rodents</b> controlled around Bonriki Airport	Design and implement rodent control to include freight storage rooms	Design project 201516 Implement 2016	Ongoing regime in place and results reported to IASC	Biosecurity, Airport	Minimal ongoing costs
Improved biosecurity of <b>Gilbert Islands flights</b> as part of GI biosecurity action planning	Identify needs and design and cost airport biosecurity	Design 2016 Implement 2016 onwards as appropriate	Report progress to Director ALD, IASC	Airport, ALD, IASC	Cost determined by 2016 design and costing
<b>C2 - MANAGING EXISTING INVASIVES</b>					
Outcome 3.2 - Impacts of priority existing invasive species are eliminated or managed to acceptable levels					
OUTCOME	ACTIVITIES	TARGET AND DATE	VERIFICATION	RESPONSIBILITY	COST AND SOURCE USD
KIRITIMATI/LINES					
<b>Motu Tabu and Cook Island</b> stay IAS-free	Surveillance of rats and YCAs on Motu Tabu and	Surveys completed 2x monthly Motu Tabu 2x	Data sheets completed and summarised yearly	WCU (note ALD manage rats in villages)	Need 30HP Yamaha motor and ideally new

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

	Central Lag	annually elsewhere			boat
De-ratted motu in <b>Central Lagoons</b> stay rat-free	Surveillance for rats 2x annually. Re-bait any invaded motu following monitoring protocols	Re-bait motu only if surveys indicate rat reinvasion.	Report on baiting to IASC and Director ECD	WCU	<\$1000 bait needed annually
	Annual trapping for black rats in Central Lagoons/Carver Way	Follow protocols of Kiritimati Biota Monitoring Guidelines	Report to IASC and Director ECD	WCU	Vehicle operating and staff time; new traps every few years
<b>YCAs eradicated at CXI</b>	Eradication and monitoring in partnership with Pacific Biosecurity	As part of PF 3 386 2015 – 2019 (See Activity Design document for details)	See PF 3 386 Activity Design document for details. Director ALD, IASC	ALD, WCU, Pacific Biosecurity (Allan Bume / Monica Gruber)	\$100,000 over five years MFAT NZ Aid Partnerships fund PF 3 386, plus staff time ALD, ECD, WCU
<b>Mainland seabird colonies</b> protected at Big Pen and Tangouoa Closed Area	Trap cats in Big Pen, Tanguoua and if resources allow sooty tern colonies. Complete shotgun license application for supplementary control	Follow cat-control protocols of CXI monitoring plan, ongoing April-November annually	Report on trapping results to IASC and Director ECD	WCU	4 x VHF radios and a second base set for the above 3 projects
<b>PHOENIX ISLANDS/PIPA</b>					
<b>Enderbury restored</b>	Update operational plan and biosecurity as needed	Appoint IASC contact, review operational plan 2015	Revised operational plan to Director PIPA, IASC	Director PIPA, IASC	\$0 needed
	Raise funds for rat eradication	2016 onwards	PIPA account made for Enderbury funds	Director PIPA	Staff time + \$1,000,000 needed for operation
	Employ operational	Aim to employ one year	Depends on funds	Director PIPA	Part of above budget

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

	manager	before operation	raised by PIPA		
	Undertake eradication of rats and 14 coconuts	Aim for eradication by 2020	As for above	Director PIPA/contract	Part of above budget
<b>Kanton Channel Island</b> seabirds protected	Plan for and remove rats	Plan completed 2016, rats removed by 2017	Plan completed 2016	Director PIPA, PIPAMC, WCU	\$1000
<b>Kanton</b> IAS removed	Review Kanton biosecurity	Meet to revise Kanton biosecurity plan, 2016	Revised plan sent to Director PIPA, IASC and stakeholders	Director PIPA, IASC, PIPAMC	\$0
	Revise operational plan and raise funds for rat and cat eradications	2017-19 fund raising, eradication in 2020 or sooner if funds raised	Plans, flyers, bids and publicity approved by Director PIPA, IASC	Director PIPA, IASC, PIPAMC, contract	\$1,000,000 (less if timed with Enderbury) PIPA Trust
<b>Nikumaroro, Orona and Manra</b> IAS removed	Review biosecurity and operational plans and raise funds for rat and cat eradications	2020-22 fund-raising, eradications post 2022.	Plans etc. approved by Director PIPA IASC	Director PIPA, IASC, PIPAMC, contract	Total cost for 3 islands c.\$3,000,000
GILBERT ISLANDS					
<b>Wedelia</b> (“Singapore daisy”) eradicated on Tarawa	Alert public to its presence and invite reporting. Develop emergency plan, survey distribution and eradicate urgently	Complete awareness and survey 2015-16 and implement eradication if feasible 2016-17; ongoing surveillance and awareness	Survey and eradication locations mapped and reported to Director ALD and IASC	Agriculture officers, SPREP, SPC, networking with environment experts from other countries e.g. Tokelau	<\$10,000 for planning and operating, potentially GEF-PAS
<b>Mynas eradicated</b> from Gilberts	Resurvey and plan eradications and eradicate	Survey completed Feb 2015 Eradication March 2015	Reports to SPREP, GEF-PAS, IASC	Contract +ECD	GEF-PAS funded
<b>Scale insects managed</b>	Survey, plan, seek funds and manage	Survey 2015 Manage 2016 onwards	Surveying and monitoring reports to Director ALD	Director ALD	Unknown cost, seek SPC and USP support

C3 – ADDITIONAL RESTORATION AS NEEDED					
Outcome 3.3 – Biota further enhanced					
Needs for enhanced restoration known of PIPA/Line islands and actioned	Monitor recovery of biota following IAS removal and assess needs for restoration planting, translocations	Link with PIPA Management Plan and K-BSAP for ongoing monitoring and actions	Expedition reports disseminated to IASC and technical advisers	Directors PIPA, ECD	Staff time
Needs for rehabilitated weed areas known and actioned	Monitor recovery of weeded areas and assess needs for planting	As needed, e.g. in <i>Wedelia</i> and Lantana weeded areas	Photo-points and species lists to IASC, project leaders	Directors ALD/ECD	Staff time

## REFERENCES

- Barun A., C. C. Hanson, K. J. Campbell and D. Simberloff. 2011. A review of small Indian mongoose management and eradications on islands Pages 17-25 In: Veitch, C. R.; Clout, M. N. and Towns, D. R. (eds.). 2011. *Island invasives: eradication and management*. IUCN, Gland, Switzerland.
- Falconer R. 2004. *Together Alone*. Australia, Bantam Books.
- Fosberg F.R; and D.R. Stoddart. 1994. *Flora of the Phoenix Islands, Central Pacific*, Atoll Research Bulletin 393: 1-55.
- Hilliard R. 2005. *Best Practice for the Management of Introduced Marine Pests - A Review*. Publisher GISP
- Jackson, L. 2008. *Guidelines for the Prevention and Management of Marine Biofouling and Invasive Species*. Publisher GISP
- Jones H. L. 2000. *Maiuia Mannikibani: The birdlife of Christmas Island*. Dames and Moore.
- KDP 2008. *Kiribati Development Plan 2008-11*. Government of Kiribati.
- KIEP 2013. *Kiribati Integrated Environment Plan*. Government of the Republic of Kiribati.
- K-NBSAP 2005. *Kiribati National Biodiversity Strategies and Actions Plan 2005*. ECD, Tarawa.
- 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.
- Office of Te Beretitenti. 20. *Kiritimati*. Republic of Kiribati Report Series.
- Pagad, S. 2014. *Compile and Review Invasive Alien Species Information*. Final Report for the Ministry of Environment, Lands and Agricultural Development. ISSG, Auckland.
- Pierce R.J. 2011. *Biosecurity Guidelines for the Phoenix Islands, Kiribati*. Conservation International Lessons Learned Technical Series. 8: 1-78 pp.
- Pierce RJ and Teroroko T. 2011 *Enhancing biosecurity at the Phoenix Islands Protected Area (PIPA), Kiribati* Pages XX-XX In Veitch, C. R.; Clout, M. N. and Towns, D. R. (eds.). 2011. *Island invasives: eradication and management*. IUCN, Gland, Switzerland.
- Pierce R.J. 2013. *Birds and Invaders*. Chapter 4 In: Stone et al (eds.) 2013. *Underwater Eden: Saving the last coral wilderness on earth*. Chicago and London, The University of Chicago Press.
- Pierce R.J., D. Brown, K Taabu and E. Vander Werf 2013 (revised 2015). *Monitoring Guidelines for Biota at Kiritimati*. EcoOceania Report for Government of Kiribati, NZAID, SPREP.
- Pierce 2015. *Biosecurity action plan for Kiritimati and Kanton*. EcoOceania Report for Government of Kiribati and RSPB.
- Scott, D. 1993. Republic of Kiribati. *A directory of wetlands in Oceania*. Pp 199-228. International Waterfowl and Wetlands Research Bureau.
- Space, J. C. and C. T. Amada 2004. *Report to the Republic of Kiribati on Invasive Plant Species on the Islands of Tarawa, Abemama, Butaritari and Maiana*. Report to Government of Kiribati.
- 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.
- Steadman, D.W. 2006. *Extinction and biogeography of tropical Pacific birds*. Chicago. University of Chicago Press.
- Watkins, D. and K. Batoromaio 2014. *Directory of Wetlands of Kiribati*. Report to Secretariat of the Pacific Regional Environment Programme.
- Whistler, W.A. 1992. *Flowers of the Pacific island seashore*. Isle Botanica, Honolulu. 146 pp.

APPENDIX 1- NAMES OF PLANTS AND ANIMALS MENTIONED IN THE TEXT

Asian rat *Rattus tanezumi*  
Black or ship rat *Rattus rattus*  
Cane toad *Rhinella marina*  
Coconut rhinoceros beetle *Oryctes rhinoceros*  
Coconut crab *Birgus latra*  
Common myna *Acridotheres tristis*  
Crown of thorns starfish *Acanthaster planci*  
European rabbits *Oryctolagus europaeus*  
Feral house cat *Felis catus*  
Giant African snail *Achatina fulica*  
Green turtle or On *Chelonia mydas*  
Hawksbill turtle or On tabwakea *Eretmochelys imbricate*  
House mouse *Mus musculus*  
Jungle myna *Acridotheres fuscus*  
Lantana *Lantana cantareus*  
Little fire ant *Wasmania auropunctata*  
Long-tailed koel *Eudynamis taitensis*  
Mongoose (grey mongoose) *Herpestes auropunctatus*  
Mosquitoes e.g. *Aedes aegypti*  
Mosquitofish *Gambusia affinis*  
Norway rat *Rattus norvegicus*  
Red-imported fire ant *Solenopsis invicta*  
Red-vented bulbul *Pycnonotus rufiventris*  
Singapore daisy *Wedelia trilobata*  
Snakes e.g. brown tree snake *Boiga irregularis*  
Sweet-scent *Pluchea odorata*  
Taro beetle *Papuana uniondis*  
Te Ango *Premna serratifolia*  
Te Aroua *Surinana maritima*  
Te Bitin or Pacific pigeon *Ducula pacifica*; also refers to *Columba livia*  
Te Boi *Sesuvium portulacastrum*  
Te Bokikokiko or Christmas Island reed-warbler *Acrocephalus aequinoctialis*  
Te Buka *Pisonia grandis*  
Te Burukam *Casuarina equisetifolia*  
Te Bwebwe Ni Marawa or White-throated storm-petrel *Nesofregatta fuliginosa*  
Te Itai *Calophyllum inophyllum*  
Te Kaai or Pacific reef heron *Egretta sacra*  
Te Kaina *Pandanus tectorius*  
Te Kanawa *Cordia subcordata*  
Te Kaura *Sida fallax*  
Te Kewe or bristle-thighed curlew *Numenius tahitiensis*  
Te Kimoa or Pacific rat *Rattus exulans*  
Te Kinongo or Yellow crazy ant *Anaplolepis gracilipes*  
Te Kirikiri or wandering tattler *Tringa incanus*

Te Kitibwa or ruddy turnstone *Arenaria interpres*  
Te Kun or Pacific golden plover *Pluvialis fulva*  
Te Kura or Rimatara Lorikeet *Vini kuhlii*  
Te Mao *Scaevola taccada*  
Te Maukinikin or puncture vine *Tribulus cistoides*  
Te Ntenenei *Cassytha filiformis*  
Te Ni *Cocos nucifera*  
Te Noni *Morinda citrifolia*  
Te Raurau or blue noddy *Procelsterna cerulea*  
Te Ren or heliotrope *Tournefortia argentea*  
Te Ruku *Ipomoea littoralis*  
Te Ruru or Phoenix petrel *Pterodroma alba*  
Te Tarangongo or grey-backed tern *Sterna lunata*  
Te Uri *Guettarda speciosa*  
Te Utuete *Lepturus repens*  
Te Wao *Boerhavia* spp.  
Tilapia *Oreochromis mossambicus*

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

APPENDIX 2 - NISSAP WORKSHOP ATTENDEES AT TARAWA AND KIRITIMATI

NISSAP workshop attendees, Teuanete Conference Room, 27-28 January 2015.

Name	Organisation	Contact	Email address.
Aoti Teitabu	KPA	26974	<a href="mailto:aosysy21@gmail.com">aosysy21@gmail.com</a>
Burangke Tebeibeti	Agricultural and Livestock Division- Bio-security officer	62676	<a href="mailto:abau.onotoa@gmail.com">abau.onotoa@gmail.com</a>
Tukabu Teroroko	PIPA-Director	29762	<a href="mailto:tukabut@gmail.com">tukabut@gmail.com</a>
Bwebwe Tuare	PPU-Senior Project Officer	28830	<a href="mailto:ruauaba@gmail.com">ruauaba@gmail.com</a>
Aketa A Karotu	Assistant Secretary-MELAD	28211	<a href="mailto:msawerika@gmail.com">msawerika@gmail.com</a>
Taati Eria	Fisheries Division	28061	<a href="mailto:taatie@fisheries.gov.ki">taatie@fisheries.gov.ki</a>
Tooua Bateriki	Customs officer	26531	<a href="mailto:tooua.bateriki@kiribaticustoms.gov.ki">tooua.bateriki@kiribaticustoms.gov.ki</a> <a href="mailto:tbateriki@mefp.gov.ki">tbateriki@mefp.gov.ki</a>
Takena Redfern	ALD-Research office	28108	<a href="mailto:macktaken79@gmail.com">macktaken79@gmail.com</a>
Ratita Bebe	ECD-MELAD	28000	<a href="mailto:ratitab@environment.gov.ki">ratitab@environment.gov.ki</a>
Keebwa Teremita	GEFPASIAS P/Coordinator	28000	<a href="mailto:keebwat@environment.gov.ki">keebwat@environment.gov.ki</a>
Tenikoiti Kaitu	ECD-MELAD	28000	<a href="mailto:tenikoitik@environment.gov.ki">tenikoitik@environment.gov.ki</a>
Bwaraniko Namanoku	Curriculum Designed and Resources Development-Education	29052/28447/28632	<a href="mailto:bnamanoku@gmail.com">bnamanoku@gmail.com</a>
Rateiti Vaimalie	Fisheries Division	28061	<a href="mailto:rateitiu@fisheries.gov.ki">rateitiu@fisheries.gov.ki</a>

NISSAP Workshop Attendees for Line and Phoenix groups, Linnix boardroom, 5<sup>th</sup> February 2015

Name	Position	Organisation	Email address
Tiribon.Terara	CPPL Agent	CPPL	<a href="mailto:teraratiribon0@gmail.com">teraratiribon0@gmail.com</a>
Ureta. Kalele	ACO	Customs	<a href="mailto:ureta.Kkiteie@gmail.com">ureta.Kkiteie@gmail.com</a>
Taratau. Kwong	OIC-Fisheries	MFMRD	<a href="mailto:taratauk@fisheries.gov.ki">taratauk@fisheries.gov.ki</a>
Kaititi.Tengata	OIC- Marine	MCTTD	<a href="mailto:Kaitititengata12@gmail.com">Kaitititengata12@gmail.com</a>
Katareti. Taabu	AWO	WCU-ECD	<a href="mailto:teeirak@gmail.com">teeirak@gmail.com</a>
Aobure.Teatata	AWO	WCU-ECD	<a href="mailto:riiuij@gmail.com">riiuij@gmail.com</a>
Kaotan. Moantau	OCD	Police	<a href="mailto:ruuka250@gmail.com">ruuka250@gmail.com</a>
Tioti Kirarenti	Tourism Officer	KNTO	<a href="mailto:george.kirarenti@gmail.com">george.kirarenti@gmail.com</a>
Reei Tioti	CLMO	Lands Kiritimati	<a href="mailto:maianateburakewe@gmail.com">maianateburakewe@gmail.com</a>
Nenebo. Benetito	Env/Health	MoH	<a href="mailto:n.benetito69@gmail.com">n.benetito69@gmail.com</a>
Ata Binoka	OIC-ALD	ALD	<a href="mailto:atabinoka1@gmail.com">atabinoka1@gmail.com</a>
Teaa Tominiko	Immigration Officer	MFAI	<a href="mailto:teaakonta@gmail.com">teaakonta@gmail.com</a>
Ruta loata	Airport Manager	Cassidy Airport-Aviation	<a href="mailto:riota.am@gmail.com">riota.am@gmail.com</a>
Eera Tiira	Quarantine officer	ALD	<a href="mailto:tiareera@gmail.com">tiareera@gmail.com</a>
Taan Teiaua	Quarantine officer	ALD	<a href="mailto:temariteraira@gmail.com">temariteraira@gmail.com</a>
Tearei. Rianmarewe	Education officer	MoE	<a href="mailto:teareiryan@gmail.com">teareiryan@gmail.com</a>
Tebatei.Kourabi	Fisheries Handyman	MFMRD	<a href="mailto:kourabit13@gmail.com">kourabit13@gmail.com</a>
Tearaatu. Simon	KUC (ICW)	KUC	<a href="mailto:tsiotia85@gmail.com">tsiotia85@gmail.com</a>

APPENDIX 3 – ACTIVITIES FUNDED BY GEF-PAS 5 FOR KIRIBATI

<b>Objective Gov't/Agency doing activity</b>	<b>Activities</b>	<b>Deliverables</b>	<b>Benchmarks</b>	<b>GEF</b>	<b>Co-finance</b>
Output 1.2.1: National invasive Species Coordinators are appointed and multi-sectoral national invasive species committees are formed for seven participating countries and carryout regular meetings 2 or more times per year	Position established to coordinate activities under this project.	Job description. Coordinator position hired.	Job descriptions approved. Coordinator position hired. Position actively coordinating activities under this project.	\$35,561	\$48,000
Output 1.2.2: Seven participating countries update or write National Invasive Species Strategies and Action Plans to ensure a high quality & that they are harmonized with the regional Guidelines for Invasive Species Management in the Pacific.	Revise National and Line & Phoenix Island invasive species strategies and action plan	IAS Strategic Action Plan. Meeting held and Plan endorsed by responsible agency or stakeholders as appropriate	Strategic Plan Stakeholder meetings. Strategic Plan Draft. Strategic Plan endorsed by responsible agency or stakeholders as appropriate.	\$10,000	\$20,000
Output 1.2.3: Training/capacity needs are identified and training programs for key invasives management issues are developed and implemented in Kiribati, Niue, PNG and Samoa.	Carry out an invasive species training needs analysis	Training needs report.	Training needs (capacity gaps) and opportunities identified.	\$5,000	\$10,000
	Training and capacity building on risk assessments and pathway analysis.	Training course materials. Trainee evaluations.	Trainer selected. Training done. Training evaluations.	\$10,000	\$20,000
Output 1.2.4: National invasive species management facilities and equipment are reviewed, and development plans produced, facilities improved in Niue and Kiribati.	Improve quarantine inspection and decommissioning facilities on S Tarawa, Kiritimati and Canton.	Facilities built and/or upgraded.	Plans made, costs identified, and facilities built.	\$40,000	\$30,000
Output 1.2.6: Kiribati uses regional invasives services to strengthen its capacity for planning, implementing, monitoring and evaluating its invasive species activities.	Participate in PILN and other regional invasive species planning fora.	Services provided.	Services identified to meet needs. Service providers offer service.	\$40,000	\$30,000
Output 2.1.1: Surveys or monitoring systems are implemented in 5 countries to document the status and/or impact of invasives and native	Surveys of IAS to establish status and distribution and form a basis for detecting change.	Survey reports. Populated databases.	Targets identified. Surveys completed. Databases populated. Reports written.	\$15,000	\$15,000

Final DRAFT K-NISSAP 3 MAY 2015 updated to 26 April 2016

biodiversity in marine and terrestrial sites (including protected areas), include in local or regional databases All countries will implement monitoring as part of management under component 3.					
Output 3.1.1: Inspection and treatment procedures are improved to ensure that invasives are not transferred from one country to another or between islands of the same country. The general strategy will be tried in Kiribati but specific measures for high risk taxa identified apriori are under 3.1.2	Improve pest control on Kiribati-registered inter-island transport.	Pest control plan. Annual reports regarding control effectiveness	Pest control plan. Control carried out. Annual reports regarding control effectiveness	\$20,000	\$26,000
Output 3.1.2: Early detection and rapid response (EDRR) procedures are established for priority potential invaders (e.g. snakes, ants, mongoose, plants etc) for the 5 countries identified in Appendix 6 of the Project document.	Write and implement an EDRR plan.	Response plan. Simulation exercise report.	Hold stakeholder meetings. Write plan. Run simulations.	\$10,000	\$20,000
Output 3.2.1: Best practices are determined and implemented for invasive species management of priority species and sites identified in Appendix 6 of the Project Document.	Write a management plan and implement it for two myna species in Betio, Tabiteuea North and Onotoa.	Management plan. Report about plan implementation and effectiveness.	Management plan. Carry out management. Write report about management effectiveness.	\$50,000	\$50,000
Output 3.2.2: Priority invasive species are eradicated (completely removed) from islands where feasible (7 projects in 5 countries identified in Appendix 6 of the Project Document).	Conduct feasibility studies for pest eradications on uninhabited islands, draw up plan of action and begin priority eradications.	Feasibility studies. Eradication projects initiated. Reports about management effectiveness.	Target species and island sites determined. Feasibility reports written Management initiated. Management effectiveness determined.	\$88,479	\$89,525

## APPENDIX 4 –TRAINING NEEDS AND SOURCES OF TECHNICAL SUPPORT

### Background

Kiribati is an isolated and developing oceanic Republic, currently with limited technical capability. It has been fortunate over the past 10 years, however, in securing significant international support for IAS management, especially in the PIPA and Line Islands. Through this support staff have acquired or are acquiring, important skills in managing vertebrate IAS (especially rats and cats), yellow crazy ants and weeds, as well as strengthening biosecurity techniques. Sustaining these skills has been supported through key agencies, particularly NZAID and CEPF, which between them have enabled up to 20 capacity building visits across Kiribati.

Training support is needed at two levels however, firstly capacity building in best practise approaches in survey, assessments, recording and data management, and secondly training for specialist techniques e.g. to effectively operate new equipment or survey challenging biota. The following support needs have been raised by staff members of IASC and/or identified as needed by technical staff working in Kiribati in recent years.

### Training needs

#### A. General capacity building needs

- Biosecurity inspections at airports, seaports, etc. – general and best approaches.
- General surveillance methodology in and around airports, seaports adjacent areas
- Surveillance records, data sheets, recording, database maintenance etc.
- Searching on line for relevant new data on threats, management methods, etc.

#### B Specialist training needs

- Surveillance methods for marine invasives in harbours, etc.
- Training in managing marine invasives associated with ballast water and hulls
- Surveillance methods and management of invasive plants, needed at all 3 archipelagos
- Surveillance methods, identification and management of invasive ants, needed at all 3 archipelagos
- Use of specialist equipment and chemicals for fumigation of containers, etc.

### Sources of training

General needs can often be provided by regional agencies mandated with environmental and/or economic support, primarily SPREP and SPC. Kiribati needs to maintain close links with these agencies and develop working relationships with individual staff at each. This will ensure that training opportunities at regional workshops are capitalised on. Often these may have travel budgets available for in-country staff to attend workshops. Alternatively there

may be opportunities for SPC staff to visit Kiribati to help with on-site training at seaports and airports, etc. (see also specialist needs below).

Specialist training needs have in the past been provided and continue to be provided by a variety of sources. For example training of WCU staff in rodent and cat eradications/management using toxins, traps etc. have been provided by NZAID/CEPF funded work since 2006 and are ongoing under other budgets. Training in ant surveillance, identification and management have been provided by the Pacific Biosecurity partnership since 2013 and are ongoing. Training in environmental biosecurity has been funded by NZAID, CEPF and Packard. Some marine invasive training has been provided by SPREP.

The further specialist training needs identified above can be delivered from different sources, e.g.

- Marine invasives – SPREP, but potentially also in house by pre-trained staff
- Invasive plants – SPREP and/or SPC could provide support for the surveys needed at Kiritimati and Tarawa, potentially funding one or more of these via GEF-6.
- Invasive ants – these needs are currently being met via the Pacific Biosecurity partnership.
- Equipment and chemical training e.g. fumigation needs at Tarawa – potentially SPC.

## APPENDIX 5 –INVASIVE SPECIES PATHWAYS AND SOURCES OF IAS IN KIRIBATI

Table 5.1 - Invasive Species Threats Pathways to Betio/Tarawa

Pathway	Source	Invasive species threats	Risk level
Supply vessels: in containers, cargo, equipment, vehicles	Asian countries	Rodents (particularly Asian rat, Norway rat, black rat, mice)  Invertebrates – moths, copra beetle, snails  Weeds  GMO (milk, juices etc.), diseases  Marine invertebrates	High  High  Moderate  Moderate  Moderate-high
	Pacific - Fiji, Marshalls, NZ, Aust, Guam, Solomons, Vanuatu, FSM, PNG, Tuvalu, Samoa/Am, CXI	All of above (rodents, ants, weeds like <i>Wedelia</i> ) plus cane toad, mongoose, giant African snail, reptiles, ants e.g. YCA, LFA, RIFA, mynas, rhinoceros beetle, brown tree snake, timber pests, domestic bugs. Also marine invertebrates via ballast etc.	High
Fishing vessels	All of above, often multiple ports	All of above	High
Local vessels	Gilberts, CXI	Rodents, YCAs, cane toad,	High

Yachts	Fr Polynesia, Samoa, Line, Kanton, USA, Cook Islands	Rodents, LFA, YCA, Other invertebrates (e.g. fruit fly)	High
		Pets (e.g. dogs, cats, birds, etc.)	Moderate
Wrecks	Anywhere	Rats, mice and invertebrates	Extreme
Domestic vessels from Betio to Outer Gilbert	Outer Gilberts	Rats, mice, invertebrates (including ants, taro beetle), weeds e.g. <i>Wedelia</i> .	High

Table 5.2 - Invasive Species Threats Pathways to Bonriki Airport and Bonriki -Gilbert

Pathway	Source	Invasive species threats	Risk level
International flights – cargo and passenger luggage, plants, etc.	Fiji	Rodents (including Norway rat, etc.), Mongoose, Tropical fire ant TFA, YCA, other invertebrates e.g. taro beetle, snakes, cane toad, snails.	High
		Weeds, plant pests	High
	Nauru, Marshall Islands and links with Australia and Honolulu	Rodents, ants, snakes, cane toads, weeds like <i>Wedelia</i> , other ants e.g. YCA, LFA, avian malaria, fruit fly.	High
Domestic flights	Other Gilbert Islands	Cane toad (present on one island), taro beetles could be transported to outer islands	High

Table 5.3 – Invasive Species Threats Pathways to Kanton

Pathway	Source	Invasive species threats	Risk level
Supply vessels (servicing Kanton)	TRW, CXI	Rodents including Pacific rat, black (ship) rat, mice	Very high
		Ants e.g. YCA at CXI and TFI at TRW and other terrestrial invertebrates	Very high
		Invasive plants especially from CXI (e.g. <i>Lantana camara</i> , <i>Pluchea indica</i> , <i>Lucinia</i> and <i>Casuarina</i> )	Very high
		Marine invertebrates	Moderate
Patrol boat	TRW	Rats, mice, ants, seeds Marine invertebrates	High Moderate
Cruise ships (potentially increasing visitors)	International ports including Honolulu, Tahiti,	Terrestrial invertebrates (e.g. moths, mosquitoes, flies, beetle, wasps, invasive ants) Giant African snail (Samoa)	All moderate

	Samoa	Marine invertebrates and algae	
Fishing vessels (occasional visitors, now excluded from PIPA)	Samoa, American Samoa, China, Korea, United States	Rats and mice	Very high
		Terrestrial invertebrates, reptiles	Very high
		Marine invertebrates and algae	High
Yachts (increasing visitors)	United States, Cook Islands, Fr Polynesia, Samoa,	Little fire ant, yellow crazy ant, red imported fire ant	High
		Other invertebrates (e.g. fruit fly)	High
		Rats and mice	High
		Pets (e.g. dogs, cats, etc.)	Moderate
Wrecks	Anywhere	Rats, mice and invertebrates	Extreme

Table 5.4 – Invasive Species Threats Pathways to Kiritimati (and other Line Islands)

Pathway	Source	Invasive species threats	Risk level
Supply vessels I (servicing Kanton, CXI)	TRW, Kanton,	Rodents (particularly Pacific rat, black rat, mice)	High
		Tropical fire ant TFA, other invertebrates e.g. taro beetle	High
		Weeds	High
		Marine invertebrates	Moderate
Supply vessels II (servicing CXI, Fanning, Washington)	Honolulu, Cooks, Line Is	All of above (rodents, ants, weeds like <i>Wedelia</i> ) plus cane toad, mongoose, giant African snail, reptiles, other ants e.g. YCA, LFA, avian malaria.	High
Supply vessels III	Fiji	All of above from Honolulu plus <i>Aedes</i> mosquitoes (dengue)	High
Fishing vessels			
Yachts and voyaging canoes	Fr Polynesia, New Zealand, Tonga, Samoa, USA, Cook Islands	LFA, YCA, red imported fire ant	High
		Other invertebrates (e.g. fruit fly)	High
		Rodents	High
		Pets (e.g. dogs, cats, birds, etc.)	Moderate
Wrecks	Anywhere	Rats, mice and invertebrates	Extreme
Aircraft, passenger and freight	Hawaii, Fiji, others	Rodents, ants, other invertebrates, weeds	High