



PHOENIX ISLANDS PROTECTED AREA
KIRIBATI



Nomination for a World Heritage Site 2009

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Map by Kerry Lagueux, New England Aquarium*

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LIST OF ACRONYMS

BEN	South Equatorial Current
BES	South equatorial branch of the South Equatorial Current
CBD	Convention on Biological Diversity
CEPF	Critical Ecosystem Partnership Fund
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of Parties
CRISP	Coral Reef InitiativeS in the Pacific
DSL	Deep Scattering Layer
DWFN	Distant Water Fishing Nation
EEZ	Exclusive Economic Zone
EIC	Equatorial Intermediate Current
ENSO	El Niño-Southern Oscillation
FAD	Fish Aggregating Device
FFA	Forum Fisheries Agency
FSP	Foundation of the Peoples of South Pacific
GBRMPA	Great Barrier Reef Marine Park Authority
GCF	Global Conservation Fund of Conservation International
GEF	Global Environment Facility
GLISPA	Global Island Partnership
GoK	Government of Kiribati
IBA	Important Bird Area of Birdlife International
IFAW	International Fund for Animal Welfare
IUCN	International Union for the Conservation of Nature
KANGO	Kiribati Association of Non-Governmental Organisations
KBA	Key Biodiversity Area of Conservation International
MELAD	Ministry of Environment, Lands and Agricultural Development
MIC	Micronesians in Island Conservation
MLPID	Ministry of Line and Phoenix Islands
MOU	Memorandum of Understanding
MPA	Marine Protected Area
NBSAP	National Biodiversity Strategy and Action Plan
NDS	National Development Strategy
NEAq	New England Aquarium
NOAA	National Oceanic and Atmospheric Administration
NSCC	North Subsurface Countercurrent
NZ-DOC	New Zealand Department of Conservation
NZODA	New Zealand Overseas Development Agency
PAS	Pacific Alliance for Sustainability
PCB	Polychlorinated Biphenyl
PIF	Project Identification Form
PII	Pacific Invasives Initiative
PIPA	Phoenix Islands Protected Area
PIPA-MC	Phoenix Islands Protected Area Management Committee
PISC	Phoenix Islands Steering Committee
POP	Persistent Organic Pollutants

RNHP	Regional Natural Heritage Programme of Australia
SAMTEC	The Space and Missile Test Center
SECC	South Subsurface Countercurrent
SOPAC	Secretariat of the Pacific Islands Applied Geoscience Commission
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
TBAP	Tuna and Billfish Assessment Programme
TIGHAR	The International Group for Historic Aircraft Recovery
UNDP	United Nations Development Programme
VMS	Vessel Monitoring System
WCU	Wildlife Conservation Unit
WWF	World Wide Fund For Nature

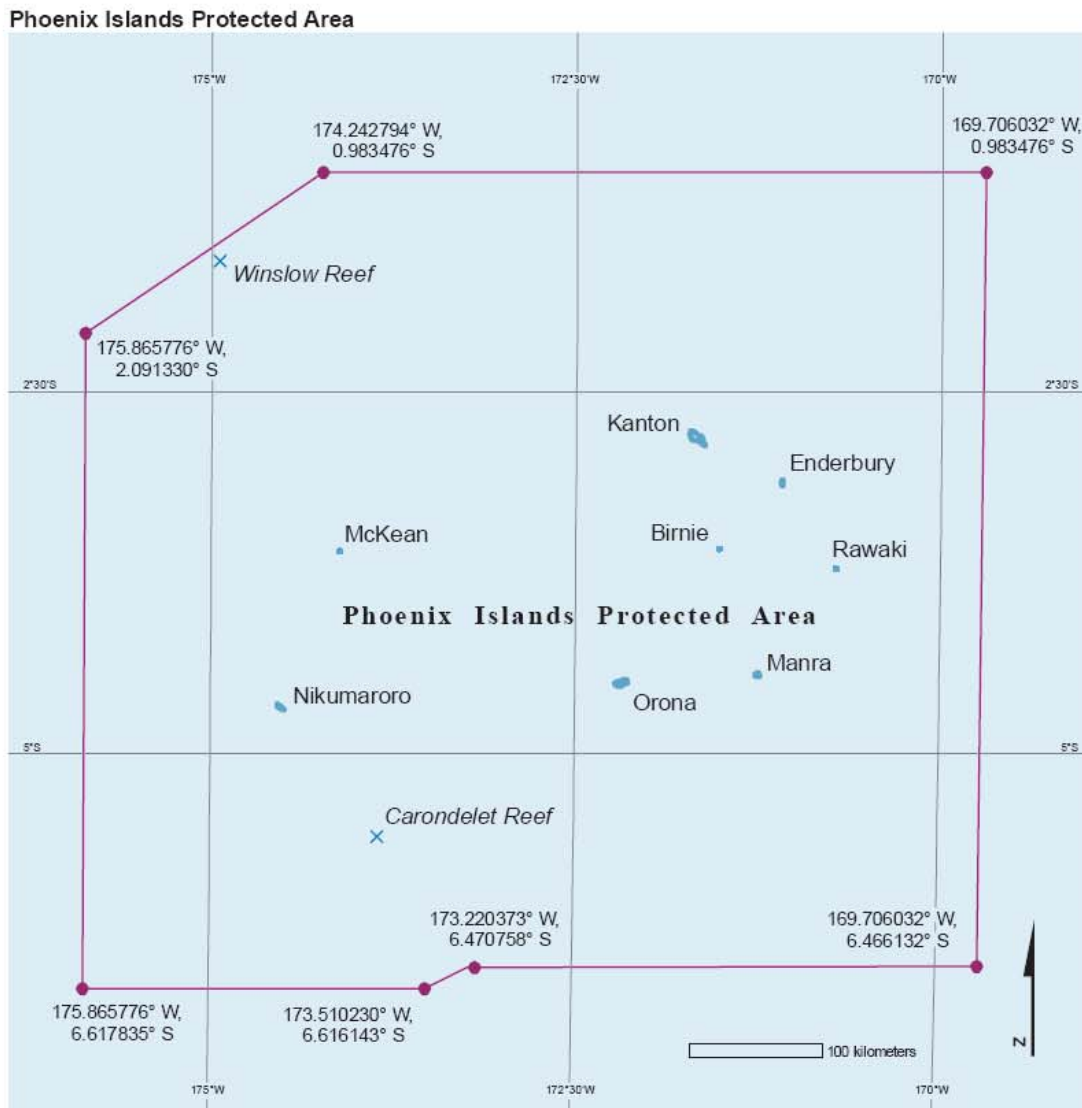
EXECUTIVE SUMMARY





State Party	Kiribati		
State, Province or Region	Phoenix Islands		
Name of Property	Phoenix Islands Protected Area		
Geographical coordinates to the nearest second	<i>Longitude</i>	<i>Latitude</i>	
	174.242794 ⁰ W	0.983476 ⁰ S	
	169.706032 ⁰ W	0.983476 ⁰ S	
	169.706032 ⁰ W	6.466132 ⁰ S	
	173.220373 ⁰ W	6.470758 ⁰ S	
	173.510230 ⁰ W	6.616143 ⁰ S	
	175.865776 ⁰ W	6.617835 ⁰ S	
	175.865776 ⁰ W	2.091330 ⁰ S	
Textual description of the boundary(ies) of the nominated property	<p>PIPA's boundaries consists of a heptangular (7 corner points) shaped area that encompass some 408,250 sq km and includes 8 atoll islands, two submerged reefs and at least 14 identified seamounts and their surrounding mainly deep water marine area.</p>		
Justification Statement of Outstanding Universal Value (text should clarify what is considered to be the outstanding universal value embodied by the nominated property)	<p>As a vast expanse of largely pristine mid-ocean environment, replete with a suite of largely intact uninhabited atolls, truly an oceanic wilderness, the PIPA, the largest marine protected area in the world (408,250 sq km), is globally exceptional and as such is a superlative natural phenomenon of global importance.</p> <p>A feature of the marine environment of PIPA is an outstanding collection of large submerged volcanoes, presumed extinct, rising direct from the extensive deep seafloor with an average depth of more than 4,500 metre and a maximum depth of over 6,000 metres. Included in the collection of large volcanoes are no less than 14 recognised seamounts, submerged mountains that don't penetrate to the surface. The collection of atolls represent coral reef cappings on 8 other volcanic mountains that approach the surface.</p> <p>The large bathymetric range of the submerged seamount landscape provides depth defined habitat types fully representative of the mid oceanic biota. The widely recognized local endemism and distinctive species assemblages associated with seamounts generally, specifically demonstrable in PIPA, is evidence of on-going insitu evolution of marine ecosystems and communities of plants and animals.</p> <p>PIPA is of crucial scientific importance in identifying and monitoring the processes of sea level change, growth rates and age of reefs and reef builders, (both geologically and historically) and in evaluating effects from climate change. The reef systems are so remote and exhibit such near pristine conditions that PIPA can serve as a benchmark for</p>		

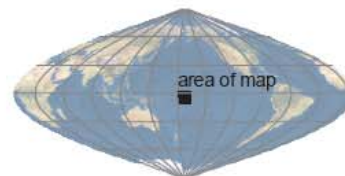
	<p>understanding and potentially restoring other degraded hard coral ecosystems. The islands are acknowledged as critical sites for ongoing study of: global climate change and sea-level events in that they are located in a region less affected by other anthropogenic stresses; the growth of reefs, evolution of reef systems, biological behavioural studies, recruitment processes in isolation, size classes and population dynamics of all marine organism groups and reef species diversity studies. As such, the oceanic Central Pacific islands are natural laboratories for understanding the natural history of the Pacific.</p> <p>As a known breeding site for numerous nomadic, migratory and pelagic marine and terrestrial species, PIPA makes a significant contribution to on-going ecological and biological processes in the evolution and development of global marine ecosystems and communities of plants and animals.</p> <p>Due to its great isolation, PIPA occupies a unique position in the biogeography of the Pacific as a critical stepping stone habitat for migratory and pelagic/planktonic species and for ocean currents in the region. PIPA embraces a range of associated marine environments that display high levels of marine abundance as well as the full spectrum of age and size cohorts, increasingly rare in the tropics, and especially in the case of apex predator fish, sea turtles, sea birds, corals, giant clams, and coconut crabs, most which have been depleted elsewhere. The overall marine trophic dynamics for these island communities across this archipelago are better functioning (relatively intact) compared with other island systems where human habitation and exploitation has significantly altered the environment.</p> <p>PIPA provides important natural habitats for in-situ conservation of globally important oceanic biological diversity, both marine and terrestrial. It is the most important secure habitat of the local endemic and now endangered Phoenix petrel and serves as crucial breeding and resting area for a number of threatened migratory birds. PIPA collectively provides very important habitat for the continued existence of a number of globally endangered species (e.g. Napoleon wrasse, hawksbill turtle), vulnerable species (e.g. White-throated storm petrel, Bristle-thighed curlew, green turtle, giant clam, bumbhead parrotfish) and numerous others globally depleted species, both marine and terrestrial, including for example apex predators such as sharks.</p> <p>The remoteness of the area and absence of permanent human settlement provides a unique opportunity for a high standard of habitat protection for species and ecosystems of global importance to science and conservation, from atoll to deep sea.</p>
<p>Criteria under which property is nominated (itemize criteria)</p>	<p>(vii) (ix) (x)</p>

<p>Name and contact information of official local institution/agency</p>	<p>Phoenix Islands Protected Area (PIPA) Office Ministry of Environment Lands and Agricultural Development P.O Box 234 Bikenibeu, Tarawa Republic of Kiribati</p> <p>Telephone: (686) 28211 and 686-29762 Fax: (686) 28334 Email: teroroko@phoenixislands.org (or tukabutavel@yahoo.com) Webaddress: www.phoenixislands.org</p>
<p>A4 (or "letter") size map of the nominated property, showing boundaries and buffer zone (if present)</p>	<p>Phoenix Islands Protected Area - Boundary Map</p>

Map 1. Phoenix Islands Protected Area Boundary Map



-  PIPA boundary
-  PIPA coordinate
-  atoll
-  submerged reef



scale: 1/5,000,000
 projection: Sinusoidal
 central meridian: 180°
 datum: WGS84

data:
 Conservation International - Pacific Islands
 VMap0, National Geospatial Intelligence Agency

acknowledgements:
 New England Aquarium

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SECTION 1. IDENTIFICATION OF THE PROPERTY

1. a) Country

Republic of Kiribati

1. b) State, Province or Region

Phoenix Islands

1. c) Name of Property

Phoenix Islands Protected Area

1. d) Geographical coordinates to the nearest second

The coordinates for PIPA's boundary corner points are presented in the map in section 1.e).

Coordinates for each island within PIPA:

Kanton: 2°46.2'S to 2°52.2'S;
171°37.4'W to 171°43.4'W

Enderbury: 3°6.3'S to 3°8.9'S;
171°4.7'W to 171°5.7'W

Rawaki: 3°43.0'S to 3°43.6'S
170°42.5'W to 170°43.0'W

Manra: 4°26.2'S to 4°28.0'S;
171°13.6'W to 171°15.9'W

Orona: 4°29.0'S to 4°32.3'S;
172°8.1'W to 172°13.1'W

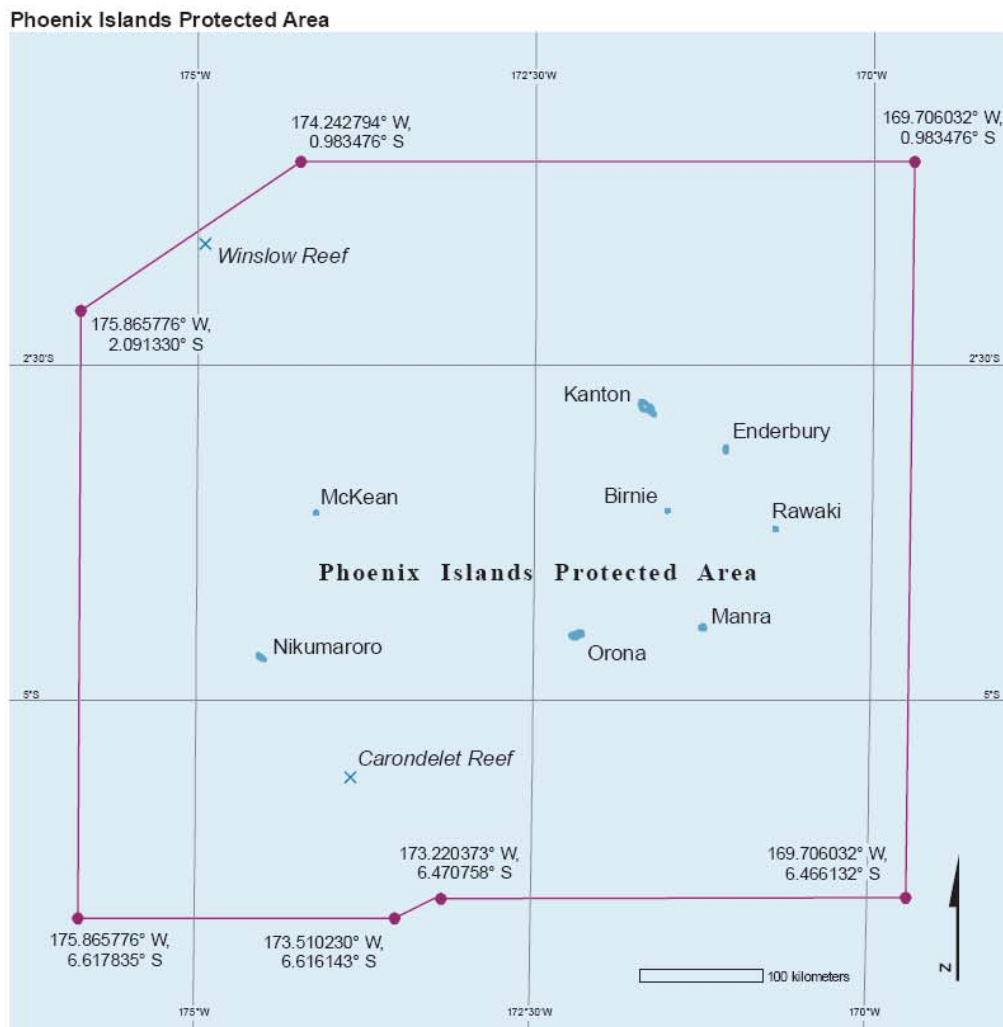
Birnie: 3°34.8'S to 3°35.4'S;
171°30.7'W to 171°31.2'W





McKean: 3°35.5'S to 3°36.1'S;
174°7.2'W to 174°7.6'W

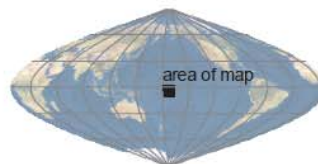
Nikumaroro: 4°39.2'S to 4°41.8'S;
174°29.8'W to 174°32.8'W

1. e) Maps and plans, showing the boundaries of the nominated property and buffer zone

Map 1. Phoenix Islands Protected Area Boundary Map



-  PIPA boundary
-  PIPA coordinate
-  atoll
-  submerged reef



scale: 1/5,000,000
 projection: Sinusoidal
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data:
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In addition to the previous map a series of PIPA maps have been generated and are given in the Appendices as listed below:

Appendix 1. Location of the Phoenix Islands Protected Area (PIPA) within the Pacific Ocean.

Appendix 2. Location of the Phoenix Islands Protected Area (PIPA) within Kiribati.

Appendix 3. PIPA Locality Map in relation to other major MPAs.

Appendix 4. Bathymetry of PIPA.

Appendix 5. PIPA Phase 1 (current) Zonation.

Appendix 6. PIPA Phase 2 draft proposed Zonation map.

1.f) Area of nominated property (ha.) and proposed buffer zone (ha.)

Total marine area: **c. 408, 224.49 km²**

Total land area: **c. 25.51 km²**

Total nominated area: **408,250 km²**

Island	Total area (ha)	Land area (ha)
Manra	-	c.500
Rawaki	73.24	58.14
Enderbury	596.6	500+
Birnie	50.95	48.2
Kanton	-	c.900
McKean	74.32	48.77
Orona	-	c.600
Nikumaroro	-	c.400

(According to Ray Pierce 2008)

Because the islands are small islands with large reef flat areas, they tend to change size depending on the weather and time, hence the approximate sizes.

Areas of islands are still not formally surveyed and most recent calculations by Ray Pierce et al in 2008 suggest smaller than above calculations in the table, i.e. Rawaki calculated 2008 to be 66 ha and McKean 32 ha incl. lagoons, the latter of which were 15.3 and 11.2 ha respectively. Birnie is probably also smaller than all the previous calculations suggest.

There is no specific buffer zone designated; PIPA being the largest Marine Protected Area in the world it provides sufficient self buffering to effectively protect the World Heritage values of the site.

SECTION 2. DESCRIPTION

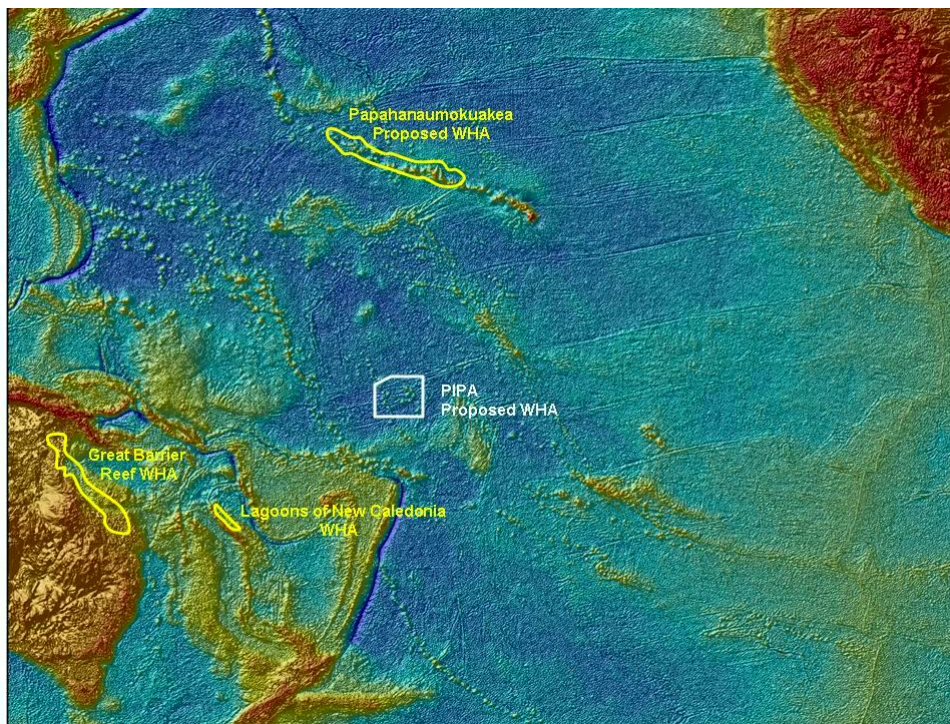
2. a) Description of Property

Kiribati is an ocean nation stretching over 3,600,000km² in the central Pacific on both sides of the equator approximately midway between Australia in the southern Hemisphere and Hawaii in the northern hemisphere. Kiribati's marine area is dotted by three island groups, Gilbert, Phoenix and Line Islands, that together contain 33 islands and land area of 811 km². With its land area well less than 1% of its sovereign domain Kiribati is truly an 'oceanic nation'.

The Phoenix Islands Protected Area (hereafter called PIPA) situated in the Phoenix Island group constitutes 11.34% of Kiribati's Exclusive Economic Zone (EEZ). With a size of 408,250 km² PIPA is the largest Marine Protected Area (MPA) in the world, first established in 2006 and further extended in February 2008. PIPA presently contributes 17.5% by area of global MPA effort, and it is the largest MPA yet attempted by any developing nation.

PIPA is the world's first large, truly deep water, mid-ocean marine protected area. Whilst the greater part by area of PIPA comprises mainly ocean floor with a water column averaging more than 4,000 metres, an important feature of the marine environment is the abundance of large extinct underwater volcanoes. These underwater mountains contribute a huge diversity of marine habitat types - atoll, low reef island, submerged reef, seamount and deep seabed as well as open ocean habitats. It can also be described as an underwater 'mountain-scape' with the highest peaks of the volcanic mountains, some rising more than 5,000 metres above the adjacent seabed, the highest reaching almost to the surface forming atolls, reef islands and, just below the surface, shallow submerged reefs.

Bathymetric Context of PIPA in Pacific Ocean



Note location of PIPA in a deep ocean basin. Two existing World Heritage listed Marine Protected Areas (Great Barrier Reef and Lagoons of New Caledonia), together with Papahānaumokuākea in Hawaii, an MPA currently nominated for WHA are illustrated diagrammatically. Base map courtesy J.Maragos.

The Phoenix Island group is situated between the Gilbert Islands to the west and the Line Islands to the east, extending across the centre of Kiribati. Two of the Phoenix Islands, Howland and Baker, are low reef islands in adjacent territory of the United States to the north of Kiribati.

Located directly north of the Tonga-Kermadec ocean trench, the Phoenix Islands region shows no evidence of a northward extension of the trench; rather it is located on the Tokelau Ridge, incorporating some of the many Tokelau volcanoes aligned along the ridge (See map in Bathymetry and Seamounts section). Beyond the Tokelau seamounts there is a well defined cluster of volcanoes to the east, including Kanton, Enderbury, Rawaki, Birnie, Manra and Orona atolls and low reef islands, all within PIPA. Beyond the volcanoes, the sea floor is typical flat terrain mid-ocean sea floor. With an average water depth of 4,500 m and maximum depth of 6,147 m, the highest peaks of the underwater volcanoes reach to the surface where they are capped by coral atolls and reefs.

As many as ten of these massive volcanoes have a surface or near surface manifestation; four are capped with coral atolls (Orona, Manra, Kanton and Nikumaroro), six occurring as low reef islands (Birnie, Rawaki, McKean and Enderbury in Kiribati, Baker and Howland in US territory) and two as submerged reefs (Carondelet and Winslow).

PIPA includes all eight atoll and low reef islands of the Kiribati section of the Phoenix group: Rawaki, Enderbury, Nikumaroro, McKean, Manra, Birnie, Kanton and Orona. Their tops are all isolated peaks rising from the deep ocean floor (3,000 m or greater) with several other presumed old volcanoes rising to near the surface, and many more known only from bathymetric study that do not reach to near the surface. Two known submerged reefs, Carondelet Reef, located 125 km southeast from Nikumaroro, and Winslow Reef located 240 km northwest from the McKean Island, are shallow platform reefs with Carondelet Reef being as little as 3-4 m underwater at low tide.

The 8 atolls and low reef islands and the two submerged reefs of PIPA represent only the highest of numerous large and long-extinct volcanoes. An even larger number of large volcanoes do not reach to within 200 metres of the surface and are therefore technically classified as seamounts. A few of PIPA's seamount volcanoes have been studied bathymetrically and formally named and entered into the Seamount Catalogue, including the Carondelet and Winslow seamounts near their namesake submerged reefs. The catalogued seamounts also include Fautasi, Siapo, Polo, Tai, Tanoa, Tau Tau, Gardner, and four unnamed seamounts. Another large unnamed seamount is located in the south east of PIPA (170° 15'W, 5° 36'S).

These atolls and low reef islands are surrounded by some of the most pristine coral reefs in the world. The waters are teeming with fish in quantities rarely seen elsewhere and tens of thousands of seabirds find refuge on the atolls.

The Phoenix group islands have no permanent inhabitants, although most islands have a recent cultural history extending over the past 150 years. The one currently inhabited atoll, Kanton, has a non-permanent population of approximately 50 people comprising government employees and their families engaged in protection and management of Kiribati interests in the region.

Meteorology

PIPA is located in the Pacific equatorial dry zone that experiences droughts and periods of heavy rainfall. During El Niño periods, the Phoenix Islands may experience high rainfall. Historic Kanton rainfall data indicates that precipitation between 1940 and 1965 was much lower than that between 1986 and 2001. Overall, the rainfall in the Phoenix Islands is among the lowest in the Central Pacific. Most of the Phoenix Islands receive less than 1,000 millimetres (mm) of rain annually with a dry period from March through June. The northern most islands in the Phoenix are the driest, i.e. Kanton and Enderbury. Birnie, Rawaki, Nikumaroro and McKean are wetter. Orona and Manra are the wettest.

Air temperature ranges from 21.7° to 36.7°C with an average 28.9°C. Relative humidity ranges from 57 to 85 percent.

Nunn (1994) noted that the intertropical convergence zone remains relatively stationary during the year over the central Pacific Ocean. However, the South Pacific convergence zone moves north from January to July. The Phoenix Islands are between the two zones throughout the year. Between 5°N to 5°S particularly in the central Pacific Ocean (where the Phoenix Islands are located), there is persistent high pressure preventing the development of tropical cyclones (hurricanes).

The meteorological conditions have a big influence on fish stocks in the region. Lehodey et al (1997) examined the El Niño - Southern Oscillation (ENSO) in relationship to the western equatorial Pacific warm pool. During ENSO events this warm water pool shifts to the east and skipjack tuna populations also shift to the east extending significant catches to the Phoenix Islands. The Phoenix Islands region appears to be the centre of El Niño activities in the Pacific so may be ideal for studying the El Niño phenomenon and more generally in relation to climate change.

Geology

There has been little study of geology of the atolls and seamounts in PIPA but based on what is known from Howland and Baker, the US islands within the Phoenix Group, some extrapolations can be made for the origins and geological history of PIPA. Joyce Miller in Maragos et al provide the following information (Chapter 15, Coral Reefs of the USA, 2008):

The Line and Tokelau (PIPA is located across the Tokelau ridge) ridges lie within the Darwin Rise, on magnetically “quiet” seafloor formed during the Cretaceous Normal Superchron (120–83 Ma) (Atwater et al. 1993). The seafloor underlying the northern part of the Tokelau ridge is dated between 120.4 and 131.9 Ma (Early Cretaceous) (Muller et al. 1997; Clouard and Bonneville 2005).

Recent research by Koppers and Staudigel (2005) along the Tokelau ridge and Gilbert Island chain establishes seamount ages from dredge samples in these areas, particularly focusing on dating the bends that occur in the two chains. These seamount ages are combined with predicted hotspot traces from extinct hotspots (Wessel et al. 2003; Kroenke et al. 2004) to compare the age of Tokelau (57 Ma) and Gilbert (67 Ma) bends with the 47 Ma age of the Hawaiian–Emperor Bend (Dalrymple and Clague 1976), which has recently been revised to 50 Ma (Sharp and Clague 2006). Koppers and Staudigel (2005) argue that because the ages of the three bends are asynchronous, these data do not support a stationary hot spot paradigm,

but may point to either hot spot motion or magmatism caused by short-term local lithospheric extension as the origin of the Tokelau ridge.

The geological processes that formed the Kiribati Phoenix Islands and associated seamounts are likely the same as for Howland and Baker. Atoll and reef island development began when the volcanic foundations were still emergent islands in the Cretaceous to Eocene periods, followed by subsidence being offset by upward reef growth maintaining proximity to the sea surface over long time periods.

The summits of Baker and Howland Islands are the smallest of the Pacific remote islands of the USA, and the highest point on any of these lies just 8 m above sea level. Their tops are all isolated peaks rising from the deep ocean (3,000 m or greater) with no surrounding ridges or other connected features. Although the flanks of these islands are very steep with slopes between 30° and 40° down to a depth of about 1,000 m, both also have small shallow terraces that probably reflect previous sea level stands. The terraces marked by the areas of low slope, are present between ~7 and 17 m and between ~90 and 130 m around the islands. Additional terraces are present at multiple depths off Howland Island. According to bathymetric information available (see also chapter on bathymetry), it is probable that the PIPA islands and seamounts, are similarly isolated volcanic peaks extending from deep sea. Seafloor age adjacent at Baker and Howland is estimated to be 123-124 (Ma).

Larson and Chase (1972) correlated the magnetic anomaly sets near the Phoenix Islands, east of Japan, and west of Hawaii as part of their analyses of patterns and evolution of sea-floor spreading in the Cretaceous and Cenozoic periods. This was based on the Phoenix lineation set of magnetic anomaly data. A magnetic reversal model was derived and applied. This shows that the Phoenix Islands, Japan, and Hawaii were formed during the Cretaceous and Cenozoic period.

Magnetic anomaly data around the Phoenix Islands was used to analyze sea-floor spreading in the Cretaceous and Cenozoic periods. In the 1970s, Pacific Islands Applied Geoscience Commission (SOPAC) conducted manganese nodule surveys around the Phoenix Islands. The eastern side of the Phoenix Islands portion of the Kiribati EEZ appeared to have higher amounts of manganese nodules than the western side. Phoenix Islands manganese nodules had an average of 1.35 percent Ni content. These nodules (and nodules from all of Kiribati's EEZs) were of low grade and appear to have no economic value for commercial harvest in the foreseeable future.

Several bathymetric surveys have been completed in the Phoenix Islands. Seabed surface composition was primarily calcareous ooze, siliceous-calcareous clay, and brown clay. Most of the seamounts on the eastern side of the Phoenix Islands portion of the Kiribati EEZ were surveyed by the Japanese in the late 1980s.

The substrate of the Phoenix Islands is almost entirely limestone with accumulated organic matter (Fosberg and Sachet c1976). Garnett (1983a) noted that the soils on Kanton were composed of coral sand and larger fragments of dead corals and other biogenic materials. Little or no humic material was in the soil. Soil samples at most sites around Kanton were primarily sand (GoK 1995).

Darwin has been reported to have used some of the Phoenix Islands as a basis for development of his theory of coral reef and atoll development.

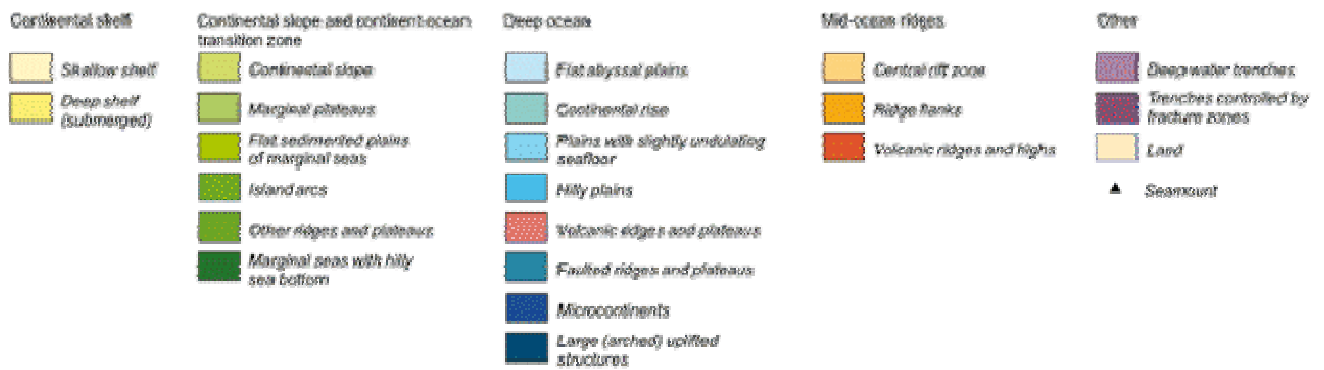
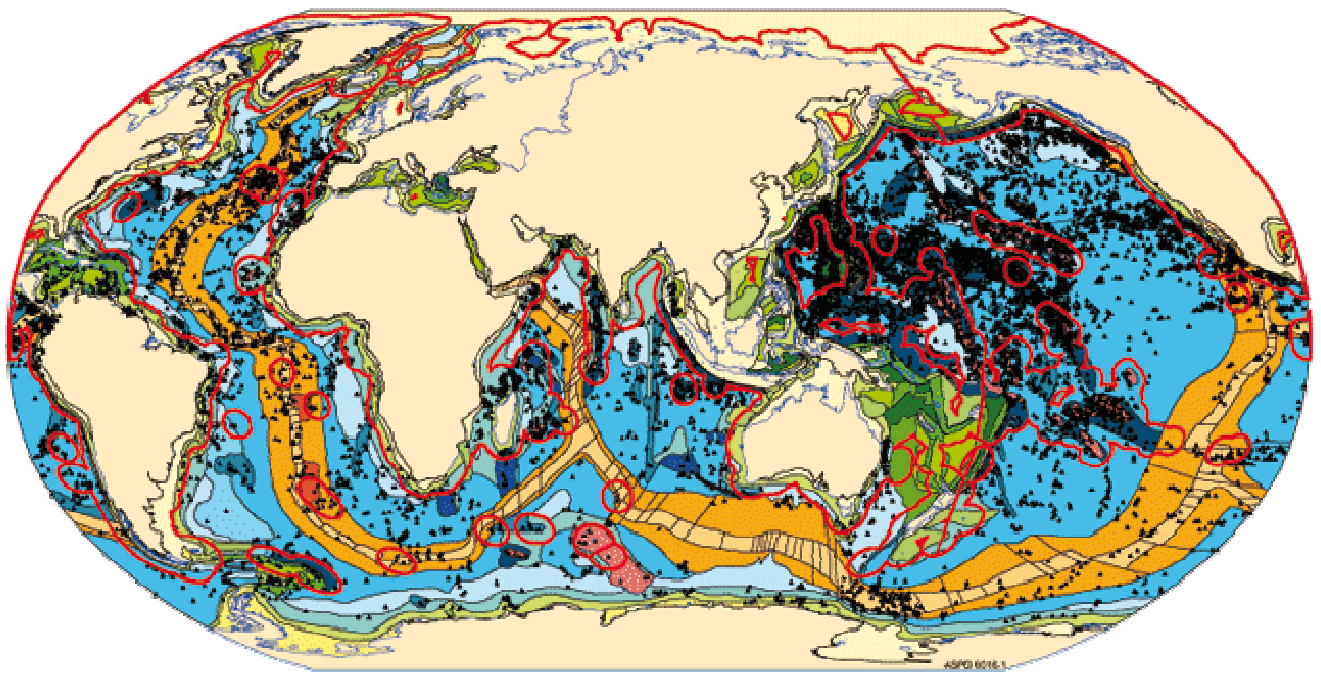
To summarize, PIPA illustrates evolutionary stages of volcanic subsidence and corresponding reef growth culminating in the formation of large biogenic structures. The Phoenix Islands are among the most ancient atoll archipelagos in the world. All were formed as coralline limestone accumulated atop subsiding volcanoes over a period of millions of years. Subsequent development of lagoons and dunes has continued during sea level changes in the Holocene. Fringing coral reefs continue to develop around the islands.

The Phoenix Islands reflect a geological sequence of globally significant mid-oceanic archipelagos, capturing a diversity of forms and developmental stages of ancient atolls, low reef islands, submerged reefs and seamounts, recording in their rock strata the formation of the world's largest biogenic structures (atolls and reef islands) over the past 10 to 80 million years. These formations collectively contain one of the world's largest pristine atoll archipelagos, which in turn contribute essential habitat for coral communities, benthic algae communities, giant clam beds, intact atoll forests and intact atoll dry scrubs. It is a unique opportunity to have nominated as World Heritage, an entire suite of atolls, low reef islands, submerged reefs and seamounts set on a deep mid-ocean sea floor and that have had minimal anthropogenic impact.

Bathymetry and Seamounts

PIPA has a huge bathymetric range with waters reaching to maximum of 6,147 meters depth but the main seafloor averages around 4,500 metres below the ocean surface. Additional to the ancient volcanoes that reach or approach the surface, bathymetry reveals a series of topographic features which are interpreted to also be volcanoes which technically qualify as 'seamounts' – 'submerged mountains with a height of more than 1,000 metres above the sea floor but whose peak lies below the photic zone'.

Based on bathymetry alone, it is estimated that there may be more than 30 seamounts to be found within the PIPA nomination. Globally the Pacific Ocean contains the highest density of seamounts followed by the Atlantic and Indian Oceans. Several estimates on the number of seamounts globally have been made ranging up to 30,000 but less than 150 seamounts have been explored. One of the most recent estimates is 14,287 seamounts published by Kitchingman & Lai 2004 (from <http://www.ga.gov.au/ausgeonews/ausgeonews200706/marine.jsp>) which was based on an analysis of the ETOPO2 raster bathymetric dataset produced by the United States National Oceanographic and Atmospheric Agency (NOAA). The map of geomorphic features below shows 6739 seamounts (47%) within EEZs, with the remainder (7548 or 53%) on the high seas. Note the higher density of seamounts in the Central Pacific, including Kiribati. The total area of the oceans covered by seamounts is very small (probably less than 1%), since most seamounts are less than 20 kilometres in radius.

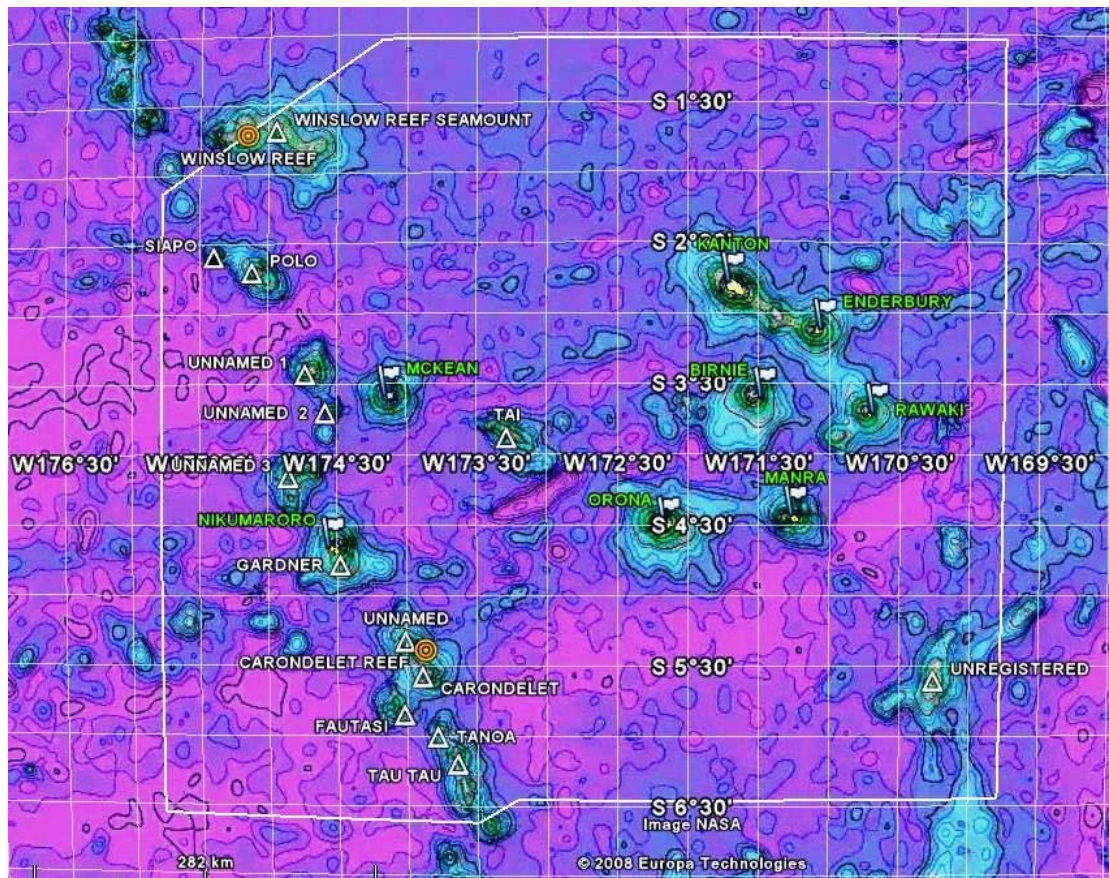


Map of seafloor geomorphic features (after Agapova et al 1979), with distribution of seamounts (after Kitchingman & Lai 2004) superimposed relative to the 200-mile EEZ. (Map source <http://www.ga.gov.au/ausgeonews/ausgeonews200706/marine.jsp>)

Research to study the seamounts and other volcanoes of PIPA is on-going. To date, some 14 seamounts have been identified within PIPA, thirteen of which have been formally registered but only nine of those have yet been named viz Tai, Polo, Siapo, Gardner, Tanoa, Fautasi, Tau Tau, Carondelet and Winslow Reef, which are the larger seamounts. The Government of Kiribati will likely recommend re-naming of some of the seamounts, proposing culturally appropriate Kiribati names.

A further exploratory cruise will be conducted in the Phoenix Islands in 2009 led by the New England Aquarium. The primary objective of this cruise will be to obtain further information on seamounts in the Phoenix Islands area utilising remotely operated submarine equipment.

Topographic Features of Phoenix Islands Protected Area (PIPA):

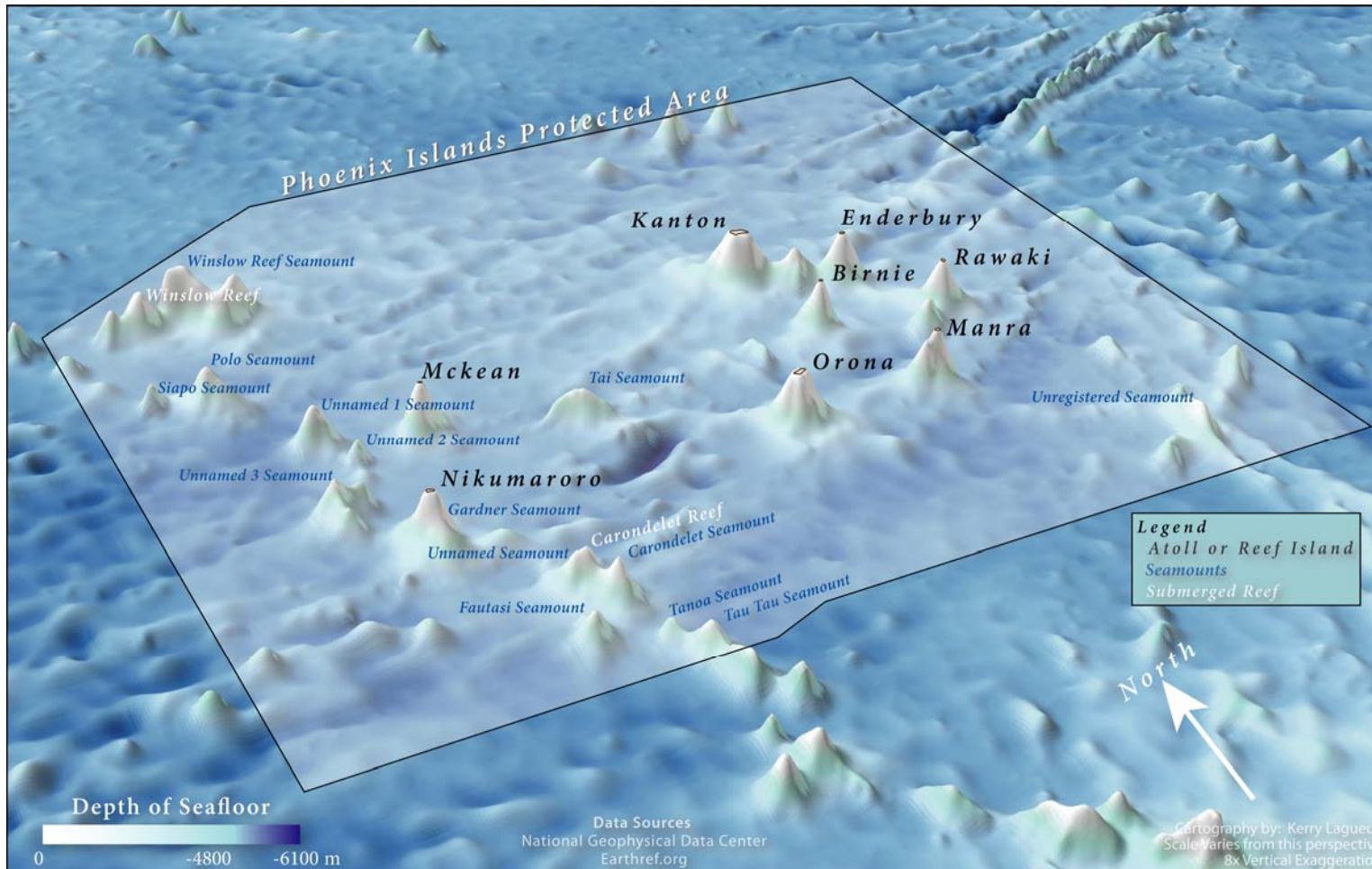


Map base is a Merged Bathymetric Map courtesy of <http://www.earthref.org/SBN/>. Labelling and placement using Google Earth is indicative only.

Atolls and Reef Islands are shown with flag icons, submerged reefs with concentric circles and seamounts with triangles. Most of the confirmed seamounts are part of the Tokelau Seamounts array extending north-south. Also located on the Tokelau ridge are two atolls – Mckean and Nikumaroro – as well, two submerged reefs – Winslow and Carondelet - both of which are associated with adjacent large seamounts.

Six of the Phoenix Islands, in the east of PIPA, occur as a cluster on a lateral ridge extending eastward from the Tokelau Ridge.

Seamounts within PIPA
PIPA Topography in 3 Dimensions

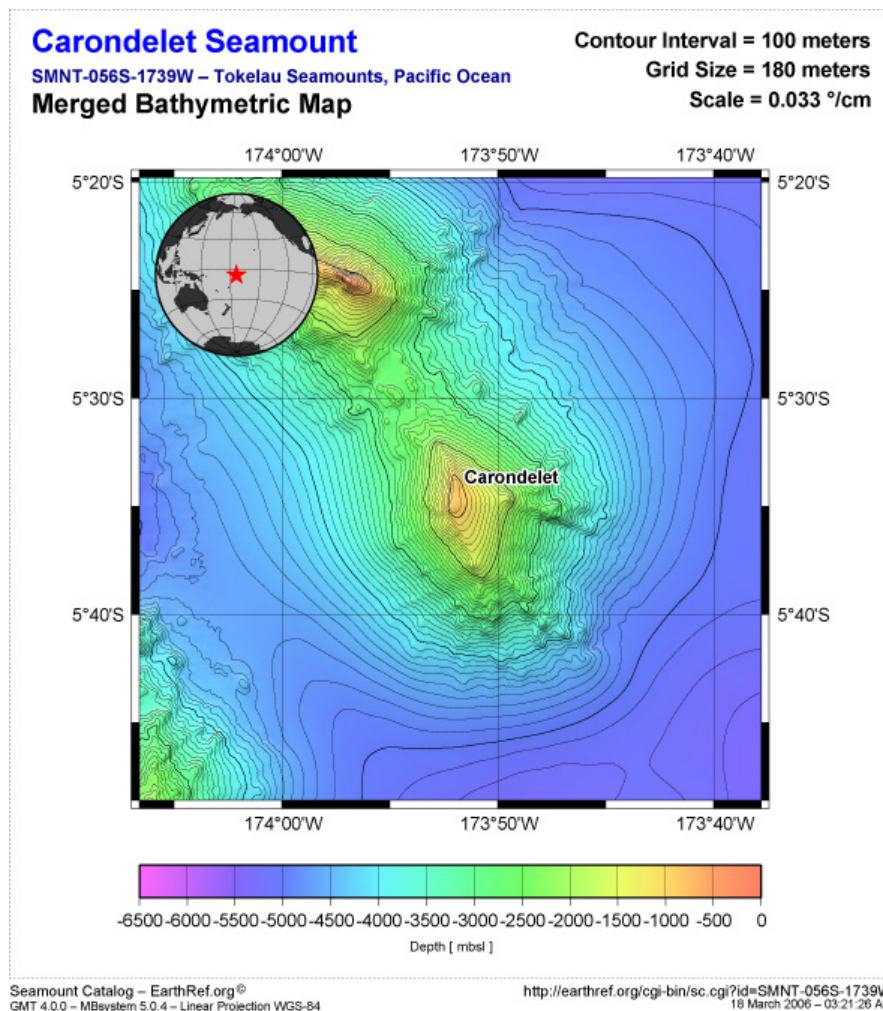


This three dimensional map shows the underwater topography of PIPA. The atolls (4), reef (4) islands, submerged reefs (2) and 9 of the 14 confirmed seamounts have been named. Average depth of the seafloor is about 4,500 metres, with a maximum of 6,147 m. Details on each of the topographic features are provided elsewhere in the nomination document.

Carondelet Reef and adjacent unnamed seamounts

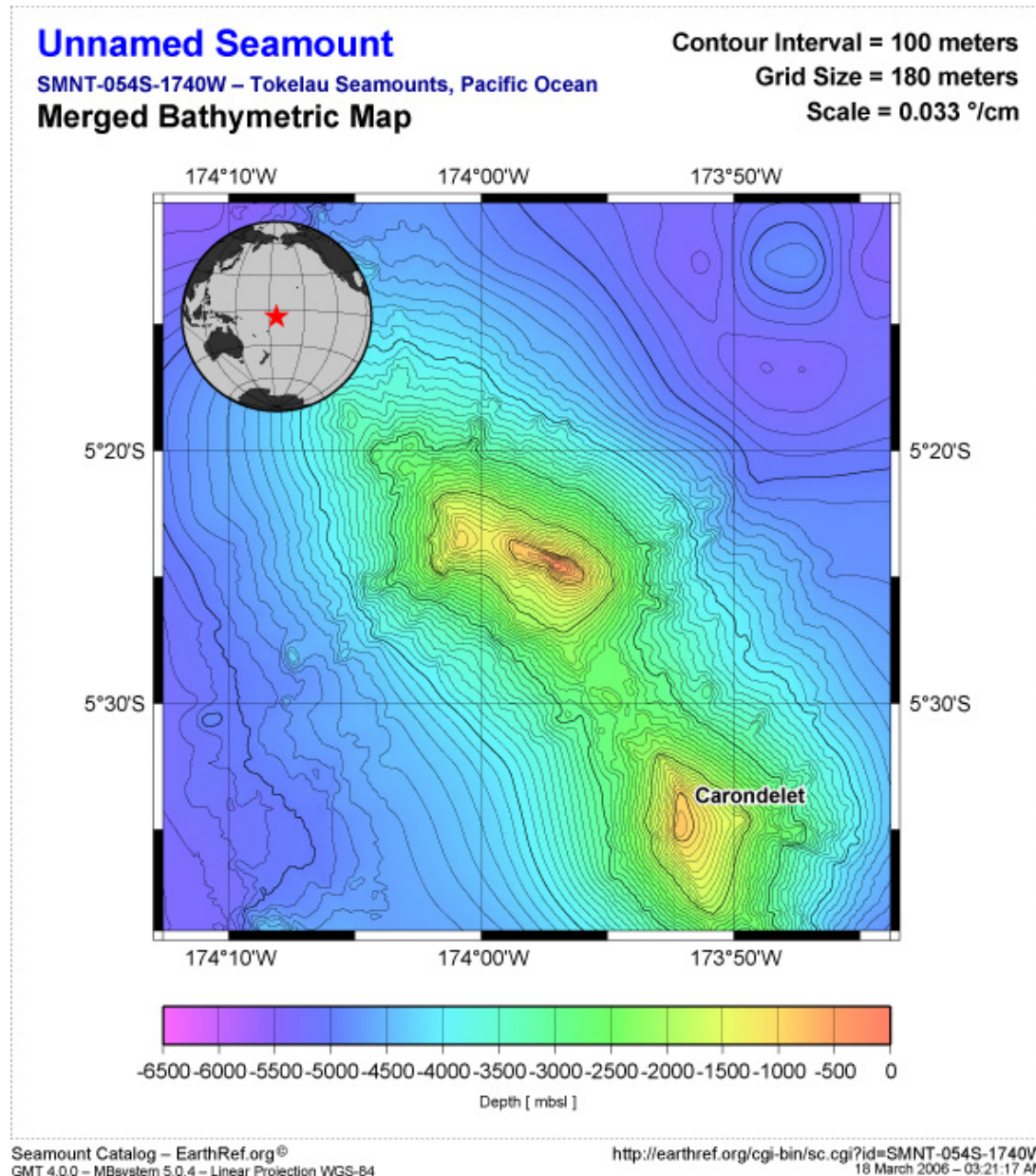
Carondelet Reef is located 125 km southeast from Nikumaroro. It is 1.2 km ($\frac{3}{4}$ mile) north-northeast and south-southwest in the shape of a horse shoe; about 732 m long (north-south) and 640 m wide (east-west). It is totally submerged. The maximum depth is 3.7 m. Depth just off the reef is 9.1 to 18 m. There can be an occasional wave break over the reef. Carondelet Reef was first confirmed by the H.M.S. *Wellington* in 1937.

The seamount next to Carondelet Reef (confusingly also named Carondelet in the map below although it is a separate from the Carondelet Reef described above) is located at $5^{\circ} 34.7' S$, $173^{\circ} 51.9' W$. It is 4365 m high with the top at -700 m and the ocean bottom at -5065 m. The seamount has a volume of 2359 km^3 and is slightly elongated. The edges are fairly smooth. A single summit is observed. A saddle to the northwest connects Carondelet to another unnamed seamount.



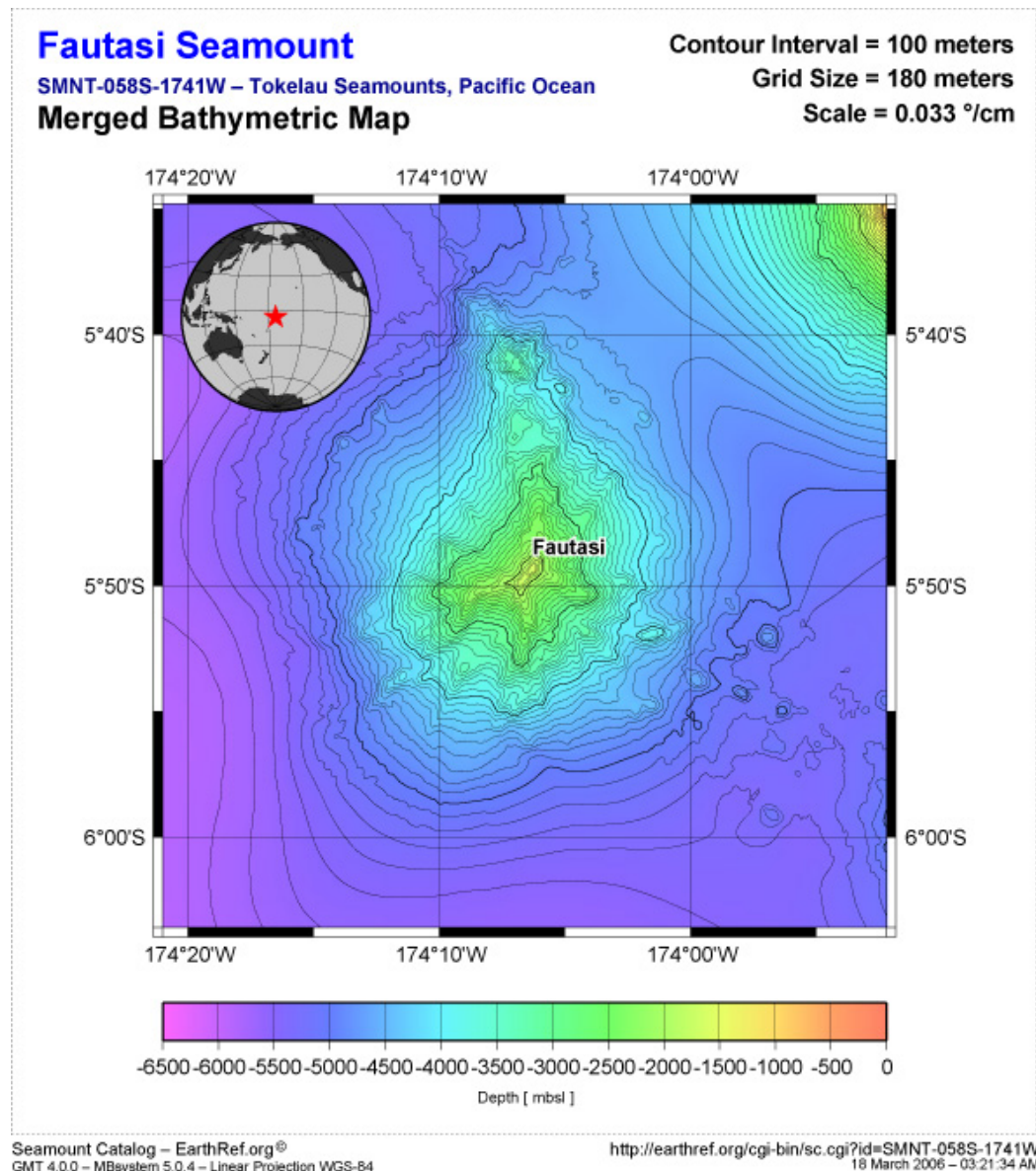
Unnamed Seamount

Unnamed Seamount SMNT-054S-1740W is located at 5° 24.5' S, 173° 58.4' W and is part of the Tokelau Seamounts on the Pacific Plate. It is 4707 m high with the top at -400 m and the ocean bottom at -5107 m. The seamount has a volume of 3395 km³ and is slightly elongated. The edges are relatively smooth but several rifts are seen radiating out from a central ridge. To the southeast there is a saddle connecting the seamount to Carondelet Volcanic Island.



Fautasi Seamount

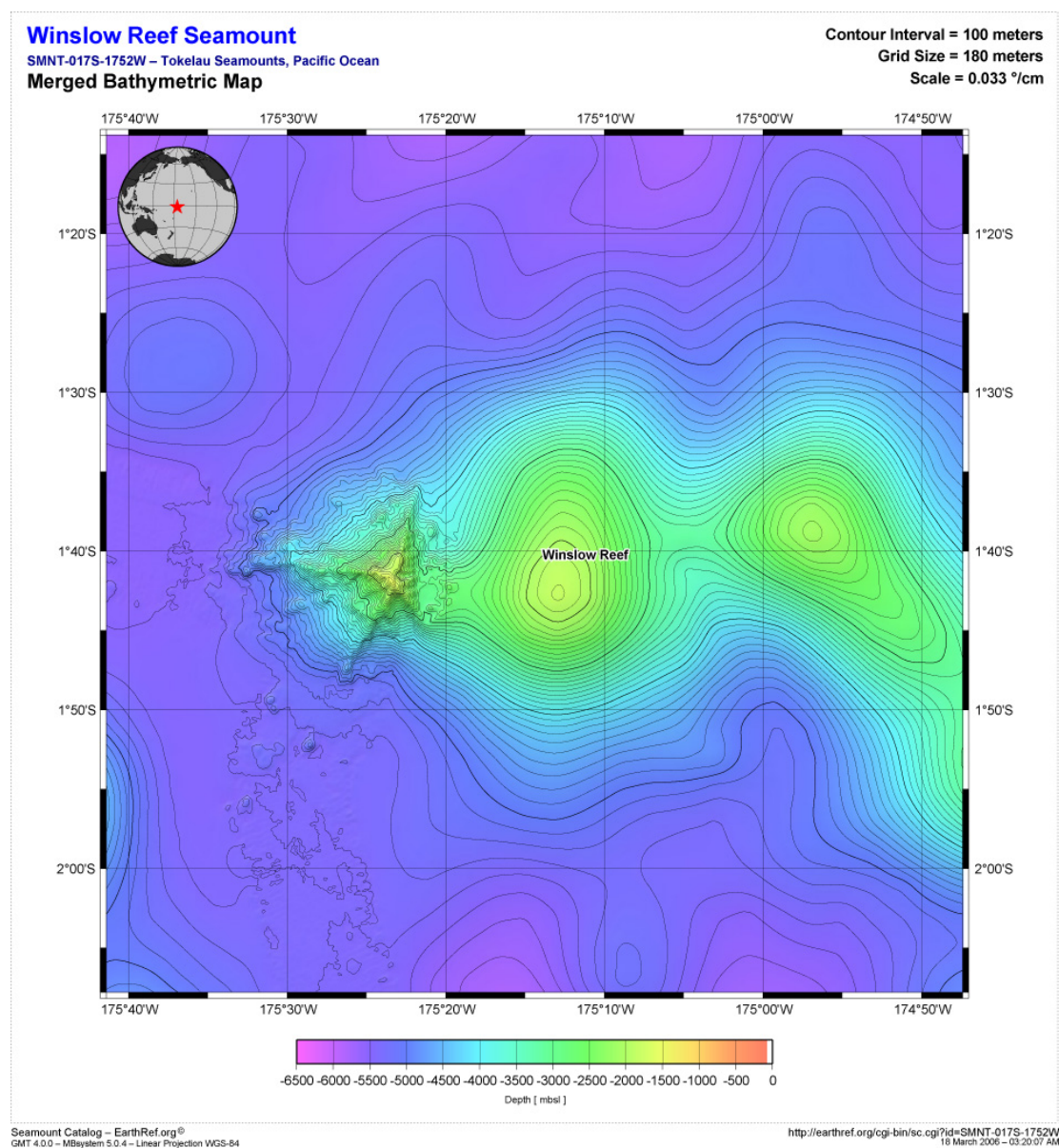
Fautasi Seamount is located at 5° 48.9' S, 174° 6.7' W and is part of the Tokelau Seamounts on the Pacific Plate. It is 3745 m high with the top at -1700 m and the ocean bottom at -5445 m. The seamount has a volume of 2457 km³ and is cross-shaped with very little elongation and only slightly irregular edges. Carondelet is located to the northeast of Fautasi.



Winslow Reef and two adjacent unnamed seamounts

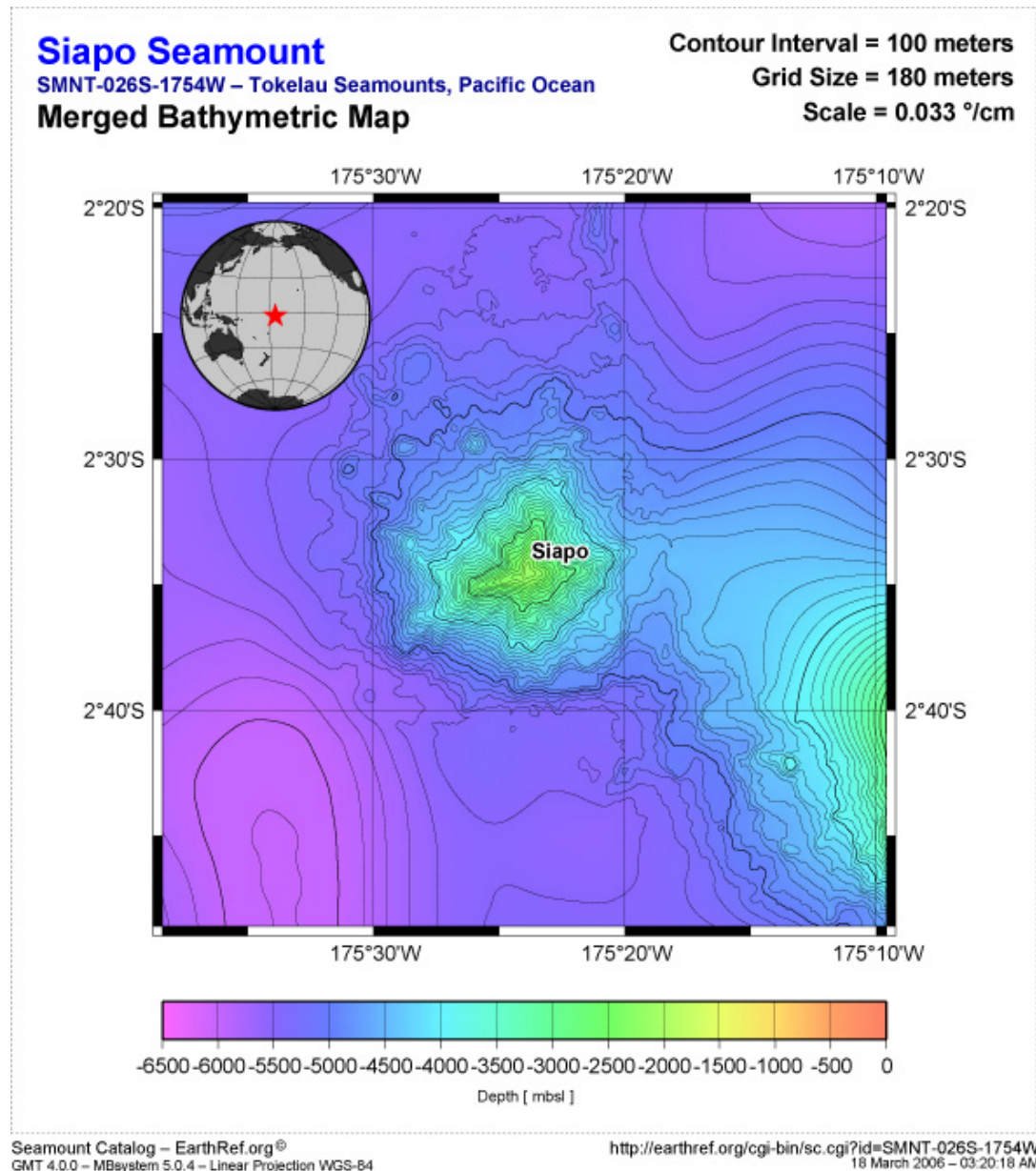
Winslow Reef is located 240 km northwest from the island of McKean. Its exact location was confirmed in 1944 but not reaffirmed in 2008. The depth is about 11.0 m and it is 1.6 km (1 mile) long in an east to west direction, and 0.8 km (0.5 miles) wide.

The seamount next to Winslow Reef (confusingly also called as Winslow Reef in the map below although it is a separate from the Winslow Reef described above) is located at $1^{\circ} 41.2' S$, $175^{\circ} 14.7' W$ and is part of the Tokelau Seamounts on the Pacific Plate. It is 3700 m high with the top at -1500 m and the ocean bottom at -5200 m. The reef has a volume of 4677 km³ and is slightly elongated. The edges are slightly irregular and four predominant rifts are observed. There is a saddle to the east, connecting it with the rest of the Winslow Reef.



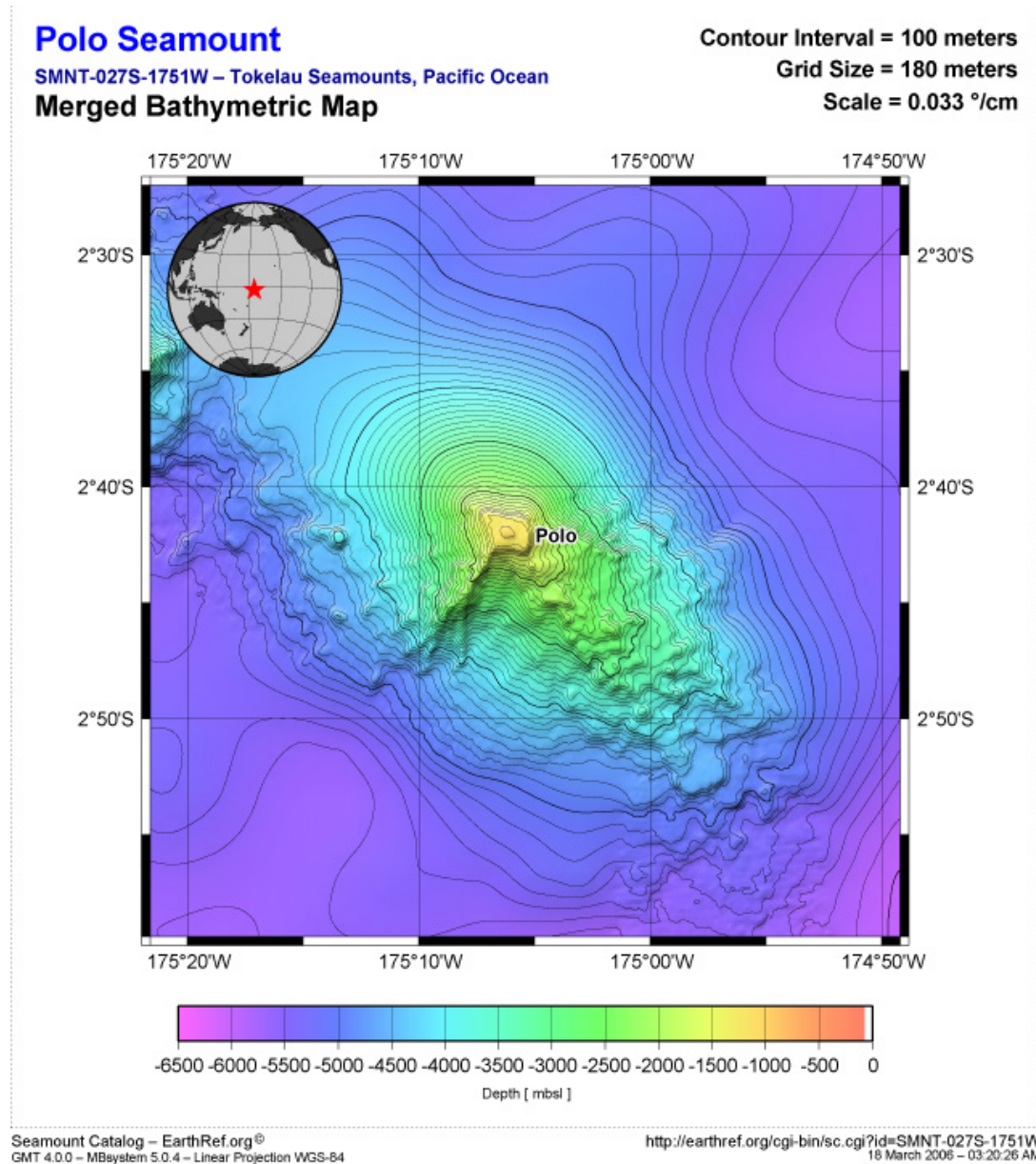
Siapo Seamount

Siapo Seamount is located at 2° 34.3' S, 175° 24.1' W and is part of the Tokelau Seamounts on the Pacific Plate. It is 3212 m high with the top at -2200 m and ocean bottom at -5412 m. The seamount has a volume of 1258 km³ and is fairly round with slightly irregular edges. There are five predominate rifts meeting at a single summit. A saddle connects this seamount with the Polo Seamount to the south.



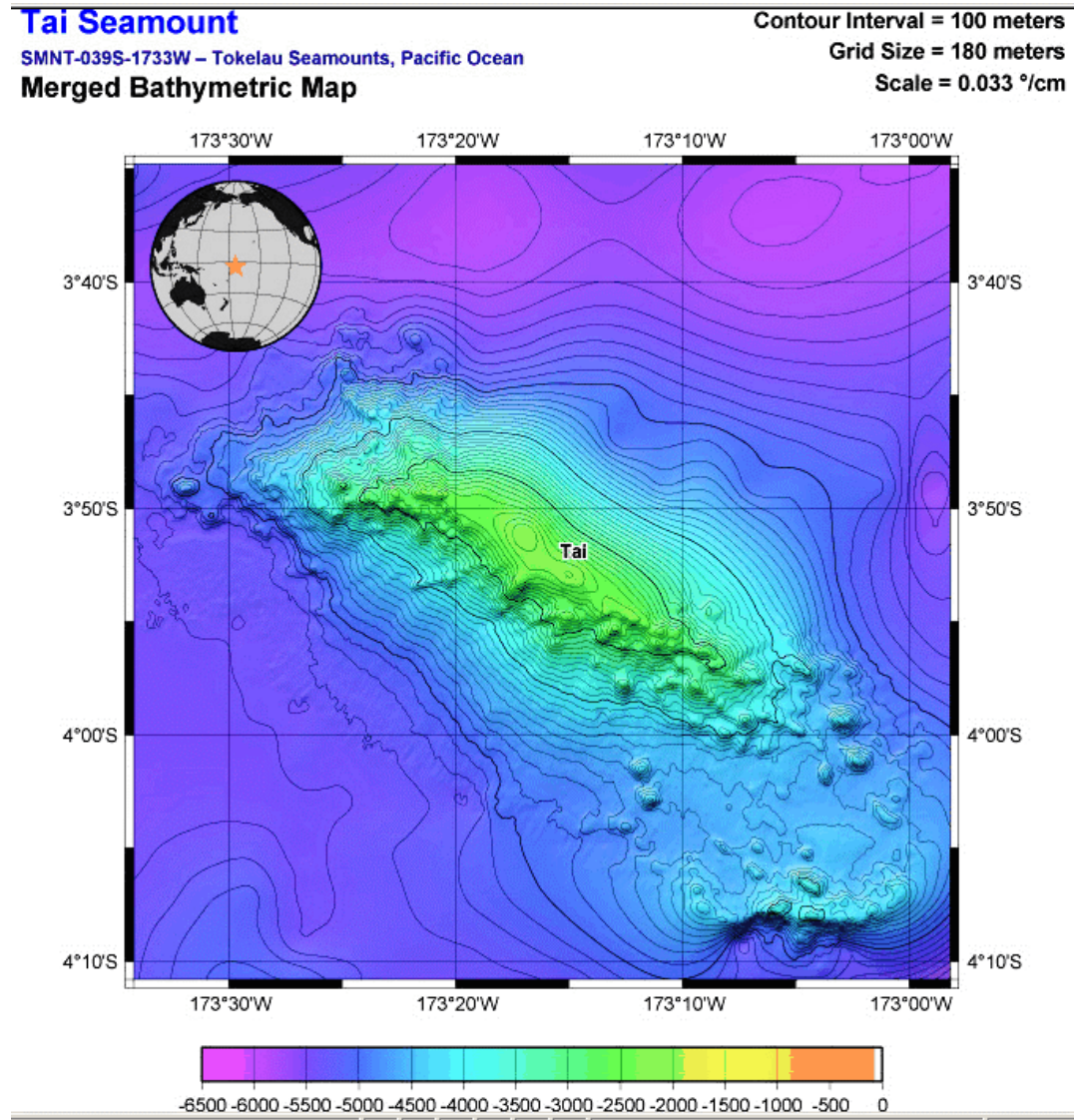
Polo Seamount

Polo Seamount is located at 2° 42.9' S, 175° 5.4' W and is part of the Tokelau Seamounts on the Pacific Plate. It is 4229 m high with the top at -1100 m and the ocean bottom at -5329 m. The seamount has a volume of 3225 km³ and is slightly elongated. The edges of the seamount are slightly irregular and there is one predominate rift which radiates out to the southwest from the summit. A saddle to the northwest connects Polo to Siapo Seamount.



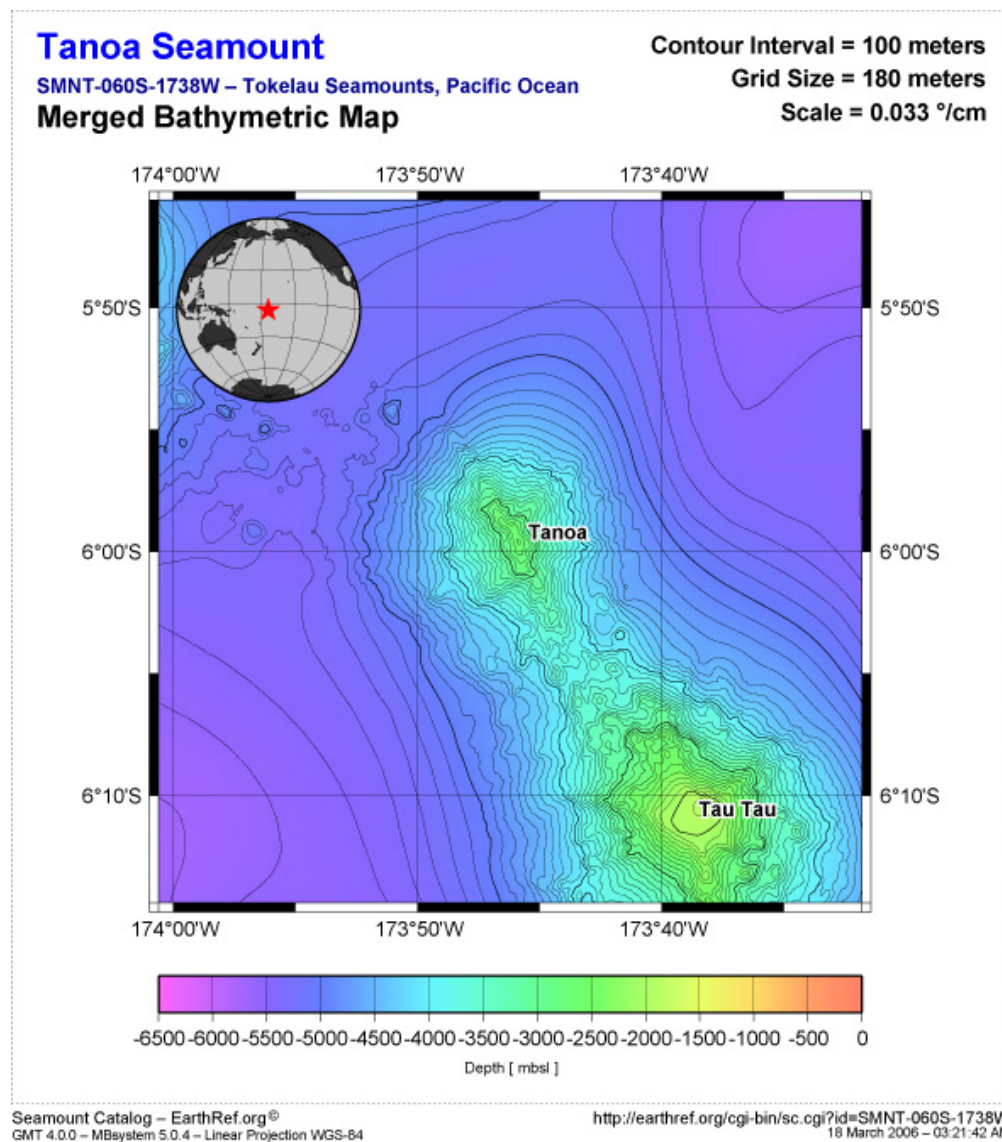
Tai Seamount

Tai Seamount, featured in the map below, is located at 3° 52.4' S, 173° 16.1' W halfway between McKean low reef island and Orona atoll. It is 3590 m high with the top at -2000 m and the ocean bottom at -5590 m. The seamount has a volume of 6507 km³ and is very elongated. The edges of the seamount are slightly irregular but none of the rifts are very pronounced.



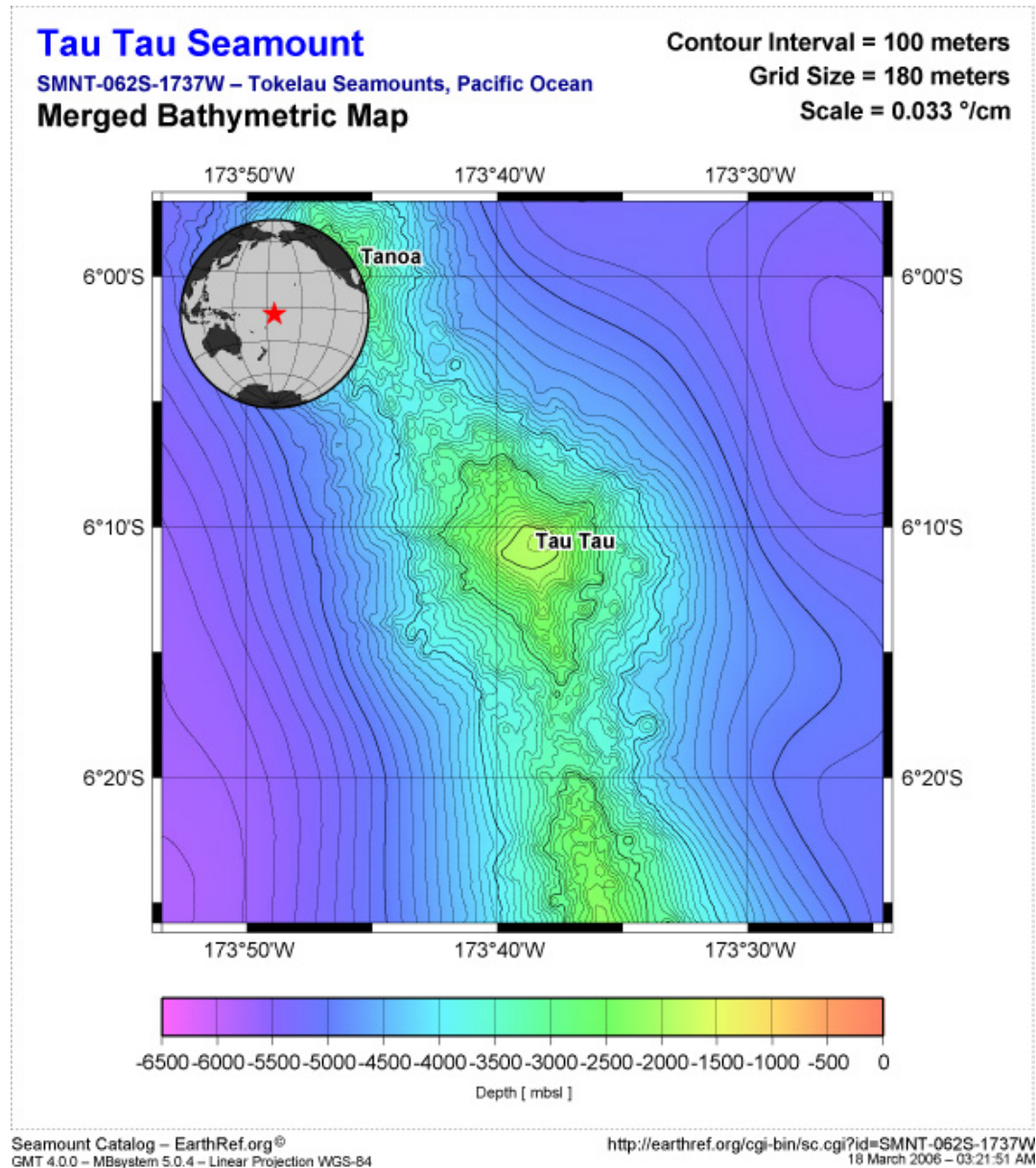
Tanoa Seamount

Tanoa Seamount is located at 5° 60.0' S, 173° 46.0' W and is part of the Tokelau Seamounts on the Pacific Plate. It is 2748 m high with the top at -2600 m and the ocean bottom at -5348 m. The seamount has a volume of 1080 km³ and is moderately elongated. The edges of the seamount are slightly irregular and there are multiple rifts radiating out from a central summit. The edges of the seamount are slightly irregular and there are multiple rifts radiating out from a central summit. A saddle exists to the south connecting Tanoa to Tau Tau Seamount. Tanoa is the northern most volcano in a cluster of volcanoes on a common platform.



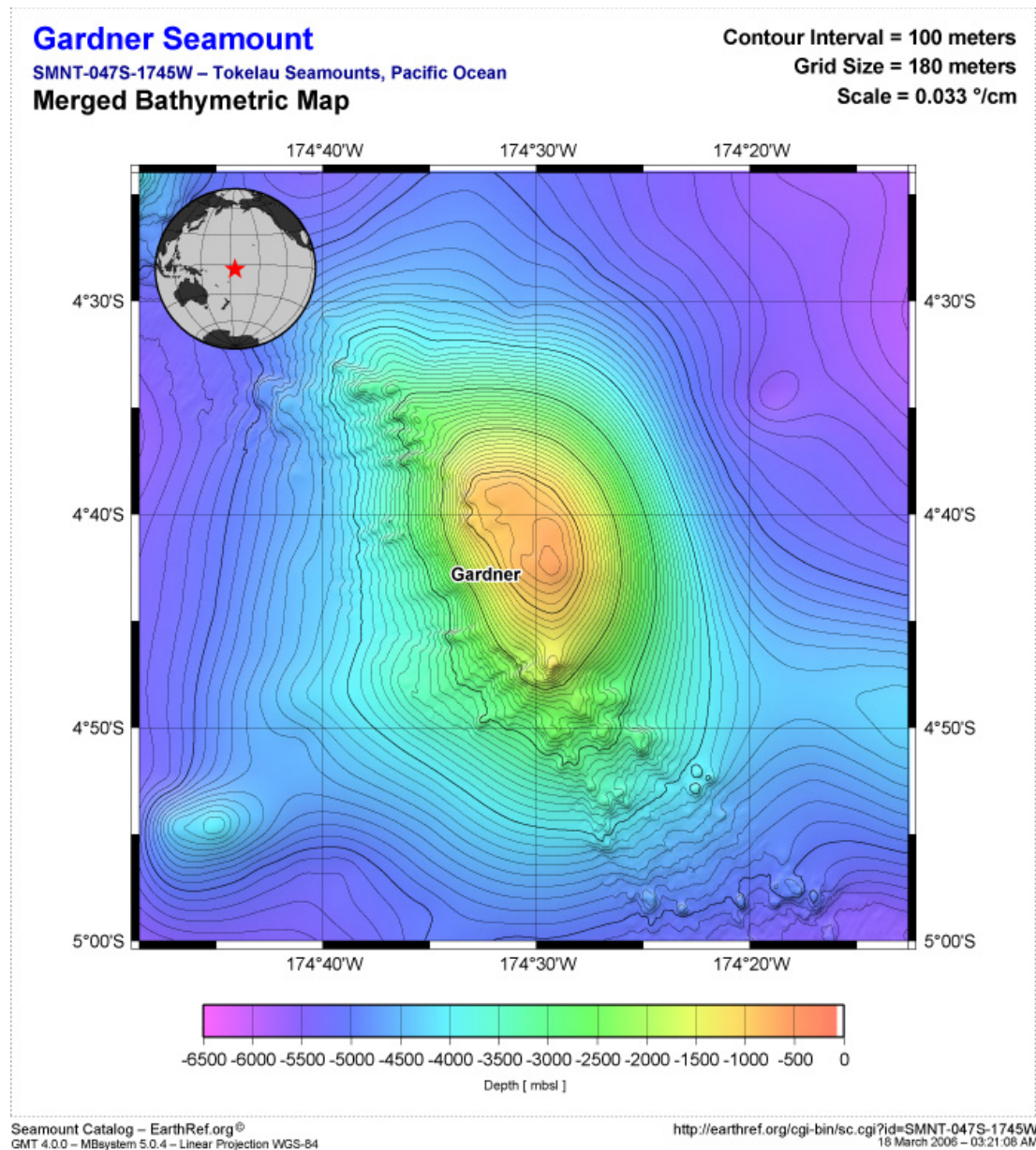
Tau Tau seamount

Tau Tau Seamount is located at 6° 11.3' S, 173° 39.0' W and is part of the Tokelau Seamounts on the Pacific Plate. It is 3592 m high with the top at -1600 m and the ocean bottom at -5192 m. The seamount has a volume of 1665 km³ and is slightly elongated. The edges are slightly irregular with rifts radiating out from the center. Tau Tau is part of a cluster of volcanoes. A saddle connects Tau Tau to Tanoa Seamount to the north and to an unnamed seamount to the south.



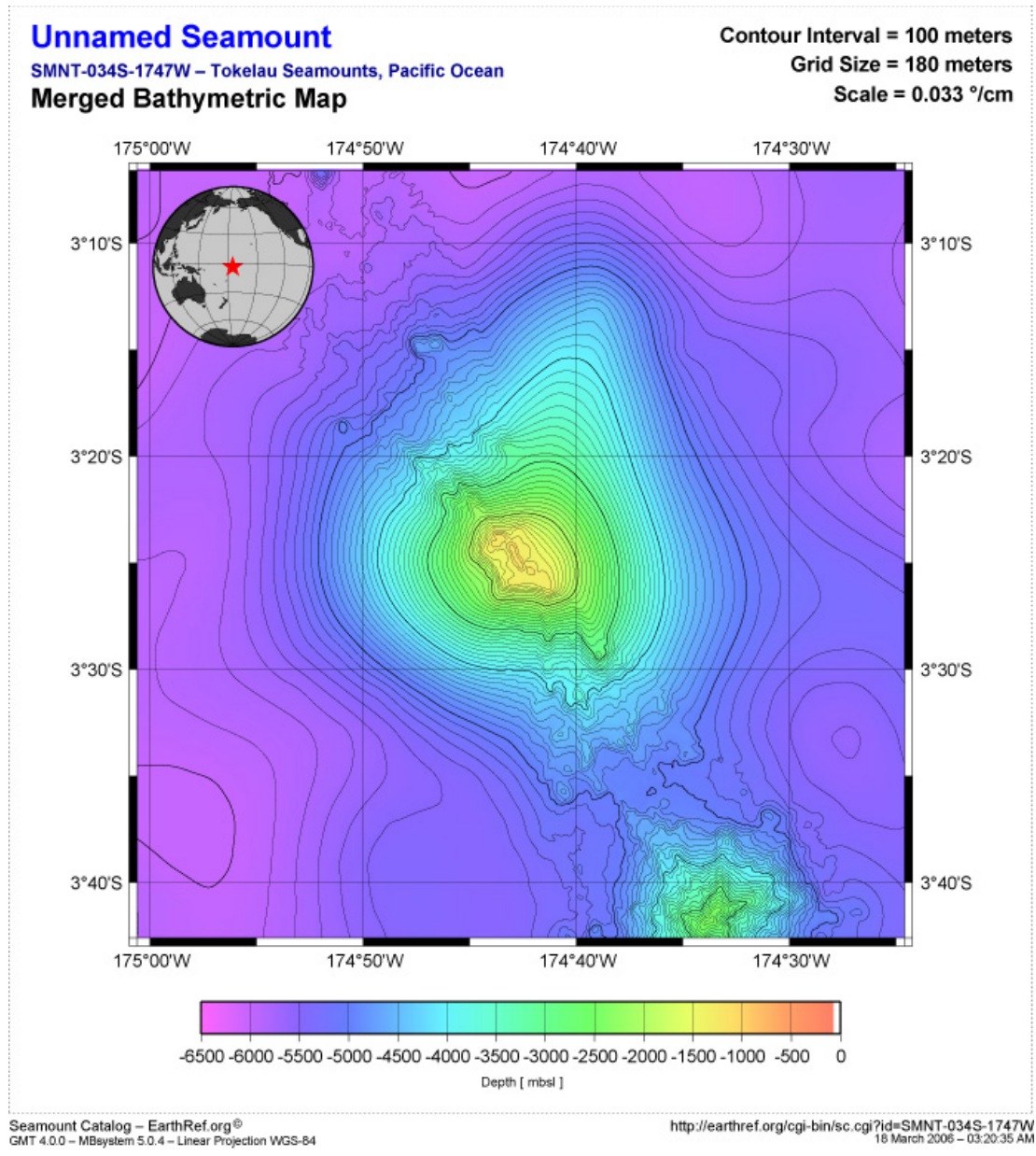
Gardner Seamount

Nikumaroro Volcanic Island (previously known as Gardner Island) is located at 4° 42.0' S, 174° 30.3' W and is part of the Tokelau Seamounts on the Pacific Plate. It is 4584 m high with the top at -600 m and the ocean bottom at -5184 m. The seamount has a volume of 7506 km³ and is slightly elongated. The edges of the volcano are relatively smooth and no dominate rifts are seen. Gardner Seamount is connected via a saddle to Nikumaroro atoll to the south.



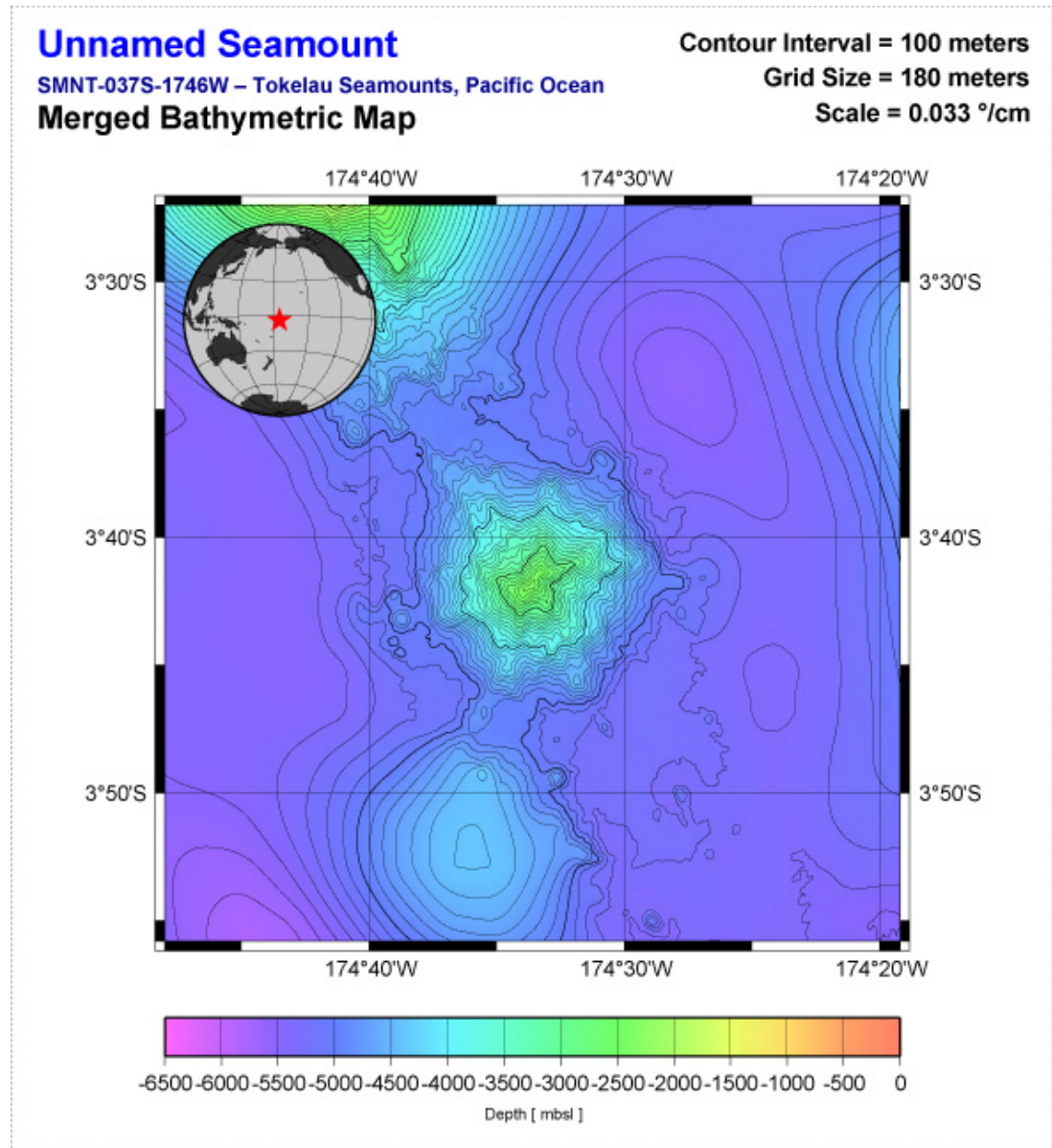
Unnamed Seamount 1

Unnamed Guyot SMNT-034S-1747W is located at 3° 24.6' S, 174° 42.2' W west from McKean Island and is part of the Tokelau Seamounts on the Pacific Plate. It is 4633 m high with the top at -1100 m and the ocean bottom at -5733 m. The guyot has a volume of 5231 km³ and is a fairly round with relatively smooth edges. There appears to be three rifts to the south and two rifts to the northwest. The top is relatively flat resulting in the classification as a guyot. To the southeast a saddle connects the guyot to an unnamed seamount.



Unnamed Seamount 2

Unnamed Seamount SMNT-037S-1746W is located at 3° 41.6' S, 174° 33.6' W west from McKean Island and is part of the Tokelau Seamounts on the Pacific Plate. It is 2835 m high with the top at -2400 m and the ocean bottom at -5235 m. The seamount has a volume of 577 km³ and is fairly round with relatively smooth edges. There are six predominate peaks radiating out from a single summit. The seamount is connected by a saddle to another unnamed seamount to the north.

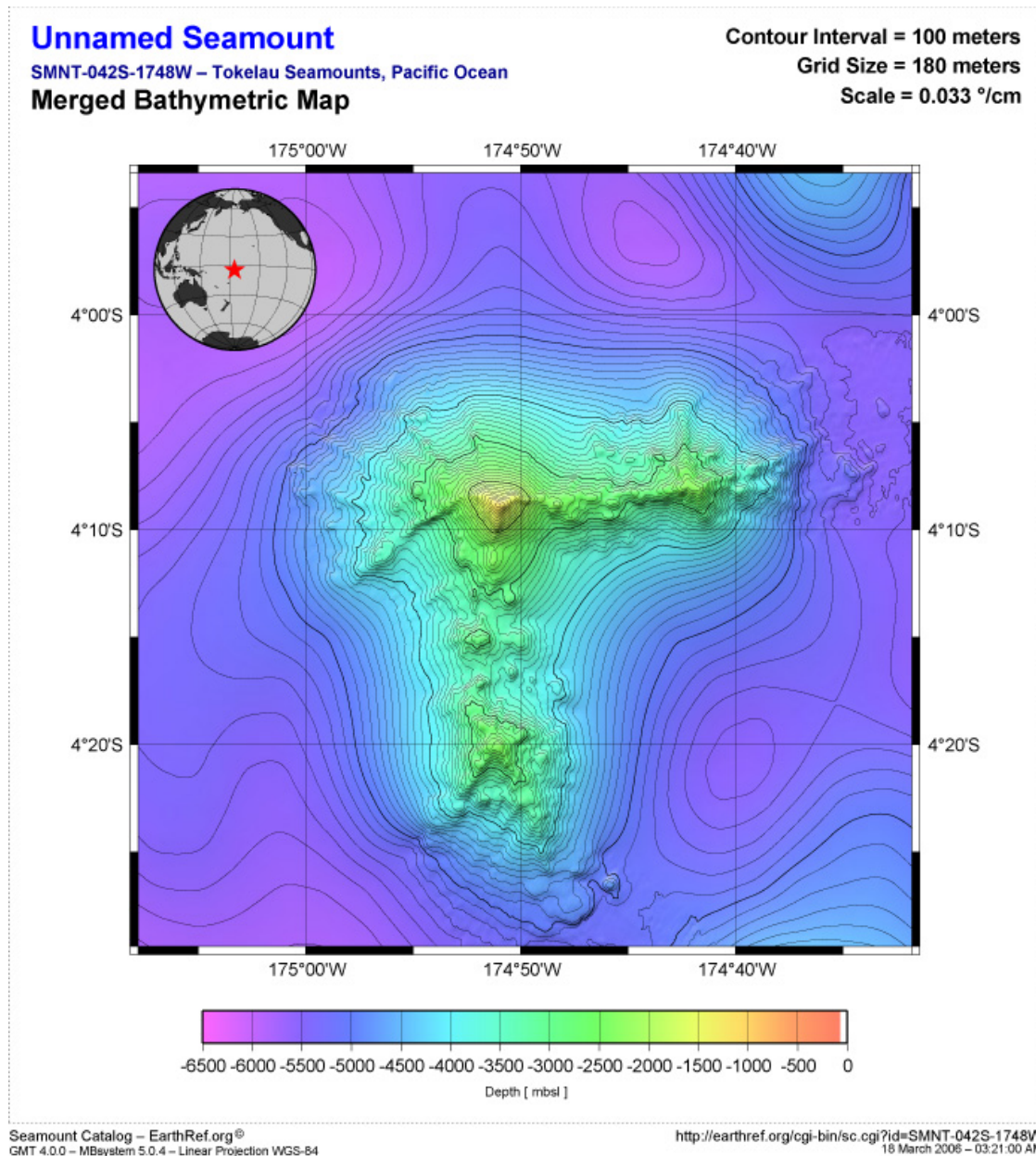


Seamount Catalog – EarthRef.org®
GMT 4.0.0 – MBSystem 5.0.4 – Linear Projection WGS-84

<http://earthref.org/cgi-bin/sc.cgi?id=SMNT-037S-1746W>
18 March 2006 – 03:20:43 AM

Unnamed Seamount 3

Unnamed Seamount SMNT-042S-1748W is located at 4° 11.2' S, 174° 49.7' W south-west from McKean Island and is part of the Tokelau Seamounts on the Pacific Plate. It is 4458 m high with the top at -1100 m and the ocean bottom at -5558 m. The seamount has a volume of 5934 km³ and is slightly elongated. The edges are very irregular and two predominant rifts radiate out to the east and south of a peak in the northwest corner of the seamount.



No previous resource surveys have been identified for Carondelet or Winslow reefs, or for the unnamed reefs in the Phoenix Islands. A survey was attempted at Winslow in August 2008 but the reef could not be located (Jim Maragos, US Fish and Wildlife Service, oral information). These remote untouched reefs undoubtedly have high species diversity and populations of endangered species. The draft management plan has an objective to complete baseline surveys of the reefs of Carondelet and Winslow and of other unnamed reefs in the Phoenix Islands using standardized quantitative methods. The 2009 expedition by New England Aquarium is expected to provide more information on these reefs. Establishing no-take zones around Carondelet and Winslow Reefs is foreseen in the new management plan.

More information on the ecology of seamounts is provided later in this nomination in the chapter on Seamounts.

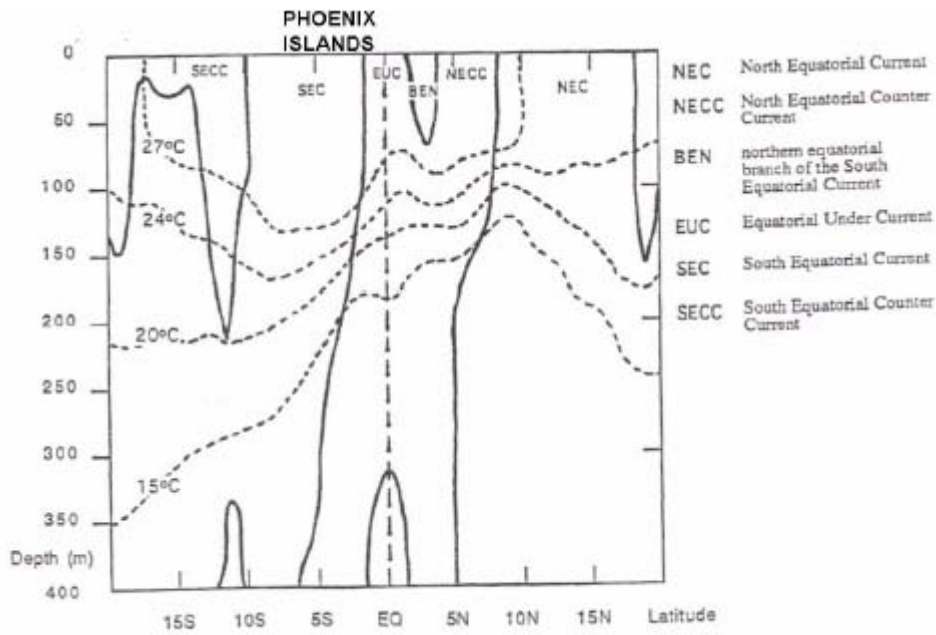
Oceanography

Sea surface temperatures within PIPA are normally between 28-30°C. There is no significant thermocline down to 50 m depth. Sea level observations on Kanton show regular four-day oscillations related to equatorial waves. Oceanographic studies reveal that silicate and phosphate levels in the waters around the Phoenix Islands are elevated compared adjacent waters. This may be a result of upwelling and have high importance for the pelagic food chain in the region. For example in 2000, McKean water temperature was slightly cooler than that of Nikumaroro. This suggested up-welling and mixing of deeper water on McKean. The minimum water temperature recorded was 26.7°C at Nikumaroro (Obura and Stone 2003).

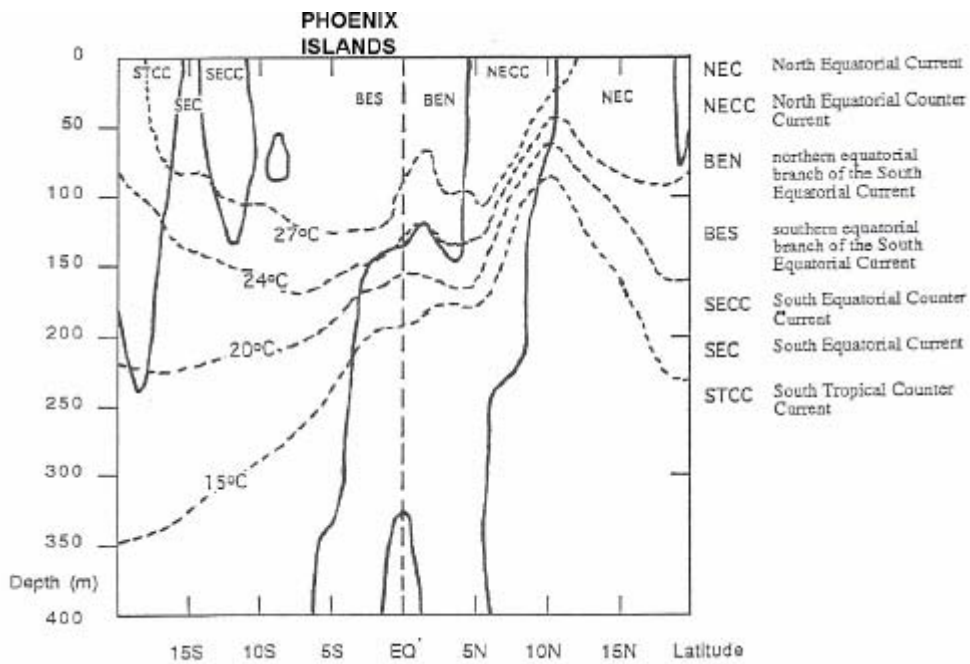
The Phoenix Islands are adjacent to the equator and are predominantly influenced by the westward-flowing Equatorial Current (northern equatorial branch of the South Equatorial Current (BEN) and south equatorial branch of the South Equatorial Current (BES) (TBAP 1993). Offshore currents are generally westward. The strength of the currents varies with the wind. Usual current speed is 1.9 km per hour (1 knot), with a maximum of 3.7 km per hour (2 knots).

The Phoenix Islands are subject to the ENSO that occurs every two to seven years and lasts for 18 to 24 months. During ENSO events, the westward trade winds are reduced and the main water currents experience variations and even reversal. This deepens the eastern Pacific thermocline. More specifically, the Phoenix Islands are located within the region of the Central Pacific in which warm pool of surface waters develops at the onset of El Niño phases, and can experience persistent hotspots lasting 1 year or more, as occurred in 2002-3. This unique environment of high exposure to warm water pools may exert unusual selective pressures on marine organisms relevant to climate change adaptation, discussed further in later sections.

The Tuna and Billfish Assessment Programme (TBAP 1993) provided diagrams (some shown below) of the seasonal changes in major equatorial surface currents around the Phoenix Islands.

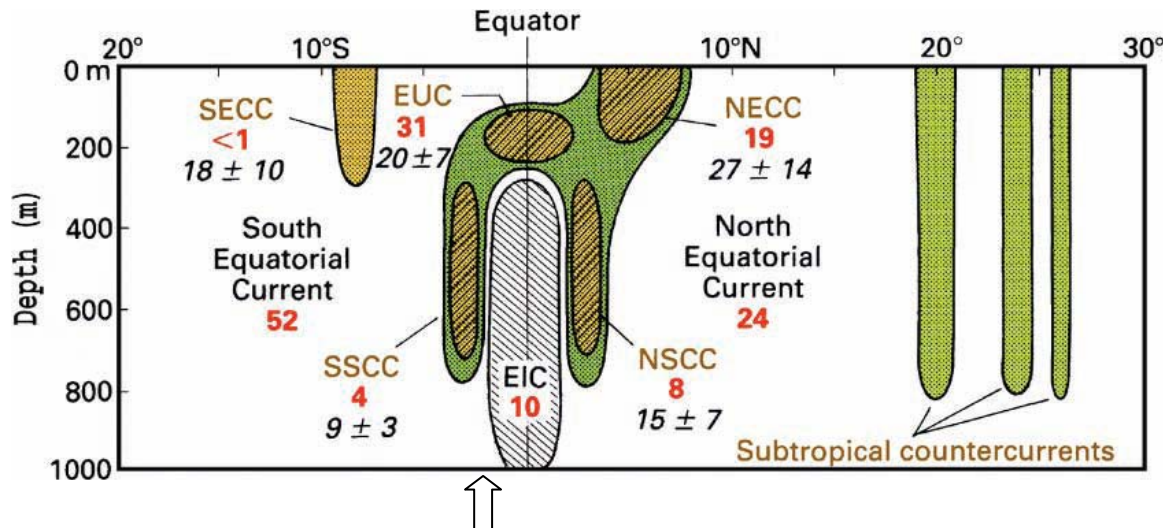


Vertical sections of the central Pacific, including the Phoenix Islands, showing mean temperature, and current profiles for JUNE between the surface and 400 m (source: TBAP 1993).



Vertical sections of the central Pacific, including the Phoenix Islands, showing mean temperature, and current profiles for DECEMBER between the surface and 400 m (source: TBAP 1993).

Jamie Gove in Maragos et al (2008) provided a sketch of the equatorial current system in the central Pacific shown in the figure below. The Phoenix Islands were in an area of unique subsurface water currents. This may have great significance for dispersing larvae originating from the Phoenix Islands.



Sketch of equatorial current system in the central Pacific Ocean (170°W) including the Equatorial Intermediate Current (EIC), the North and South Subsurface Countercurrents (NSCC and SECC). (Source: Maragos et al Coral Reefs of the USA, 2008). Cross-sectional sketch of the equatorial current system in the central Pacific Ocean (170° W). Shown in crosshatch are the North and South Equatorial Countercurrent (NECC and SECC), subsurface Equatorial Intermediate Current (EIC), North and South Subsurface Countercurrents (NSCC and SSCC), and Equatorial Undercurrent (EUC). Eastward flow is colored green or brown, and all westward flow is white, including the North Equatorial Current (NEC) north of 5° N and the South Equatorial current (SEC) south of 5° N and outside the EIC. Black numbers in italics were observations from January 1984 to June 1986 (latitude 165° E), and bold red numbers were observations from April 1979 to March 1980 (latitude 155° W), with both representing transports in Sverdrups (Sv = 106 m³/s) (Modified from Tomczak and Godfrey (2003).

MARINE ECOSYSTEMS

The marine environment of the PIPA is extremely diverse. It varies from the spectacular turquoise lagoons with huge coral heads and clams to pristine and colorful coral reefs that form and surround the atoll, low reef islands and submerged reefs down the slopes of the massive volcanoes to the ocean floor to over 6,000 meters deep. The marine environment of the PIPA is known to support a number of globally endangered and endemic species and hosts interesting and unique species assemblages not found elsewhere in the world.

From a marine science perspective the PIPA is extremely important because of the minimal human impacts and hence it's near pristine state. In addition PIPA is biogeographically uniquely situated in the center of the equatorial Pacific. PIPA plays a significant role in movements and dispersal of marine animals and larvae. Little is still known about the full effect of these islands on the surrounding pelagic marine species and systems, which in turn support internationally important seabird populations and numerous migratory birds.

Signs (prolific algae growth) of unusually high nutrient levels for oceanic atolls have been observed in the Phoenix Islands. This effect could be caused by a combination of lagoon enrichment, leaching of guano deposits or oceanic upwelling caused by deep currents striking the massive seamounts underlying each of the Phoenix Islands. Pierce et al (2006) suggested

that the Phoenix Islands are affecting and supporting the pelagic marine life/seabird ecology by increasing nutrient status, which has a food chain effect reaching outwards for a very long distance off shore.

The Phoenix Islands are considered spawning grounds for skipjack tuna. Hence their protection should also contribute to increase in tuna stocks. Tuna is the most important income earner for Pacific island countries including Kiribati.

Below are a few testimonials from scientists that have visited PIPA in recent years.

Dr. Ray Pierce, internationally renowned bird expert and leader of PIPA invasive species eradications, in Pierce et al (2006) describe their underwater experience in the Phoenix Islands: *“Our survey effort and experience of the Phoenix Islands supports the view that this Island group exhibits many of the characteristic of an oceanic coral reef system which is close to pristine and free of human impacts, most notably fishing. With some exceptions our data certainly reinforces this description. There were many unique experiences underwater at these islands which our team had not experienced in a decade of diving in the Central Pacific and Eastern Pacific. The impression a diver gets is one of sheer abundance of fish and an almost unsettling presence of many very large fish. In diving there you are immediately aware that these large fish are playing out their ecological role on the reef in an impressive manner. Watching a giant napoleon wrasse foraging on a coral, with a swarm of other reef fish in close attendance sorting through the cloud of debris, is an impressive sight. We were ‘examined’ on several occasions by manta rays spiralling around us within touching distance. We were treated to witnessing trevally schools charging at tremendous speed into clouds of Anthias far too numerous to find cover on the reef. What is so important about the Phoenix Islands is that there is almost no reef systems left where the full range of naturally occurring species and reef ecology is so unaffected.”*

Fish expert Dr. Gerald Allen has dived extensively on reefs of the Indo-Pacific region over the past 35 years. This experience provides an excellent basis of comparison, which encompasses a huge variety of reefs from the coast of the Americas to East Africa. He considers the Phoenix Islands as one of the best examples of a near-pristine atoll environment. Moreover, the islands seem to have escaped coral-bleaching episodes up until the event of late 2002. Therefore, there is excellent justification for establishing a conservation reserve that incorporates at least a portion of these islands.

The New England Aquarium explorers Dr. David Obura and Dr. Greg Stone testify the uniqueness of the Phoenix Islands. At his first underwater glimpse of the coral reefs of the Phoenix Islands, ocean explorer Greg Stone realized that they were among the most pristine coral reefs in the world. They also had a chance to witness a mass spawning of Pacific longnose parrotfishes, as Greg Stone describes in a National Geographic (February 2004) article: *“Then, like the start of a breeze, the water began to move. Nearly imperceptible at first, the strengthening current gradually diverted our bubbles at a slight angle as they ascended. The flow increased steadily and a roar replaced the peaceful silence as water began to gush out the lagoon’s entrance into the ocean on the full moon ebb tide. Cued by this outgoing current, a school of perhaps 5,000 Pacific longnose parrotfish gathered around us and started to circle. Our bubbles were flowing sideways now as we clung to bottom rocks, and our hair and dive gear flapped and fluttered in the torrential tide. If we had let go of the rocks, we would have been swept out into the ocean. The foot-long parrotfish tightened their school and swam faster. This was what we had come here to see: the periodic spawning of*

the parrotfish on the outgoing tide. Within the group, a few fish swam faster and shook, stimulating the entire school to spiral and bolt upward, releasing ecstatic bursts of eggs and sperm along the way like biological fireworks. The egg and sperm clouds they left behind were so dense they dulled the penetration of sunlight through the water. Again and again the fish repeated this act, spiralling toward the surface every ten to fifteen seconds. For almost an hour the school exploded in a rite of reproduction, relying on the fast ebb tide to carry the fertilized eggs far out to sea, where they would be safer from predators. As I watched from the seafloor, a large shadow passed over me. A half-ton manta ray, hovering magically and somehow unmoved by the current, was feeding serenely on the parrotfish eggs and sperm. Too soon, our nearly empty air tanks forced us to return to the surface and our waiting skiff. "Incredible—I've never seen anything like it!" said David Obura, a specialist in coral reefs who has spent more than a thousand hours underwater studying ocean life. I also was deeply moved. As vice president for global marine programs at the New England Aquarium, I've made it my goal to find Earth's last pockets of primal ocean, those underwater havens that have remained unspoiled as long as the ocean can remember. Here in this lagoon we had discovered such a place."



Photo Credit: David Obura

Dr. Jim Maragos, the world renowned coral reef scientist from the US Fish and Wildlife Service, has been diving all over Pacific for over 40 years. He quotes: "*The Phoenix Islands Protected Area is the single-most important conservation achievement in the modern history of Oceania. The Republic of Kiribati, a nation of low islands and atolls, made this noble commitment. The importance of the eight mostly uninhabited Phoenix Islands and atolls in the Protected Area include near pristine coral reefs, deep reefs, marine mammals, marine reptiles, seabirds, and shorebirds that will become even more important as these continue to decline and vanish elsewhere on the earth. The Republic and supporters, including local communities, nongovernmental organizations and scientists, deserve considerable credit for this achievement, and I hope that other nations will be encouraged to establish additional large scale marine protected areas within their jurisdictions. The Phoenix Islands clearly warrant recognition from the global community and World Heritage status.*"

Coral reefs

The Phoenix Islands of Kiribati consist of three atolls with lagoons encircled by perimeter coral reefs (Orona, Nikumaroro, and Kanton) and five (Manra, Rawaki, Birnie, McKean and Enderbury) low reef islands surrounded by fringing coral reefs. Two additional outlying low reef islands (Baker and Howland) to the northwest are territories of the United States and protected as National Wildlife Refuges. Collectively they are among the least disturbed coral reefs in the world. The reef system is so remote and largely pristine (except for Kanton which was modified as a military base between WWII and the mid 1970s) that it can serve as a benchmark for understanding and potentially restoring other degraded hard coral ecosystems.

The Phoenix Island reefs provide a model of what atoll and low reef islands in this part of the Pacific Ocean are like with minimal human disturbance.

The Phoenix Islands reefs show classic features of small remote atoll islands, including:

- Extreme exposure to surf and storms on three quarters of the island perimeters;
- Infelicity of marine fauna and unusual species assemblages of reef organisms (algae, corals and fishes); and
- Relatively moderate species diversity but high abundances of normally rare species;



Photo: Mary Jane Adams

Researchers have identified a total of over 200 coral species in the Phoenix Islands. A list of coral species is attached to the nomination. Preliminary assessments of the coral fauna indicate range extensions of 2 species from the Eastern Pacific (*Pavona eplanulata* and *Pavona chiriquensis*) and little-known species also only recorded from other remote Pacific islands without protection status such as in the Line Islands. Coral reefs of the Phoenix Islands were notable for the moderate coral cover (20-40%) and evidence of high physical breakage by wave energy on the southern, eastern and northern shores of the islands.

While the islands and coastal waters of these islands have been explored, there is no evidence of anyone systematically diving and studying these reefs prior to the New England Aquarium Phoenix Rising expeditions of 2000 and 2005 except for limited marine assessments of Kanton Atoll in 1973 (Maragos and Jokiel 1978, Jokiel and Maragos 1978) and the August 2008 surveys (Maragos unpublished).

Typical reef structure comprised 4 zones, from deep to shallow, with 2 additional zones on atolls with both islands and lagoons:

- **Reef slope** – between 60-85° slope, surveyed from 20 to 50m deep, and extending beyond the range of visibility to > 100 meters depth. Upper slopes tend to have high cover of rubble and *Halimeda*, some with up to 60-70% coral cover. Soft corals are common, dominated by leathery forms.
- **Reef edge** – transition between the steep slope and the near-horizontal shallow platform, about 12-20m deep.
- **Shallow platform** – from 12-20m at its deep edge, to the shallow surge zone at 5-6m. Depending on wave exposure, it can be covered with hard and soft coral growth with close to 100% cover in patches, or dominated by rubble and coralline algae on wave exposed slopes.
- **Surge zone** – extends from 4-6m to the surface, and typically cut into buttresses and surge channels with up to 3m vertical relief.

On Nikumaroro, Orona and Kanton Atolls two additional zones have been recorded:

- **Passes and dredged Channel** – shallow passes for Orona and Nikumaroro (<1m), and a deep channel (10m) in Kanton. However, Kanton's deep channel was dredged by the military, causing lagoon water levels to submerge reef crests and to emerge several feet (Jokiel and Maragos, pers.comm. 1973).
- **Lagoons** – characterized by soft silty bottoms with raised rocky features on which grow corals, algae and encrusting invertebrates. Maximum depths recorded were 4m (Nikumaroro), 12m (Orona) and 26m (Kanton). Extensive relict pillars and ancient reef structures are common in Orona and Kanton lagoons, while Kanton lagoon has some 'line reef' structures that run approximately north-south, topped by sand and rubble.

In general, the greater the distance between islands, the fewer species are found on the more remote islands. This is because reef animals with short larval life spans or specialized habitat requirements do not make it across the gaps of open ocean. The atolls, especially Kanton which has been more thoroughly studied, appear to support higher species numbers because of larger size and additional habitats (protected lagoons, pinnacles, patch reefs, passes, and dredged channel).

Coral cover varied considerably around Kanton depending on the site visited (Stone et al 2001). In some sites, coral cover was more than 50 percent. Coral communities were more highly developed on Kanton than on other islands in the Phoenix Islands. The lagoon coral gardens on Kanton were among the most highly developed *Acropora* communities ever observed by investigators. Dominant coral species on the outer reefs of the Phoenix Islands includes *Acropora* spp., *Pocillopora* spp., *Favia stelligera*, *Plerogyra sinuosa*, *Lobophyllia hemprichii*, *Porites* spp. and others. Within the lagoons, apart from the branching and tabulate *Acropora* stands, common corals include *Pavona* spp., *Montipora* spp., *Goniastrea pectinata*, and *Favia* spp., and in some locations beds of the rare coral *Anacropora forbesi*. Regional endemics include *Montipora capitata* and *M. dilatata*, the latter currently only known elsewhere from two small locations outside the Phoenix Islands.

In July 2002 and into 2003, there was a seawater hot-spot over the Phoenix Islands. This caused mass bleaching and mortality of corals most notably in the lagoon and sheltered western reefs of Kanton. This was the first time that coral bleaching was reported from Kiribati.

Bleaching in the most highly developed *Acropora* stands in Kanton lagoon and the *Acropora*/mixed communities on the western shores was near 100 percent. The bleaching may have been exacerbated by the residual effects of previous WWII military dredging and filling at Kanton. Farther from these zones, coral mortality decreased to between 60 and 30 percent on Kanton, and on the other islands of the group. By the time of surveys in 2004 (Planetary Coral Reef Foundation) and 2005 (NEAQ), many coral recruits and juveniles up to 10 cm diameter were observed. This indicated that significant recruitment had taken place after the mass mortality event. Also deep water corals stayed in good condition, with mortality ending at about 15-20 m on the east-facing sides and 30-35 m on the west-facing sides. These are a sign of resilience of the Phoenix reefs, with rapid recruitment from refuge populations in deep waters, and resistant corals in shallow reefs.

Also in 2006, Kerr and Wragg conducted coral health rapid assessment surveys on Manra, Rawaki, Enderbury, Birnie, McKean, Orona, and Nikumaroro. All surveys were completed on the lee sides of these islands. They reported no evidence of the recent coral bleaching events and they did not observe any significant coral diseases, also reaffirming recovery of reefs post the bleaching event.

Even though coral reefs of the Phoenix Islands are not isolated from the effects of global warming (such as bleaching) their ability to regenerate appears much better than reefs in more populated areas in part because of lack of other threats and stresses to the reefs. This provides an important and likely unsurpassed opportunity to research and understand climate change impacts on coral reef systems in the virtual absence of other anthropogenic factors.

A list of all coral species identified from PIPA is attached to the nomination in the Species List attachment.

Fish

Documented fish fauna of the Phoenix Islands consists mainly of shallow water species associated with coral reefs. The most abundant families in terms of number of species are wrasses (Labridae), groupers (Serranidae), gobies (Gobiidae), damselfishes (Pomacentridae), surgeonfishes (Acanthuridae), moray eels (Muraenidae), butterflyfishes (Chaetodontidae), blennies (Blenniidae), squirrelfishes (Holocentridae), and cardinalfishes (Apogonidae). These 10 families collectively account for 62 percent of the total reef fish fauna. Deep sea and open ocean species have not been surveyed, except for tuna resources.

The total known shallow reef-fish fauna of the Phoenix Islands now stands at 518 species, consisting of the following: 192 species originally recorded by Schultz (1943), 100 species recorded by the year 2000 expedition (Stone *et al.* 2001), 9 species recorded in various generic revisions, and 217 new species from the 2002 New England Aquarium expedition. A formula for predicting the total reef fish fauna based on the number of species in six key indicator families (Allen, unpublished data) indicates that at least 576 species, over 50 more than currently listed, can be expected to occur at the Phoenix Islands. A new species of damselfish, *Chrysiptera albata*, was collected in 42-50m depth at Nikumaroro Island (Allen and Bailey 2003). Other potential undescribed species were found in the genera *Myripristis* (Holocentridae), *Eviota* (Gobiidae), and *Trimma* (Gobiidae).

Certain species are particularly common on Phoenix Islands reefs, occurring in much higher densities and full age/size cohorts than at most localities in the Indo-Pacific region. These include various surgeonfishes (Holocentridae), *Eviota* (Gobiidae), and *Trimma* (Gobiidae) (*Acanthurus guttatus*, *A. nigricans*, *A. triostegus*, *A. xanthopterus*, *Naso literatus*, and *Zebrasoma veliferum*) and parrotfishes (*Hipposcarus longiceps* and *Scarus ghobban*). All of these species can be frequently sighted in extraordinarily large aggregations in the Phoenix Islands.

The composition of local reef fish communities in the Indo-Pacific region is largely dependent on habitat variability and consequent availability of food and shelter. The relatively limited faunal diversity of the Phoenix Islands compared to areas further to the west is primarily due to two factors: 1) the distance from the “coral triangle”, which is generally acknowledged as the center of Indo-Pacific coral reef fish diversity, and 2) the relatively homogenous nature of the reef environment. Phoenix Island reefs, typical of atolls, are generally characterised by limited habitat diversity, and are consequently inhabited mainly by fishes typical of atoll seaward reefs, with the exception of the 26 lagoon species. The few islands that contain substantial lagoons (Nikumaroro, Kanton and Orona) possess relatively impoverished lagoon faunas due to poor circulation, extensive shallows, lack of reef structure, or combination of these factors. However, what they may lack in species number or diversity is made up for in the sheer robustness and abundance of reef fish species, especially apex predators, seldom observed in these quantities in other reef systems.

Perhaps the most interesting segment of the Phoenix fauna is the group of species that are largely restricted to the central Pacific. Springer (1982) provided ample evidence for a discrete Pacific Plate province characterized by a high degree of endemism, particularly for

shore fishes. Allen (in press) estimated that approximately 19 percent of the overall Pacific Plate fauna is endemic, based on an analysis of 17 common reef fish families.

The endemicity of reef fish is largely unknown. The recently described damselfish (*Chrysiptera albata*) and goby (*Trimma squamicanta*) are currently known only from the Phoenix Islands. However, they can be expected at other areas in the central Pacific such as the Line Islands.

Phoenix Islands fishes with apparent restricted distributions:

Species	General Distribution
<i>Myripristis earlei</i> (Holocentridae)	Marquesas and Phoenix Islands
<i>Paracirrhitis nisus</i> (Cirrhitidae)	Tuamotus and Phoenix Islands
<i>Kuhlia petit</i> (Kuhliidae)	Marquesas and Phoenix Islands
<i>Chaetodon declivis</i> (Chaetodontidae)	Marquesas, Line Is., and Phoenix Is.
<i>Apolemichthys xanthopunctatus</i> (Pomacanthidae)	Gilbert, Phoenix, and Line Islands
<i>Chrysiptera albata</i> (Pomacentridae)	Nikumaroro Atoll
<i>Bodianus prognathus</i> (Labridae)	Line and Phoenix Islands
<i>Coris centralis</i> (Labridae)	Line and Phoenix Islands
<i>Parapercis lata</i> (Pinguipedidae)	Line and Phoenix Islands
<i>Ctenogobio sp.</i> (Gobiidae)	Line and Phoenix Islands
<i>Priolepis ailina</i> (Gobiidae)	Society and Phoenix Islands
<i>Trimma squamicana</i> (Gobiidae)	Phoenix Islands

Inter-island comparisons:

Although general diving conditions of the various islands are similar due to the relatively homogenous atoll environment, each island possesses distinctive faunal characteristics. Below some of the most obvious fish faunal highlights or peculiarities of each island are mentioned (from Allen and Bailey).

Nikumaroro Atoll. – Huge numbers of surgeonfishes were one of the most impressive faunal features of the Phoenix Islands in general and some of the largest aggregations were witnessed here. Schooling species included *Acanthurus triostegus*, *A. guttatus*, *A. nigroris*, *A. xanthopterus*, and *Zebrasoma veliferum*. Nikumaroro was also the best location for sharks, including *Charcharhinus amblyrhynchos*, *C. melanopterus*, and *Triaenodon obesus*. As many as 15-20 sharks were seen on each dive. Other highlights included large schools of *Lutjanus fulvus* and an inordinate number of hawkfishes, which were generally abundant throughout the Phoenix Group.

Manra Island. – Manra was notable for its abundance of the surgeonfish *Acanthurus guttatus*, which formed large feeding shoals in shallow, wave-affected gutters. In addition, an extensive sand patch at dive site 18 yielded about 20 individuals of *Malacanthus brevis* as well as numerous *Coris centralis*. Other extraordinarily abundant fishes included *Kyphosus cinerascens* and *Mulloidichthys mimicus*.

Rawaki Island. – Plectognaths (triggerfishes, puffers, and allies) were generally abundant. The most puffers (*Arothron meleagris*) were seen at this island, including up to 15-20 fish in a single aggregation. There was also an abundance of the relatively rare *Xanthichthys* triggerfishes (*X. auromarginatus* and *X. caeruleolineatus*).

Kanton Atoll. – The relatively wide, deep passage and interconnected lagoon habitat were unique physical features associated with a number of fish species that were seen here and nowhere else in the Phoenix Islands: *Heteroconger haasi*, *Atherinomorus lacunosa*, *Doryhamphus dactyliophorus*, *Epinephelus socialis*, *Kuhlia petiti*, *K. mugil*, *Gerres argyreus*, *Centropyge bicolor*, *Heniochus acuminatus*, *Chromis ternatensis*, *Amblygobius nocturnus*, *Ctenogobius sp.*, and *Pleurosicya micheli*. In addition, the following species were sighted only on the outer reef at Kanton: *Belonoperca chabanaudi*, *Apogon taeniopterus*, *A. semiornatus*, *Fowleria punctulata*, *Chromis weberi*, *Halichoeres chrysus*, *H. pallidus*, *Hologymnosus doliatus*, *Ptereleotris evides*, and *Siganus argenteus*. Parrotfishes were generally more numerous at Kanton compared to the other islands. Especially notable in this regard were huge spawning aggregations of *Hipposcarus longiceps*, encountered on the outer reef at the entrance to the main passage. Spectacular early morning (during outgoing spring tides) spawning episodes were witnessed on two occasions. Also, with the exception of one sighting at Birnie Island, *Scarus altipinnis* was confined to Kanton, and present in large numbers. Other fishes with unusually high abundance included *Caranx lugubris*, *Chaetodon lunula* (a school of 70 individuals seen in the lagoon), and *C. trifascialis* (confined to the lagoon).

Birnie Island. – This small island was subject to strong surge, and consequently exhibited relatively low coral relief and a lower level of fish diversity. One notable observation was the presence of the normally deeper dwelling *Paracentropyge multifasciatus* and *Xanthichthys auromarginatus* in only 8-9 m depth. Conversely, *Myripristis woodsi*, usually found in less than 12 m, was seen as deep as 32 m. This soldierfish was exceptionally common. Other species that were seen in higher than usual numbers included *Epinephelus polyphkadion* and *Bodianus prognathus*.

Orona Atoll. – Large shoals of Bumphead Parrotfish (*Bulbometopon muricatus*), included up to 200 or more individuals. This impressive fish was seen on most dives at Orona, both in the lagoon and on outer reefs. Kanton and Nikumaroro were the only other locations where it was sighted, but only small groups were encountered. The lagoon at Orona was also notable for its population of juvenile Napoleon Wrasse (*Cheilinus undulatus*), with observations of as many as 20-25 per dive.

As part of the NEAq 2002 fish dive surveys, fish abundance was estimated (Obura and Stone 2003). Fish densities averaged 0.522 fish per m². No apparent pattern was seen regarding fish abundance according to site exposure or island. Overall, fish populations were healthy and representative of coral reef communities. Key fish indicator species had similar abundance in 2002 (Obura and Stone 2003) as in 2000 (Stone et al 2001). The exceptions were dogtooth tuna and sharks, both of which declined significantly in abundance. Dogtooth went from being present in 75% of large fish sampled (in 2000, see Stone et al 2001) to zero in 2002 (Obura and Stone 2003). Reef shark density was similar between 2000 and 2003 in Enderbury, Nikumaroro, and Birnie. On Rawaki (Phoenix), Manra, Kanton, and Orona, shark density had dropped significantly and were absent in many sites. This was attributed to the shark fishing operations between those two survey years.

Sapolu (2005) reported that the relative density of angelfishes (family Pomacanthidae) was higher on isolated islands, peaking at 14 species in the Phoenix Islands. There was high correlation between isolation and endemism in pomacanthids. In addition, shallow water substrate was an important factor driving species diversity. For the Pomacanthidae, the

Phoenix Islands were the most diverse in terms of species per unit area of shallow water substrate.

The Phoenix Islands population of Napoleon Wrasse (*Cheilinus undulates*,) usually a good indicator of local fishing pressure, is exceptional compared to other internationally recognized marine biodiversity hotspots recently surveyed in the Indo-Pacific (Table below). As many as 20-25 individuals were seen on each dive in PIPA. The population could be quickly devastated if foreign or local ventures started fishing operations. This species is presently protected under Appendix II of CITES and although it is not necessarily threatened by extinction, it could easily vanish if the trade is not closely controlled.



Photo: David Obura

Frequency of Napoleon Wrasse (*Cheilinus undulatus*) for various locations in the Indo-Pacific previously surveyed by Conservation International:

Location	No. sites where seen	% of sites	total	Approx. no. seen
Phoenix Islands 2002	47	83.92		412
Milne Bay, PNG – 2000	28	49.12		90
Milne Bay, PNG – 1997	28	52.83		85
Raja Ampat Islands – 2001	7	15.55		7
Togean/Banggai Islands – 1998	6	12.76		8
Weh Island, Sumatra – 1999	0	0.00		0
Calamianes Is., Philippines – 1998	3	7.89		5

Shimada (1951) reported that juvenile skipjack were available in the Phoenix Islands, indicating that this area was a skipjack spawning area. Further surveys are needed to determine the extent and importance of the spawning area. Also spawning areas of yellowfin and bigeye tuna within PIPA need to be investigated.

A list of fish species is attached to the nomination dossier in the Species List attachment.

Marine invertebrates

The motile invertebrate fauna of the Phoenix Islands is low in diversity, has a number of taxonomic gaps, and densities of large invertebrates are generally low. During 2002 New England Aquarium expedition echinoderms were the most diverse and prominent phylum sampled, though with low species richness, noticeable for all the major classes – sea stars, sea cucumbers, brittle stars and sea urchins. Some species were abundant on all islands, such as the sea star *Linckia multifora* and in shallow waters, the urchin *Echinometra mathaei*.

Kanton and Orona host spectacular giant clam (*Tridacna maxima*) communities in sizes rarely seen elsewhere in the world. The density of these giant clams in Orona lagoon is the highest ever observed by the New England Aquarium expedition scientists (2002), a particularly unique feature within PIPA. Obura (in press) reported patches of *Tridacna*

(dominated by *T. squamosa*) clams in Orona’s lagoon with densities in patches over 50 clams per m².

Giant clams have been harvested for food by I-Kiribati (Kiribati citizens) settled in the past on Orona. However Orona is no longer inhabited and with the protected status and effective management of PIPA it is expected that clam populations will remain healthy and abundant within PIPA.



Photo: David Obura

Sea turtles

Endangered green (*Chelonia mydas*) (Vu) and hawksbill (*Eretmochelys imbricata*) (CE) turtles have been sighted in the Phoenix Islands. In 2002, turtle surveys were conducted on Kanton, Birnie, Enderbury, Manra, Nikumaroro, Orona, and Rawaki (Obura and Stone 2003). The highest number of turtles was seen at Kanton, the largest island. Most islands showed signs of turtle nesting, as old depressions in the sand without recent tracks, or from recent tracks and fresh nesting depressions, particularly at Enderbury and Nikumaroro. All tracks observed appeared to be of green sea turtles. Mating green turtles were observed on 3 occasions, at Nikumaroro, Manra and Enderbury.



Photo: David Obura

Results of recent turtle surveys in PIPA are presented in the tables below.

Number of turtles observed on dives and number of nests observed in 2002.

(Source: Obura and Stone 2003)

island	Turtles observed		Nests observed	
	green	hawksbill	old	new
Birnie	5		2	3
Enderbury	7		160	
Abariringa (Kanton)	28		30	5
Manra	10	1		2
Nikumaroro	7	2	41	18
Orona	6	1		8
Rawaki (Phoenix)	3	1		6
Total	66	5	233	42

Turtle nests observed on the Phoenix Islands in April to May 2006.

(Source: Pierce et al 2006)

Island	% shoreline covered	No. nests	Comments
Rawaki	100	0	Beach unsuitable
Birnie	100	120	Lee side
Enderbury	100	293	252 on lee side, 41 windward
McKean	100	0	Little suitable habitat
Orona	c.10	1	Lee shore
Orona lagoon	c.10	0	
Nikumaroro S & SW	c.10	0	
Nikmaroro NW	c.10	1	

Data analyzed from the 2000 and 2002 NEAq Phoenix Islands surveys showed significant declines in green turtles on Kanton. Obura, Mangubhai et al (*in press*) suggested that the commercial shark fishing vessel that fished at Kanton may also have reduced turtle populations on those islands.

Di Piazza and Pearthree (2004) and Pierce et al (2006) noted that Enderbury was still among one of the most important green turtle, *Chelonia mydas*, nesting sites in the Central Pacific.

In May-June 2008 Rawaki showed sign of 100+ old turtle diggings and a green turtle was seen ashore. These beaches were eroded during the 2006 visit (Ray Pierce, oral information).

Marine mammals

There are several marine mammals that transit or live within the waters of the central Pacific Ocean, the South Pacific Regional Environment Programme (SPREP) area (Reeves et al 1999). The SPREP area includes the Phoenix Islands. Marine mammals that may occasionally transit or live within Phoenix Islands waters include:

- 1) Bryde's whale, *Balaenoptera edeni*;
- 2) Sperm whale, *Physeter macrocephalus*;
- 3) Pygmy sperm whale, *Kogia breviceps*;
- 4) Dwarf sperm whale, *Kogia simus*;
- 5) Short-finned pilot whale, *Globicephala macrorhynchus*;
- 6) Killer whale, *Orcinus orca*;
- 7) False killer whale, *Pseudorca crassidens*;
- 8) Melon-headed whale, *Peponocephala electra*;
- 9) Pygmy killer whale, *Feresa attenuata*;
- 10) Risso's dolphin, *Grampus griseus*;
- 11) Bottlenose dolphin, *Tursiops truncatus*;
- 12) Striped dolphin, *Stenella coeruleoalba*;
- 13) Pan-tropical spotted dolphin, *Stenella attenuata*;
- 14) Spinner dolphin, *Stenella longirostri*;
- 15) Fraser's dolphin, *Lagenodelphis hosei*;
- 16) Rough-toothed dolphin, *Steno bredanensis*;
- 17) Southern bottlenose whale, *Hyperoodon planifrons*;
- 18) Cuvier's beaked whale, *Ziphius cavirostris*; and

19) Other beaked whales, *Mesoplodon spp.*

Whales, and in particular sperm whales were once abundant in the Central Pacific, including Phoenix Islands. Hutchinson (1950) compared sperm whale population levels with plankton levels across the equatorial Pacific. Plankton levels were highest at about 2°S (the latitude of the Phoenix Islands) and that corresponded with the peak in sperm whale levels. However heavy whaling in the 1800's depleted these species in the Central Pacific. In recent years sightings of sperm whales near Phoenix Islands have been very rare. For example Stone et al (2001) noted that during the 2000 NEAQ expedition to the Phoenix Islands, few cetaceans were seen. Odontocetes were the most common sub-order observed and bottlenose dolphins (*Tursiops truncatus*) the most common species. Also spinner dolphins (*Stenella longirostris*) are a relatively common sight in Phoenix Islands waters.

Pierce et al (2006) recorded no whales during a period of 27 days which is a concern considering the extensive time spent observing in Phoenix Island waters. However resident dolphin populations were recorded for most islands. During 33 days in May-June 2008 no whales were seen, the only cetaceans recorded were bottle-nosed dolphins (Ray Pierce, oral information). It is noted however that no dedicated surveys for cetaceans have been carried out and this is a gap in survey effort that needs to be remedied.

PIPA, by virtue of its large size offers significant potential benefit for cetacean conservation. However, as many of these species are migratory e.g. sperm whales this is seen as only a partial solution. The apparent lack of recovery of sperm whales, after decades of protection, is particularly worrisome and warrants further investigation.

Open Ocean and Deep Sea

PIPA is the first marine protected area in the Central Tropical Pacific bioregion and one of the few in the world which includes large areas of open ocean, deep sea and extensive seamount habitats. By nominating PIPA as World Heritage, Kiribati is showing exceptional leadership in protecting the little studied but highly important deep sea, seamounts and atolls. Waters around the Phoenix Islands reach over 6,000 metres depth with maximum at 6,147 meters. It thus safeguards the habitat of many deepwater species, undoubtedly including many species yet to be discovered or studied. PIPA also serves as a buffer area against the global changes in marine biodiversity.

The Phoenix Islands are subject to major global oceanic and meteorological processes that together function as large scale mid-oceanic climatic and marine environment drivers. The islands are influenced by ocean and atmospheric connections from both east-west and north-south directions within a relatively pristine ocean environment. The currents generate localized upwelling and marine productivity and enhance marine larvae dispersal and biodiversity levels on affected reefs and islands as well as within the open ocean.

By convention, oceanic waters are divided into different zones according to water depth. All these zones can be found within PIPA. Below are general descriptions for different depth zones of oceans.

Closest to the surface is the *epipelagic* zone which reaches to 200 meters depth. This illuminated surface zone has enough light for photosynthesis and therefore plants and animals are largely concentrated in this zone. Nearly all primary production in the ocean occurs here.

This layer is the domain of many fish species such as tuna, many sharks, dolphin fish, and jellyfish.

Mesopelagic zone reaches from 200 meter to about 1000 meters depth. Although some light penetrates this deep, it is insufficient for photosynthesis. At about 500 m the water becomes depleted of oxygen. Still, an abundance of life copes with more efficient gills or minimal movement. Animals such as swordfish, squid, wolffish, a few species of cuttlefish, and other semi-deep-sea fauna can be found in this zone.

Below 1000 meters depth starts the deep sea area where very little or no light penetrates. Most of its organisms rely for subsistence on falling organic matter (known as 'marine snow') and carcasses derived from the productive zone above. For this reason it was assumed life would be sparse in these great depths, but virtually every probe has revealed that, on the contrary, life is abundant in the deep sea. To date the deep sea represents one of the least explored areas on Earth, it is less known than the moon. The deep sea has been divided into *bathypelagic*, *abyssopelagic* and *hadopelagic* zones.

Bathypelagic zone extends from a depth of 1000 to 4000 meters below the ocean surface. The average temperature is about 4 °C. Although larger by volume than the above euphotic zone, the bathyal zone is less densely populated. Sunlight does not reach this zone, meaning there can be no primary production. Many forms of nekton live in the bathyal zone, such as squid, viperfish, deepwater sharks, large whales, and octopuses. Sponges, brachiopods, sea stars, and echinoids are also common in the bathyal zone. The fish in this zone have become very energy efficient. Many have slow metabolic rates, to conserve energy. By volume the bathypelagic zone is the most widespread habit in PIPA.

Abyssopelagic zone extends from 4,000 to 6,000 meters and contains the very deep benthic communities near the bottom of oceans. This zone remains in perpetual darkness and never receives daylight. Species found in this zone include the Black swallower, tripod fish, deep-sea anglerfish and the giant squid which are able to withstand the immense pressures of the ocean depths, up to 76 megapascals (11,000 psi – pounds per square inch). The deep trenches or fissures that plunge down thousands of metres below the ocean floor are almost unexplored. These regions are also characterized by continuous cold and lack of nutrients. The abyssal zone has temperatures around 2 to 3 °C.

Hadopelagic zone is the delineation for the deepest trenches in the ocean. This zone is found from a depth of around 6,000 meters to the bottom of the ocean. The pressure can reach over 1,100 standard atmospheres (110 MPa /16,000 psi). The most common fauna include jellyfish, viperfish, tube worms, clams, and the deep sea angler fish.

The deep sea species have a number of ways to adapt to these extreme conditions. For example the midwater fish are small, usually under 25cm; they have slow metabolisms and unspecialized diets, preferring to sit and wait for food rather than waste energy searching for it. Because of the sparse distribution and lack of light, finding a partner with which to breed is difficult, and many organisms are hermaphroditic.

It is noteworthy that globally the ocean floor between 4,000 m and 6,000 m is the single most extensive natural habitat, representing about 60% of the surface of the planet.

Seamounts

An important feature of PIPA is the more than 24 large submerged and relatively unexplored volcanic mountains rising direct from a generally level sea floor at an average depth of about 4,500 metres, including at least 10 of which extend to the surface or to within 200 metres, of the ocean surface. Collectively the more western of these volcanoes form part of the Tokelau chain of islands and submerged mountains extending north-south across the Central Pacific. The highest of these volcanoes carry coral cappings as atolls (4), low reef islands (4) and submerged reefs (2). Numerous other large submerged mountains occur throughout the nominated property but which do not extend to within 200 metres of the surface and so by definition are known as seamounts. Seamounts are isolated underwater mountains, believed to typically comprise extinct volcanoes and defined as rising more than 1000 metres above the seafloor but not reaching within 200 metres of the surface. Typically they exhibit varying geological features, such as terraces, ridges, banks, plateaux and shelves.

PIPA is one of the very few large marine protected areas in the world that contains numerous seamounts and the only such one in the tropics. PIPA includes an outstanding array of confirmed and named seamounts together with other as yet unconfirmed and unnamed seamounts that collectively form part of the Tokelau seamount chain. It is estimated that there could be more than 30 seamounts within the boundaries of PIPA. There are 14 confirmed seamounts, 13 of which have been registered in the international Seamount Catalog. Of the registered seamounts, only 9 have been officially named. Although there has been limited exploration of the PIPA seamounts to date, seamounts generally are renowned for being very important habitat for pelagic fish and from an ecological conservation perspective. Seamounts are fragile ecosystems and although very little is known of their biodiversity, they are renowned for their very particular fauna. Almost every time a seamount is explored, a high percentage of species discovered are new to science, exhibiting a high degree of endemism. The protection of seamounts and other related ecosystems e.g. high seas has been called for by the United Nations General Assembly, the Convention on Biological Diversity and reaffirmed by the Pacific Islands Forum Leaders for example in the Nadi Communiqué (2006) to prevent destructive fishing practises on the highly vulnerable seamounts.

As deep currents sweep past seamounts they swirl and eddy, which serves to concentrate plankton and carry nutrients up from deeper water layers. This upwelling turns these features into important feeding sites for a wide variety of bottom-dwelling and pelagic species. Many seamounts support dense assemblages of suspension feeding species such as corals (gorgonian, scleratinian and antipatharian), crinoids, hydroids, ophiuroids, and sponges (Rogers 1994). Orange roughy, pelagic armourhead, and oreos are some of the commercially important deep water fish species known to aggregate at seamounts to feed. Frequent pelagic visitors to seamounts include swordfish, tuna, sharks, turtles and whales (see UNEP/CBD/COP/7/INF/25).

Although relatively few (less than 200 in the world) seamounts have been comprehensively sampled, research has shown that seamounts are hot spots for the evolution of new species, refuges for ancient species, and stepping-stones for species to spread across ocean basins (Stone et al. 2004; Roberts 2002b; Koslow et al. 2001 and Richer de Forges et al. 2000). Rates of endemism are considered very high, ranging from 35% on seamounts off Tasmania, 36% for seamounts on the Norfolk Ridge; 31% on the Lord Howe Island seamounts, and 44% for fishes and 52% for invertebrates on the Nasca and Sala-y-Gomez chain off Chile (Stone et

al 2004). Research suggests that these high rates are not just an artifact due to limited sampling, for adjacent seamounts in New Caledonian waters have been found to share an average of just 21% of their species, and seamounts on separate ridges approximately 1000 km apart in the Tasman and Coral Seas have only 4% of their species in common (Richer de Forges et al. 2000. See also UNEP/CBD/COP/7/INF/25).

The biological characteristics of most deep-sea species associated with seamount ecosystems render them particularly sensitive to human disturbance and exploitation. The slow growth, longevity, late sexual maturity, and restricted distribution of many of these species (for example, deep-sea corals, sponges and fish) make them particularly vulnerable to human impacts and the risk of extinction. Concerns over the impact of fishing and the potential loss of this biodiversity are amplified by the limited information about the taxonomy, biology and ecology of most of the species found in deep ocean areas. Destructive fishing activities in these areas could bring about extinctions of entire groups of organisms that are still undiscovered (UNEP/CBD/COP/7/INF/25).

(From: www.cbd.int/doc/meetings/pa/pawg-01/information/pawg-01-inf-01-en.pdf)

In regards to the relevance of seamounts to pelagic ecology and fisheries, the summit depth below the surface appears to be as important as the elevation above the sea floor. From this point of view, seamounts can be classified into 3 classes (Anon., 2006)

(From: www.wcpfc.int/sc2/pdf/SC2_EB_IP5.pdf):

- 1) Shallow: summit reaching the euphotic zone
- 2) Intermediate: summit not reaching the euphotic zone but above the lower limit of the Deep Scattering Layer (DSL), and
- 3) Deep: summit below the DSL.

Seamounts in Class 1 and 2 may be characterised by specific oceanographic features linked to a more dynamic environment that will have a potential impact on the pelagic ecosystem and fisheries exploiting it. Feeding is probably the main reason why large pelagics gather around seamounts.

From information collected from exploratory cruises, benthic fauna on seamounts appears to be characterised by a very high percentage of organisms previously unknown to science. The high number of undescribed species makes it difficult to compare the biodiversity of different seamounts or of continental slope and seamounts. Seamounts are different from continental slopes and can be compared to islands as far as faunal biogeography is concerned; this has been demonstrated with corals. Like oceanic islands, seamounts appear to be characterised by a high level of endemism and closely adjacent seamounts can exhibit very distinctly different benthic fauna with high degrees of local endemism.

The 2000 deep-sea surveys by New England Aquarium recorded the first distribution records of sixgill (*Hexanchus griseus*) and Pacific sleeper (*Somniosus pacificus*) sharks for this part of the Pacific from 900 meters depth near Kanton. It is probable that the seamounts of PIPA have great importance for pelagic and commercially important fishery such as tuna and skipjack. With 25% of the world's seamounts already degraded the pristine seamounts of PIPA provide critical protection for these fragile ecosystems and associated species, representing a conservation resource of global significance.

A research expedition led by the New England Aquarium is scheduled for 2009 to further study the PIPA seamounts. The cruise will assist in addressing information gaps and will look at the connectivity issues between atoll terrestrial, coastal and deep sea habitats.

TERRESTRIAL ECOSYSTEMS

The marine environment of the Phoenix Islands is matched by the terrestrial environment with varied atoll and low reef islands, all with their own specific characteristics, species assemblages and history. The islands exhibit classic remote island and atoll characteristics, including steep reef drop-offs, relatively low species diversity coupled with endemism, unusual species assemblages, harsh island habitats and vegetation, and large seabird nesting colonies. The islands also include a full range of marine and land-locked lagoons, freshwater lakes and ponds, whose waters vary from freshwater to hypersaline; deep to shallow; and limited circulation to good circulation.



Photo: Gregory Stone

The aerial views of the atolls are superb characterized by lagoons and interesting land formations. Spectacular numbers of sea birds can be seen to take off and return in the evenings to the islands to breed and rest. In addition to birds, some of the islands host significant populations of crabs, most notably the coconut crabs on Nikumaroro.

Island habitats

Of the eight islands within the PIPA, four are classified as atolls and four as low reef islands.

The islands are all reefal in origin, composed of coral and coralline algae limestone, molluscs and associated detrital material. As a result, most have poor soil development, except for Nikumaroro and Orona, on which decomposing litter from *Pisonia grandis*, *Cordia subcordata* and *Cocus nucifera* have formed thick topsoil.

The highest species and habitat diversity are found on the larger atolls Kanton, Orona, and Nikumaroro. The small islands have lower diversity plant communities and dense low-lying vegetation, indicative of the harsh physical conditions imposed by wind, salt spray and shallow, poor soils.

Freshwater resources in the Phoenix Islands are extremely limited or non-existent because of the arid climate at the PIPA. Surface freshwater resources may occur during and after heavy rainfall, however these are not permanent. Freshwater lenses are present, especially after heavy rains. However, these are not dependable long term sources of freshwater. During periods of drought, the freshwater lens can turn brackish, and become unfit for human consumption.

There are no free-standing bodies of freshwater on any of the islands, though all the atolls have lagoons and the reef islands have central lakes. On the smaller islands (Enderbury, Birnie, Rawaki) these form brackish ponds, while the larger islands (Orona, Nikumaroro and Kanton) have true marine lagoons with channels to the sea. Fresh water lenses are found on the larger islands of Kanton and Orona. On Orona, the lens is deep (4 m) and of high quality, with no indication of salinity or contamination. On Kanton, however, the lens is shallow (<2 m), brackish, and shows signs of contamination. The profuse vegetation on Nikumaroro suggests the presence of a good freshwater lens, but it has not been sampled.

Vegetation

The islands have a sparse and simple vegetation cover, with no open fresh water, and groundwater only on the larger islands. Significantly, mangroves are totally absent from the island group.

Vegetation, plants and fungi have been surveyed and reported on periodically since the 1950s. About 20 to 30 species of plants are considered native.

Native flora of Kanton was identified by E.L. Caum and reported by Van Zwaluwenburg (1941). They were as follows:

- | | |
|---|-------------------------------------|
| 1) <i>Digitaria pacifica</i> , | 10) <i>Suriana maritime</i> , |
| 2) <i>Eragrostis whitneyi</i> var. <i>typical</i> , | 11) <i>Triumfetta procumbens</i> , |
| 3) <i>Lepturus repens</i> , | 12) <i>Sida fallax</i> , |
| 4) <i>Cocos nucifera</i> , | 13) <i>Ipomoea pes-caprae</i> , |
| 5) <i>Boerhavia diffusa</i> , | 14) <i>Ipomoea grandiflora</i> , |
| 6) <i>Sesuvium portulacastrum</i> , | 15) <i>Cordia subcordata</i> , |
| 7) <i>Portulaca lutea</i> , | 16) <i>Tournefortia argentea</i> , |
| 8) <i>Cassythia filiformis</i> , | 17) <i>Morinda citrifolia</i> , and |
| 9) <i>Tribulus cistoides</i> , | 18) <i>Scaevola frustiscens</i> . |

The primary factor influencing vegetation is the extreme fluctuations in rainfall from year to year. There are years during which no rain falls. During and after WWII and during the resettlement program starting in the late 1930s, large numbers of plants were introduced. Of the 129 species introduced to Kanton in the early 1950s, only 14 persisted until 1973. There have been several attempts to establish coconut plantations on key Phoenix Islands. Most attempts have failed due to the periodic droughts experienced there.

Fosberg and Stoddart (1994) reviewed the flora of the Phoenix Islands and noted that there were 87 species in 36 families. However, only 28 species (32 percent) were considered native. An additional 60 species were recorded in the literature, but many of these species have not survived.

There are several species of plants that are used for traditional Kiribati medicines. With population increases, land clearing, and urbanization of the Gilbert Islands, especially Tarawa, these plants are quickly disappearing. Several of these plants still exist in the Phoenix Islands. As such PIPA can serve as the genetic depository for these important traditional medicinal plants.

Fosberg and Stoddart (1994) noted that large numbers of plant species were introduced during the colonization scheme and the military and aviation periods. Most exotic species could not exist without the assistance of man. Weeds have been brought in accidentally and have persisted, including *Cenchrus echinatus*, *Eleusine indica*, *Portulaca oleracea*, *Euphorbia hirta*, *E. hypericifolia*, *Pluchea carolinensis*, *P. indica*, *Tridax procumbens*, and *Vernonia cinerea*.

Notwithstanding the relatively large numbers of species that have in the past been introduced to the Phoenix group, few such species have persisted and generally the vegetation of the islands remains little-modified. There are some noticeable differences between the southern

and north-eastern islands (Stoddart 1994). The low rainfall islands of the north and east support few or no trees, but a low number of grasses (e.g. *Lepturus*) and prostrate shrubs such as *Tribulus*, *Portulaca*, *Boerhavea*, *Sesuvium* and the parasitic vine *Cassytha* are present. The higher rainfall islands of the south and southwest do support indigenous forest, including *Pisonia*, *Cordia*, and *Pandanus*, with the forests of Orona being the most intact and extensive of the Group. However, these southern islands also support coconut plantations that were planted during a resettlement programme between the 1930s and 1960s (Maude 1937, Garnett 1983).

Mueller-Dombois and Fosberg (1998) reported that there were 15 more or less definable natural vegetation types or communities in the Phoenix Islands. These included the following (Kiribati name in brackets):

- 1) *Pisonia grandis* forest - Nikumaroro, Orona;
- 2) *Cordia subcordata* (te ango) forest and tall scrub – Manra, Kanton, Enderbury.
- 3) *Scaevola taccada* (te mao) scrub – Manra, Nikumaroro, Orona, Kanton.
- 4) *Tournefortia argentea* (te ren) scrub – Enderbury, Kanton.
- 5) *Morinda citrifolia* tall scrub – Nikumaroro, Manra, Orona.
- 6) *Pemphis acidula* (te ngea) scrub – Orona.
- 7) *Suriana maritima* scrub – Kanton, Orona.
- 8) *Sida fallax* (te kaura) scrub and dwarf scrub – All Phoenix Islands.
- 9) *Triumfetta procumbens* (te kiaou) mat – Kanton, Enderbury.
- 10) *Sesuvium portulacastrum* var. *griseum* mat – All Phoenix Islands.
- 11) *Tribulus cistoides* mat – No Phoenix Island named.
- 12) *Lepturus repens* and *Lepturus pilgerianus* meadows – All Phoenix Islands.
- 13) *Fimbristylis cymosa* (te uteute ni mwane) turf – Nikumaroro, Manra, Orona.
- 14) *Digitaria pacifica* bunchgrass cover – No Phoenix Island named.
- 15) Mixed-species communities – Kanton.

Pierce et al (2006) estimated the vegetation types for each islands presented in the table below.

Key physical features and vegetation of the Phoenix Islands.(Source: Pierce et al 2006)

Island	Total area (ha)	Land area (ha)	Lagoon	Substrate	Vegetation
Manra	-	c.500	Closed	Not visited	Forest, scrub, coconut
Rawaki	73.24	58.14	Closed	Rubble, c.50% sand	Grass, low scrub
Enderbury	596.6	500+	Closed	Rubble, extensive sand	Grass, low scrub
Birnie	50.95	48.2	Closed	Rubble, limited sand	Grass, low scrub
Kanton	-	c.900	Open	Varied, extensive sand	Forest, scrub, coconut
McKean	74.32	48.77	Closed	Rubble, < 30% sand	Grass, low scrub
Orona	-	c.600	Open	Rubble, sand	Forest, scrub, coconut
Nikumaroro	-	c.400	Open	Rubble, sand	Forest, scrub, coconut

Note: Land areas are total atoll area minus lagoon area; Rawaki, McKean and Birnie data courtesy of T.

Conaghan, NZ Department of Conservation, others from Garnett (1983). Note that some land area estimates are significantly greater than previously reported, notably Birnie (48.2 ha, c.f. 20 ha in Garnett 1983).

A list of native and medicinal plants is attached to this nomination in the Species List attachment.

Terrestrial fauna

Terrestrial invertebrates include primarily arachnids and land crabs. Species of other invertebrates have been surveyed on Kanton. Land crab species were recently documented for the Phoenix Islands (except Manra). Nikumaroro had been known as having an abundance of coconut crabs. However, in the late 1990s, coconut crabs were almost extinct there presumably as a result of over-harvesting by visiting vessel(s). By the mid-2000s, coconut crab populations showed signs of recovery. Pierce et al (2006) examined the species diversity of various terrestrial crab species on Nikumaroro and found that the coconut crab, *Birgus latro*, was again abundant on Nikumaroro. There were an estimated 40 to 50 animals per ha in the main coconut plantation there.



Coconut Crab Photo: Ray Pierce

Ant species were recently documented for the Phoenix Islands (except Manra which was not surveyed). None of these species were considered invasive species.

Reptiles include marine turtles that lay their eggs on land. Other species of reptiles present include species of geckos and skinks. These were found on all Phoenix Islands except Birnie.

Lizard species recorded on the Phoenix Islands, April to May 2006.

(source: Pierce et al 2006).

Species	Rawaki	Enderbury	McKean	Birnie	Kanton	Orona	Nikumaroro
<i>Lepidodactylus lugubris</i> ; mourning gecko	0	P	0	-	P	0	P
<i>Gehyra oceanica</i> ; Polynesian gecko	0	0	P	-	-	P	P
<i>Hemidactylus frenatus</i> ; house gecko	0	0	0	-	P	0	0
<i>Emoia cyanura/impar</i> ; azure- tailed skink	0	0	0	-	-	P	P
<i>Cryptoblepharus boutoni</i> ; snake-eyed skink	0	P	0	-	-	P	P

*note: *Lepidodactylus*, should read *Lepidodactylus*

Terrestrial mammals are primarily introduced and are considered destructive to native species of vegetation and birds. There are at least two species of rats and perhaps one species of mouse on various Phoenix Islands. It was speculated that the Polynesian rat was introduced by early Polynesian visitors. The Asian or black rat may have been introduced recently from a Korean fishing vessel that grounded. The mouse species was identified on Kanton and could have been introduced during WWII. Ironically, the one island with rabbits (deliberately introduced by guano collectors in the 1860s) did not have any rats. Settlers in the past have also introduced cats, dogs, and pigs with varying levels of success. In 2006 a comprehensive invasive species assessment and eradication programme was designed with the first 2 urgent eradications completed in 2008. More information on invasive species is provided in the state of conservation chapter later in this nomination.

Birds

Bird species and populations have been documented on the Phoenix Islands starting in 1891. Birds were the source of the guano that was extracted from many of the Phoenix Islands in the late 1800s. Millions of seabirds have been reported for the Phoenix Islands which are well known as a key breeding site for many species of birds. Nineteen bird species have been recorded breeding within PIPA with a total population exceeding 1 million birds in the islands. Bird colonies on key Phoenix Islands have been mapped. Extensive bird tagging studies were conducted in the early 1960s. Tag returns indicated that Phoenix Island birds migrate to other Pacific islands and as far as Asia.



Photo: *Jim Maragos*

Together with Kiribati's Line Islands, the Phoenix Islands support among the largest assemblages of tropical seabirds in the world both in terms of species diversity and total populations. PIPA hosts forested and arid seabird islands of high global significance (>40 breeding colonies with several of the world's largest seabird breeding populations). The islands support globally important breeding colonies or concentrations of the following species: Audubon's shearwater, Christmas shearwater, Phoenix petrel, white-throated storm-petrel, great frigatebird, lesser frigatebird, brown booby, masked booby, sooty tern, grey-backed tern and blue noddy.

McKean had the world's largest nesting population of lesser frigatebirds (*Fregata ariel*) (up to 85,000) but the arrival of Asian ship rat (*Rattus tanezumi*) has greatly reduced numbers of all bird species on McKean recently. With the eradication of rats that took place in June 2008 it is hoped that lesser frigatebird numbers will increase to previous levels.

Preliminary estimates of number of seabird pairs in the Phoenix Islands, April-May 2006. (Source: Pierce et al 2006)

Common name	Scientific name	Rawaki	Ender-Bury	McKean	Birnie	Kanton	Orona	Nikum-aroro	Manra	Approx total pairs
Audubon's shearwater	<i>Puffinus l'herminieri</i>	800+	50	60	0	0	0	0	0	910+
Christmas shearwater	<i>P. nativitatis</i>	500+	2	0	0	0	0	0	0	500+
Wedge-tailed shearwater	<i>P. pacificus</i>	250+	47	2 i	0	0	0	0	0	300+
Phoenix petrel	<i>Pterodroma alba</i>	11+	1 i	0	0	0	0	0	0	20+
Bulwer's petrel	<i>Bulweria bulwerii</i>	1 i	0	0	0	0	0	0	0	1i
White-throated storm petrel	<i>Nesofregatta fuliginosa</i>	20+	0	10+	0	0	0	0	0	30+
Red-tailed tropicbird	<i>Phaethon rubricauda</i>	70	500+	34	4	0	50+	100+	<10	760+
White-tailed tropicbird	<i>P. lepturus</i>	0	0	0	0	0	0	5	0	5+
Masked booby	<i>Sula dactylatra</i>	700	500+	400	109	0	1	4	100+	1814+
Brown booby	<i>S. leucogaster</i>	24	100+	75	9	50 i	0	0	0	230+
Red-footed booby	<i>S. sula</i>	3	100+	60	3	100	500+	200+	<50	1000+
Great frigatebird	<i>Fregata minor</i>	5	300+	400	0	1 i	50+	2 i	0	755+
Lesser frigatebird	<i>F. ariel</i>	4300	4000+	1500	20 i	50+	600	60	100+	10,610+
Sooty tern	<i>Sterna fuscata</i>	10000	3000+	500 i	P	50+	600,000	9 i	4000	617,000
Grey-backed tern	<i>S. lunata</i>	1000+	500+	800 i	300	2000+	0	0	600	4800+
Black noddy	<i>Anous minutus</i>	<10	100+	6	1 i	50+	2000	500	500	3150
Brown noddy	<i>A. stolidus</i>	4000	1000+	1630	2000	800+ i	10	20	<50 i	9400+
Blue noddy	<i>Procelsterna caerulea</i>	2500 (7000 i)	7 i	1 i	2 i	5+ i	0	0	1 i	2500 (7000) i
White tern	<i>Gygis alba</i>	20+	50+	100	27 i	20+	300	200	100	900+
Approx total pairs		24,500+	10,000	5,000	2,500	3000+	600,000	1000	5000	650,000
Total species		18	16	15	11	10	9	10	10	19

Note: all figures represent estimated total pairs except where "i" indicates "individuals". Red indicates threatened species, green = important populations, yellow = numbers have greatly declined since 1960s.

Pierce et al (2006) provided population estimates of shore and land birds in all eight of the Phoenix Islands. The bird species lists were identical and numbers were relatively similar between 2006 and 2008 (Ray Pierce, oral communication).

Shore and land birds on the Phoenix Islands, April to May 2006 (total number observed). (Source: Pierce et al 2006)

Species	Rawaki	Enderbury	McKean	Birnie	Kanton	Orona	Nikumaroro	Manra
Dates	19-21/4	22-24/4	28/4-1/5	25/4	26/4	2-4/5	5-6/5	18/4
Pacific reef heron <i>Egretta sacra</i>	0	0	0	0	0	0	1	-
Pacific golden plover <i>Pluvialis fulva</i>	100+	200+	30	Present	2+	10+	6	Present
Bristle-thighed curlew <i>Numenius tahitiensis</i>	c.60	c.50	6	2 anvil sites	10+	5	2	Present
Ruddy turnstone <i>Arenaria interpres</i>	120+	100+	60	20+	2+	20+	70+	Present
Wandering tattler <i>Heteroscelus incanus</i>	2	Present	30	2+	2+	30+	15	Present
Sharp-tailed sandpiper <i>Calidris acuminata</i>	1							
Great crested tern <i>Sterna bergii</i>		1		1				
Long-tailed cuckoo <i>Eudynamis taitensis</i>							2	

Differences in different bird counts may be explained by different time of year when the counts have taken place as well as different methodologies used. Some species of birds only visit the Phoenix Islands during certain times of the year (seasonal visitors). They may come there during their trans-Pacific migrations or stay for a while to nest. Therefore the time of year when a survey is completed is critical. If a survey is completed at a time when migrants are not present, bird counts will be low. If surveys are completed when there is nesting, then bird counts would be higher. Each bird species has its own schedule for visiting the Phoenix Islands. In addition, some birds would undoubtedly be residents. In addition, the methodology for conducting surveys has differed between researchers. This makes results difficult to compare.

The PIPA also support migratory shorebirds that breed in the Arctic and winter on the islands. The four commonest species in the PIPA are Bristle-thighed curlew (VU), Pacific golden plover, ruddy turnstone and wandering tattler, with the PIPA being a critically important safe wintering area for the curlew. The islands of the PIPA provide important stepping stones for all four of these shorebird species between for example the Samoan and Tokelau Islands to the south and the NW Hawaiian Islands to the north.

To summarize, the Phoenix Islands also contain:

- Very important feeding grounds for at least 15 transequatorial and other latitudinal migrants particularly *Pterodroma* and *Puffinus* spp. from the Australasian region, notably Mottled petrel (*Pt inexpectata*), Cook's petrel (*Pt cookie*) (EN), Pycroft's petrel (*Pt pycrofti*) (Vu), Black-winged petrel (*Pt nigripennis*), Gould's petrel (*Pt leucoptera*), Collared petrel (*Pt brevipes*), *Pt externa*, Sooty shearwater (*Pu griseus*), Short-tailed shearwater *Pu tenuirostris*, Buller's shearwater *Pu bulleri* (Vu), Flesh-footed shearwater *Pu carneipes*; also Streaked shearwater (*Calonectris leucomelas*).

- Important wintering grounds for Arctic breeding shorebirds (10 species, including the Vulnerable Bristle-thighed curlew *Numenius tahitiensis*)
- Wintering grounds (wetter islands) for the east-west, annually migrating Long-tailed Koel (*Eudynamys taitensis*), a New Zealand cuckoo.

It has been estimated (by Ray Pierce) that over 100,000 austral seabirds crossed during one day through the Tokelau-PIPA area on their northern migrations. Several of these species are red listed – Cook’s petrel (*Pterodroma cookii*) (EN), Pycroft’s petrel (*Pterodroma pycrofti*) (Vu), Buller’s shearwater (*Puffinus bulleri*) (Vu) or Least Concern species e.g. Streaked shearwater (*Calonectris leucomelas*) and Flesh-footed shearwater (*Puffinus carneipes*).

Two species of birds permanently found in the Phoenix Islands have been listed in the 2007 IUCN Red List of Threatened Species (www.iucnredlist.org):

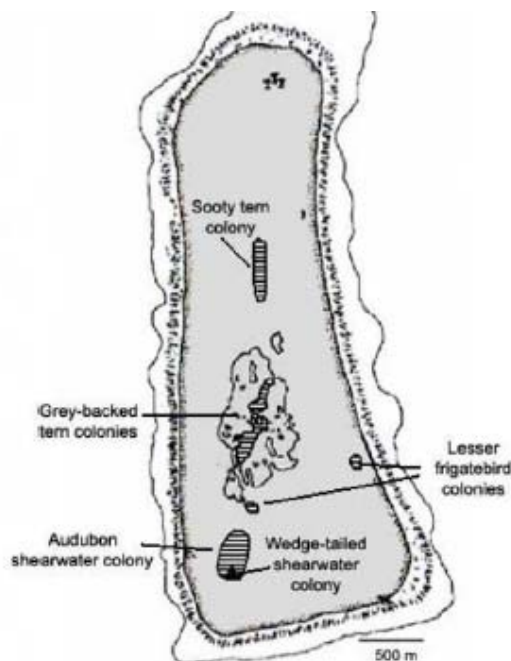
- 1) The Phoenix petrel, *Pterodroma alba* - endangered.
- 2) White-throated storm-petrel, *Nesofregetta fuliginosa* - vulnerable.

In addition to these, several other red listed species feed or pass through PIPA as mentioned in above paragraphs.

The Phoenix Islands have been identified as an important bird area by Birdlife International (Pierce 2006).

Seabird colony locations on Enderbury in 2006.

(Source: Pierce et al 2006)



The above diagram illustrates the way in which different seabird species utilise different habitat types or seek geographic separation on Enderbury Island.

Pierce et al (2006) noted that Rawaki had the highest diversity of seabirds in the Phoenix group with 18 species. It was the only island that still had a breeding population of blue noddies and the endangered Phoenix petrel, *Pterodroma alba*, and the vulnerable white-

throated storm petrel, *Nesofregatta fuliginosa*. Phoenix petrel and shearwater colonies on Rawaki were identified in the figure below.

Phoenix petrel pairs and shearwater colonies on Rawaki in 2006.

(Source: Pierce et al 2006)



Pierce et al (2006) noted that the very high density of rabbits, *Oryctolagus cuniculus*, was negatively impacting seabirds on Rawaki. Rabbits competed for burrows and shaded shelters. In addition, they trampled eggs and nestlings. Rabbits also consumed palatable species of vegetation, reducing nest site availability and burrow stability. Rabbits were eradicated in June 2008 and it is now hoped the breeding bird populations will recover well.

More recent surveys of the Phoenix Islands (Pierce et al. 2006) revealed that whilst there have been declines in the bird numbers in PIPA since the 1960s caused by invasive species, the full suite of breeding seabird species (19) are still present. Strategic eradications have already begun to initially secure populations on smaller PIPA islands and then restore larger islands via pest eradications. First eradications of invasive species in Rawaki and McKean took place in June 2008. It is expected that the bird numbers will recover to previous levels. In particular, threatened and near-threatened species (Phoenix petrel, white-throated storm-petrel, blue noddy) and the sensitive shearwater and tern species will no longer rely upon just one single island (Rawaki) for their continued survival in the PIPA.

More information on invasive species and their eradication plans is presented later in this document in the State of Conservation section.

ISLAND SUMMARIES

Descriptions and summaries for each island are provided below (Source: www.phoenixislands.org and D.Obura).

McKean

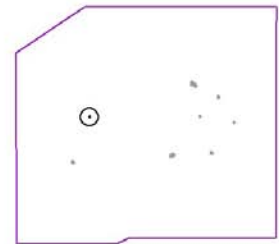
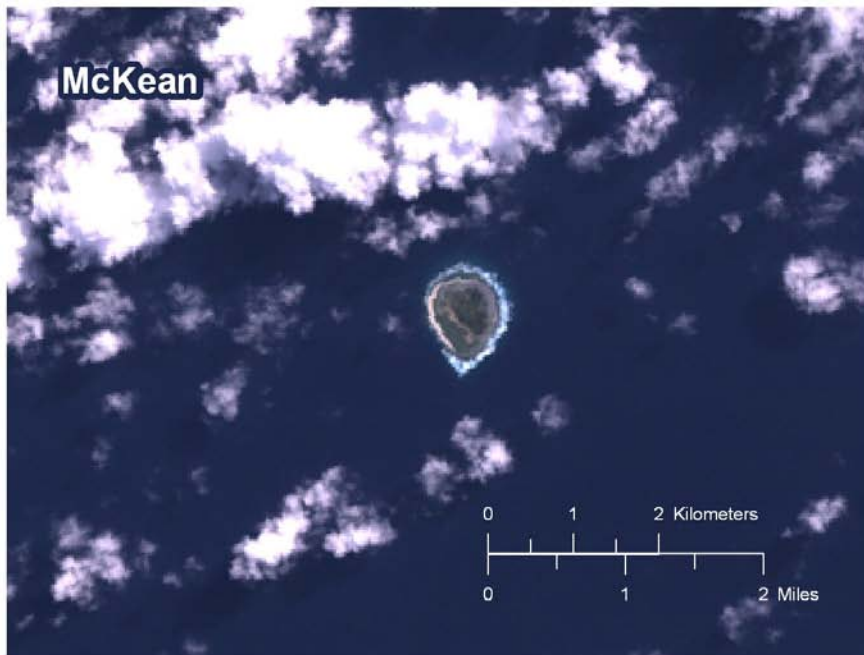


image: Landsat 7 ETM+
path 71, row 63, 07/20/1999
Global Land Cover Facility

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Land Area: 0.47 sq. km

Altitude: 5 m

Island Type: A treeless low reef island nearly ½ mile in diameter set in a heart-shaped reef.

Ecosystems:

Atoll scrub of 7 species; 1 species reptile; fringing reefs 100-200 m wide; Percent shoreline:
Coral Reef: 99% Mangrove: 0%

Invasive Species: Asian ship rat - eradicated June 2008.

Special Features:

Formerly very important seabird colonies, now much depleted. With the rat eradication project that took place in June 2008 it is hoped that lesser frigatebird numbers will increase to previous levels, perhaps returning to being the world's largest nesting population of lesser frigatebirds (*Fregata ariel*).

Human Occupation:

Uninhabited, former phosphate mining McKean Island

McKean is among the three smallest of the Phoenix Islands and is the most circular, measuring 1.07 km along its longest axis. The reef perimeter is 6.25 km and area is 1.27 km². As with the other small islands, it has no lagoon, though the island does have a brackish pond in its center. The entire northern to southwestern flanks of the island are expected to be windward in character (this zone has not been surveyed). The western side is more sheltered, though because of the island's small size there is likely to be no true leeward side. The subtidal reef width is 177 m. This is the least known island of the group.

McKean Island was named by U.S. Commander Charles Wilkes during an exploration expedition in August 1840. An American company mined the island for guano from 1859 to 1870, until there was reportedly that no guano left on the island to mine. McKean Island has a depression in the centre resulting from the guano mining. There is very little vegetation on the island and the flat openness and the pond in the centre makes it ideal habitat for resident seabirds that have claimed the island as their own.



McKean Lesser Frigate colony.

Image source: Pacific Islands Biodiversity Information Forum

Nikumaroro

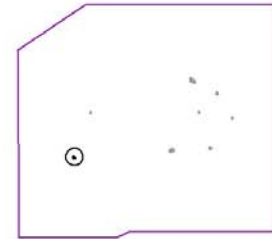


image: Landsat 7 ETM+
path 72, row 63, 07/27/1999
Global Land Cover Facility

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Land Area: 4.1 sq. km

Altitude: < 5 m elevation

Island Type:

Atoll from 11 to 27m high to the tops of trees; it encloses a lagoon encumbered with coral heads into which there are no navigable passages although there is tidal exchange between the lagoon and open ocean. Fringed by a reef that dries extending about 370 meters offshore except at NW and SE extremities where it is extending

Ecosystems:

Atoll forest and scrub; 5 reptile/amphibian species; windward and leeward atoll reefs 100-300 m wide, lagoon with coral heads and patch reefs; Coral Reef: 99% Mangrove 0%

Invasive Species:

Rats and formerly feral cats, dogs, pigs

Special Features:

Seabird colonies, turtle nesting area, significant coconut crab populations

Human Occupation:

Uninhabited, formerly inhabited by Gilbertese settlers (1938-1963) and coconut plantation workers before 1938.

Nikumaroro is the second largest atoll in the Phoenix group, and has two main channels connecting the lagoon to the ocean. It is triangular in shape, measuring nearly 4 square kilometers. *Pisonia* forest and pockets of coconut trees cover most of the island rim.

Nikumaroro has the highest coral diversity in addition to Kanton and Orona due to large area effect and lagoon habitat. It may contain key source and refuge sites for corals and other reef species during stressful events.

The atoll rim perimeter of 21.6 km encloses a lagoon of approximately 6 km², with one inlet on the western side, and one on the south western side that is periodically open depending on weather and sedimentation conditions. It thus has the most restricted circulation of the lagoons in the Phoenix Islands, and the water within the lagoon is a milky colour with visibility less than 1 m. Maximum depths in the lagoon are estimated at 3-4 m.

The outer reef area of Nikumaroro is estimated at 3.64 km², about the same size as Enderbury and only slightly larger than Manra. The intertidal reefs of Nikumaroro are relatively broad due to the wide intertidal reef shelf at the lagoon channel. The subtidal reef platform averages 151 m wide and is particularly narrow on the western shore where the reef drops from the intertidal rim to > 40 m within 50 m in some locations. The north/northwestern point is a typical feature of some of the islands (including Kanton, Phoenix, Birnie), where the platform extends out several 100s of meters from the reef crest and is swept by strong westerly currents and waves from the northeast shoreline, and sometimes strong southerly currents flowing up the leeward reef. These meet over the northern platform at the point creating swirling currents and a rip-current off the island, attracting large aggregations of barracuda, jacks and other schooling and pelagic predators.

Nikumaroro was originally named “Gardner” in 1828 after Gideon Gardner of Nantucket, the owner/agent for the ship the Ganges. The uninhabited island was used by a British shipping company until 1938 when the I-Kiribati leadership established the Phoenix Islands Settlement Scheme to solve the problem of high population density in southern Tarawa. Eighty people settled on the island until 1963, when drought and lack of fresh water drove the British colonial government to abandon the settlement scheme.

A closer view of Nikumaroro

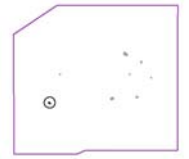


Image:

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Date: Feb 22, 2007 Center
Lat/Long: -174.526°/-4.672°
Avg Off Nadir Angle: 4°
Avg Target Azimuth: 305°
Sensor: QB02

Nikumaroro is a classic tropical atoll, the coral rim comprising the surface manifestation of a huge underwater volcano. The lagoon remains connected to the sea.

Kanton



Area: 9.1 sq. km

Altitude: 5 m

Island Type:

Coral atoll enclosing spacious lagoon studded with coral heads. There are coconut palms in places and inside the high raised beach; the island is partially covered with coarse grass and low scrub.

Ecosystems:

Some atoll forest with *Cordia* and *Tournefortia*, mostly atoll scrub and grasses; 18 plant species; Windward and leeward atoll reef and lagoon with patch reefs; Percent shoreline: Coral Reef: 99% Mangrove: 0%

Invasive Species:

Rats, feral cats and periodically dogs and pigs.

Special Features:

Seabird colonies, turtle nesting area, lagoon corals and clams

Human Occupation:

Inhabited by government caretakers only (<50); former military base (airport not currently in operation).

Kanton is the largest atoll of the Phoenix Islands, measuring about nine square kilometres. It has a narrow rim with a large dredged channel that enters into a shallow lagoon. Kanton's coral castles in the lagoon have maximum coral cover and are dominated by table and staghorn *Acropora* corals. They form a delicate climax community of low energy reefs that are highly vulnerable to disturbance, as also shown by the coral bleaching event. In addition to Orona, Kanton has the only true lagoons which contain rare habitats with extreme isolation from neighboring island groups. Kanton's lagoon mouth and adjacent sites have super abundant fish populations aggregating in and beside channel mouth for feeding and spawning. The lagoon and its mouth area have critical ecological role in feeding and reproduction but also high vulnerability to destructive and over-exploitation.

According to NEAq 2000 expedition Windward Wing dive site of Kanton had the largest barracuda aggregations seen within PIPA. Satellite Beach dive site had particularly high coral cover and diverse communities with high biodiversity and ecological complexity. Overall, Kanton has the highest coral diversity in addition to Nikumaroro and Orona due to large area effect. It may contain key source and refuge sites for corals and other reef species during stressful events.

Kanton is a good example of a long-lived coral atoll. It probably originated as a fringing reef developed around a volcanic island that has long since disappeared. It is far distant from any above-surface volcanic structure. Its parent volcano long ago subsided deep beneath the sea. Although it is the largest island in the Phoenix group, only nine square kilometers (3.5 square miles) rise above sea level.

The island was discovered in the early nineteenth century and named after an American whaling ship wrecked there in 1854. For several decades American companies extracted the valuable guano, but in the twentieth century Kanton's attraction lay in its location on the route across the Pacific, as a fueling stop for early long-haul flights, hence the long runway on the north shore and the designation, on maps, of the lagoon as a seaplane anchorage. (http://www.lpi.usra.edu/publications/slidesets/geology/sgeo/slide_09.html)

Kanton was used during WWII as a forward Allied military base, and was later occupied and used by the U.S. Army Space and Missile Tersting Center Canton in the 1970s. The atoll has a jet-length airfield and has been continuously occupied since the transition from British/U.S. to the Republic of Kiribati control in 1979.

Enderbury

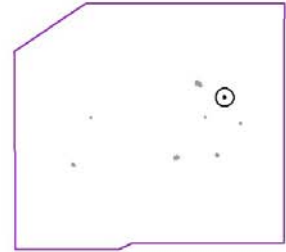


image: Landsat 7 ETM+
path 70, row 62, 02/06/2000
Global Land Cover Facility

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Area: 5.1 sq. km,

Altitude: 7 m

Island type:

Low reef island about 10 m high with a few palm trees and scattered patches of grass; fringed by a steep-to reef which is awash at LW

Offshore Dangers:

Banks with depths of less than 9m over them extend about 5 cables NNE and 3 cables SE from the island.

Ecosystems:

Mostly atoll scrub and grasses with small groves of trees; 18 plants, 2 reptiles; fringing reef 50- 200 m wide; Percent shoreline: Coral Reef: 99% Mangrove: 0%

Invasive Species:

Pacific rats, formerly feral cats.

Special Features:

Large seabird colonies, turtle nesting area; most important green turtle nesting area in Phoenix group.

Human Occupation:

Uninhabited, abandoned in 1979, former military base, former phosphate mining

Enderbury is the largest of the Phoenix Islands without a true lagoon, and is unique in being elongated north-south, measuring 4.6 km long. As with the other small islands, it has a

brackish pond in its center that is partially filled with soft muddy materials that was principally bird guano. The outer reef of Enderbury is estimated to have a perimeter of 16.3 km and area of 3.78 km², which is larger than the reef area of Nikumaroro. The intertidal rim of Enderbury is narrow, while the subtidal reef width is 201 m with a platform sticking out to the northeast up to 700 m.

Enderbury is the most important green sea turtle nesting area in the Phoenix group. With few trees and an open expanse, Enderbury is also popular among seabirds, in particular frigate birds, boobies and terns. Because of the many birds, beginning in 1860, Enderbury became an important source for guano. Guano mining left the island uninhabitable for humans, but ideal for the birds. The only evidence remaining on Enderbury is a number of mounds covered now with scant vegetation, and remnant sandstone and coral slabs forming parts of building structures.

Enderbury was once a military base and phosphate mining site, but has been uninhabited since 1979.



A higher resolution image of Enderbury, a low reef island with no true lagoon.

Rawaki

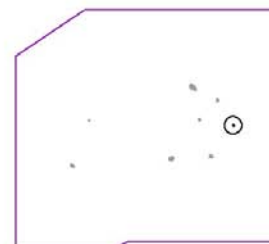
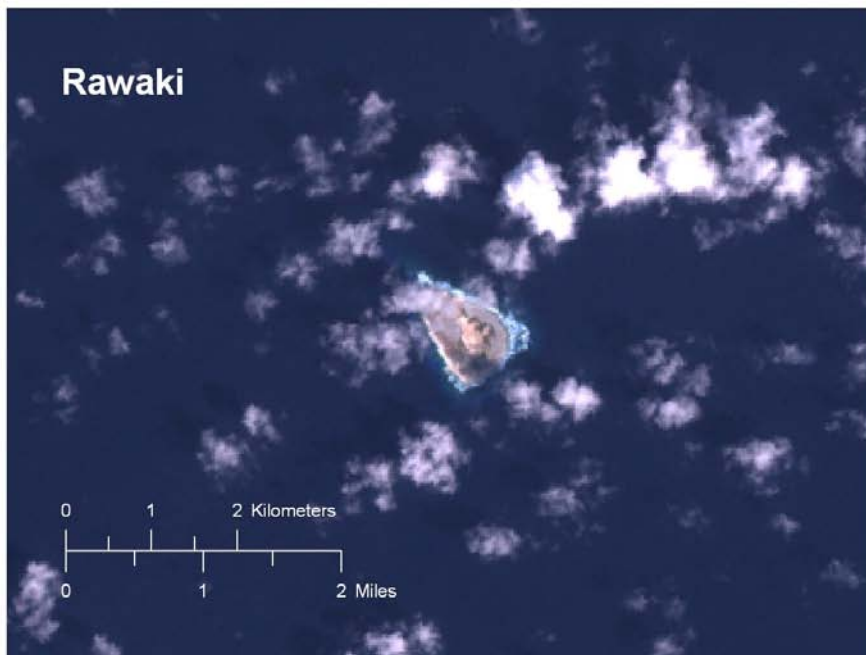


image: Landsat 7 ETM+
path 69, row 63, 01/16/2001
Global Land Cover Facility

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Area: 0.5 sq. km

Altitude: 6 m

Island Type:

Low reef island; bare with shallow brackish lagoon in center which sometimes dries.

Offshore Dangers:

Shoals, which break heavily, extend up to 3 cables off the NW and E sides of the island.

Ecosystems:

Atoll scrub, 6-7 species of plants; Fringing reef 30-100m wide; Percent shoreline: Coral Reef: 99% Mangrove: 0%

Invasive Species:

Feral rabbits - eradicated June 2008.

Special Features:

Critically important seabird colonies of c.18 species, including the Phoenix petrel; turtle nesting area.

Human Occupation:

Uninhabited, phosphate mined 1859-1871.

Rawaki is among the three smallest of the Phoenix Islands, measuring 1.12 km along its longest axis. The atoll rim perimeter of 3.07 km, and area of 0.74 km² are the smallest of the entire group. As with the other small islands, it has no lagoon, though does have a brackish pond in its center.

Rawaki is the most important sea bird island within PIPA with 18 seabird species. It is the only island which still has breeding population of blue noddies, endangered Phoenix petrel and vulnerable White-throated storm petrels.

During NEAq expedition in 2000 it had the largest aggregations of sharks, in particular grey sharks.

The original island name was likely given for the Phoenix, a ship under the command of Captain Moore in the central Pacific in 1794. Guano mining commenced in 1859, lasting for twelve years, until most of the guano was harvested.

Manra

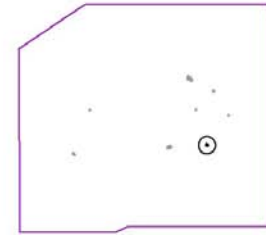


image: Landsat 7 ETM+
path 69, row 63, 01/16/2001
Global Land Cover Facility

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Area: 4.4 sq. km

Altitude: 6 m

Depth to nearest land: 5000 m

Island Type:

Low reef island; Triangular atoll, 6m high to tops of trees, entirely enclosing a circular lake; the fringing reef is steep-to except on its W side. The brackish central lake, which is not directly connected to the sea, is surrounded by dense vegetation.

Ecosystems:

Atoll forest and scrub of 14 species; fringing reef 50 m wide; Percent shoreline: Coral Reef: 99% Mangrove: 0%

Invasive Species:

No current data, but rats, feral cats, dogs, pigs all recorded in the past.

Special Features:

Seabird colonies, turtle nesting area.

Human Occupation:

Uninhabited, formerly inhabited; coconut plantation, former phosphate mining. Settled in 1938 by Gilbertese who were evacuated in 1958 because of a lack of water.

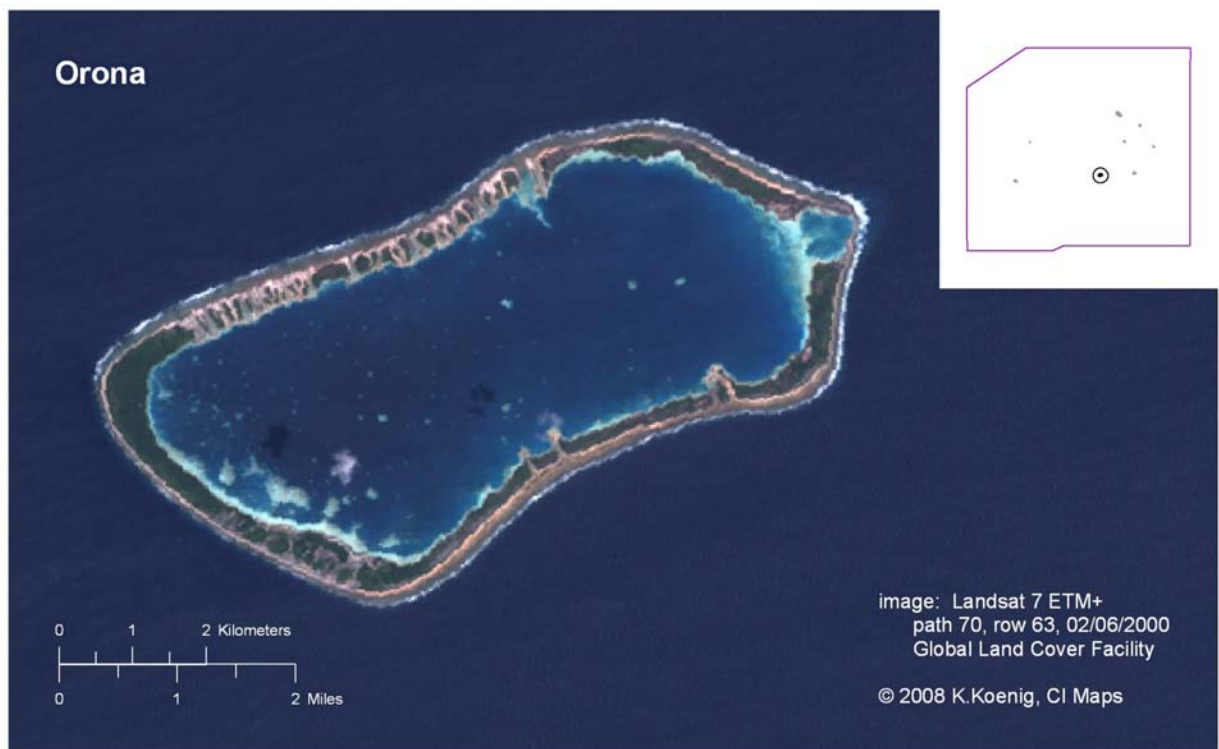
Manra is the second largest of the Phoenix Islands without a marine lagoon, measuring 4.2 km across its widest axis (east-west), and like all islands smaller in size is nearly round in shape. The reef perimeter of 15.2 km is slightly shorter than Enderbury's. This island has the

largest brackish lagoon with a depth of 5.5.m, though the dense forest of trees and shrubs makes it difficult to access. The size and salinity of the lagoon depend on rainfall.

The outer reef area of Manra is estimated at 2.97 km², slightly less than that of Enderbury due to the lack of an extended platform. The subtidal reef width is a relatively uniform 161 m wide. Manra is the smallest island with tree vegetation, including coconut trees and indigenous species.

Captain Emmet discovered and named this island “Sydney” the same year he found Birnie Island. The island was used by various American and British guano mining and copra companies until the island was placed under the jurisdiction of the Gilbert and Ellice Islands Colony.

Orona



Area: 3.9 sq. km

Altitude: 9 m

Island Type:

Atoll; Rim of land enclosing a large lagoon which is encumbered with numerous coral heads but with tidal exchange between the ocean and lagoon; Coconut palms from 12 to 18m (40-60ft) high stand on the W extremity; the remainder of the island is covered with trees and brush 6 to 12 m (20-40 ft) high.

Ecosystems:

Atoll forest and scrub of 19 species; 4 reptiles; windward and leeward atoll reefs 80-240 m wide, lagoon; Coral Reef: 99% Mangrove: 0%.

Invasive Species:

Feral cats, possibly rats, and in the past dogs and pigs.

Special Features:

Major seabird colonies, turtle nesting area, giant clams.

Human Occupation:

Uninhabited, formerly inhabited by I-Kiribati settlers in 1938 that were evacuated in 1963 because of a lack of water: There was a recent settlement from 2001 to 2004.

Orona is the second largest atoll, with a maximum length of 9.9 km oriented on a northeast-southwest axis. The atoll reef perimeter of 30.8 km encloses a lagoon of approximately 22 km² second in size to Kanton, with numerous inlets on the northern and southern side and is thus the leakiest of the atolls allowing exchange between the lagoon and surrounding ocean in the Phoenix Islands. Like Kanton, Orona's lagoon contains a variety of remnant knolls and pinnacles, though no line reef structures. The lagoon has a maximum depth of 10m, ringed by shallow rubble patches on very fine white sand. Towards the main channel it has good development of bommies and rocky/rubble patches, with a low diversity of corals and high abundance of small and medium size *Tridacna* clams.

The outer reef area of Orona is estimated at 5.91 km². The subtidal reef width of Orona is 159 m, with steep drop-offs starting uniformly at 15-20 m. Orona is the only island to have an extensive shallow bank on its most windward, extending out about 500 m. The western point is a unique site in the Phoenix Islands. It is strongly dominated by turf and fleshy algae (both brown algae and *Halimeda*) with < 5% coral cover even before recent human settlement in 2001, giving it the appropriate name 'Algae Corner'. A large ship's chain was located at the southern end of the study site potentially causing iron enrichment and suppression of coral and invertebrate growth, and the site appears subject to natural eutrophication from nutrient accumulation based on lagoon production, terrestrial vegetation and groundwater seepage.

Orona has the highest coral diversity in addition to Kanton and Nikumaroro due to large area effect and lagoon habitat. It may contain key source and refuge sites for corals and other reef species during stressful events. According to NEAq 2000 expedition two Orona dive sites had particularly high coral cover and diverse communities with high biodiversity and ecological complexity.

There are extensive stands of coconut trees on Orona that were planted in the late 1880s and then again in the last two decades. Intermingled with the coconut trees are *Pisonia* trees which stand tall and thick, forming an almost impenetrable forest.

The island was named "Hull" by the Commander Charles Wilkes for Commodore Isaac Hull, U.S.N. in 1840, when the U.S.S. Vincenne visited the island as part of its U.S. Exploring Expedition. Orona remained uninhabited until 1887 when Sir Albert Ellis and his brother James Ellis established a base and planted more than 20,000 coconuts. Formerly inhabited in 1929 and 1938-1963 and there was a recent settlement from 2001 to 2004.



A higher resolution image of Orona atoll highlighting the numerous coral heads in the lagoon. Orona atoll is the only surface expression of a massive extinct volcano rising 5,000 metres from deep ocean floor.

Birnie

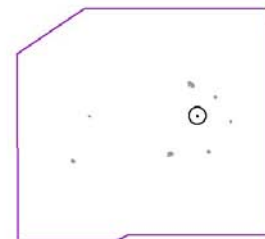
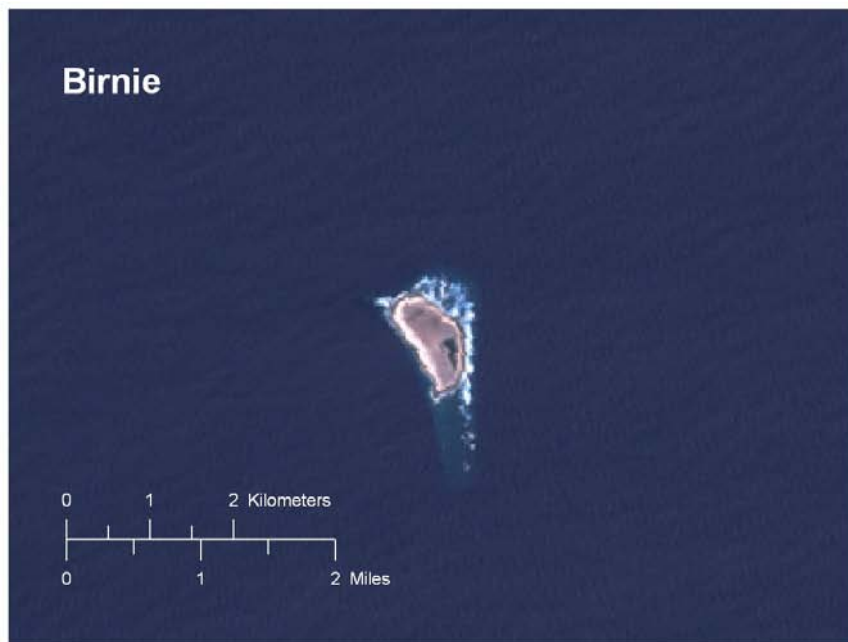


image: Landsat 7 ETM+
path 70, row 62, 02/06/2000
Global Land Cover Facility

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Area: Land area 48.2 ha, total area 50.95 ha

Island type: Low reef island, subtidal reef averages 280 m wide

Ecosystems:

Atoll scrub and grass; reef area of 2.64 km²; Percent shoreline: Coral Reef: 99% Mangrove: 0%

Invasive Species:

Pacific Rat

Special Features:

Long platform reef extending to south (1.05 km, the longest in the island group).

Human Occupation:

Island was used temporarily by several British mining and shipping companies from 1899 to 1937.

Birnie is the largest of the three smallest Phoenix Islands, in terms of reef area, though smallest in terms of island size (0.72km²). It is elongate, measuring 1.03 km along its longest axis. The reef perimeter of 8.12 km and area of 2.64 km² are high because of the long platform extending south (1.05 km, the longest in the island group) and north from the island. As with the other small islands, it has no lagoon, though the island does have a brackish pond in its center. Often the lagoon is nearly dry, but its size and salinity depend on rainfall. The phosphate deposits of Birnie were never worthwhile to exploit. Birnie's vegetation is mostly grass and low scrub.

The entire northern to southern flanks of the island are exposed and windward. The western shore is more sheltered, though because of the island's small size there is no true leeward side. Because of the long subtidal reef extending south and exposed to wave energy, it is likely that $> 4/5$ of Birnie's reefs are 'windward' in nature, with only a small proportion to the west of the island being leeward. The subtidal reef averages 280 m wide, the widest among all the islands.

Birnie was discovered and named in 1823 by Captain Emment, and was likely named after Richard Birnie, a prominent English businessman and governmental official. The island was used by several British mining and shipping companies from 1899 to 1937, when the islands were placed under the jurisdiction of the Gilbert and Ellice Islands Colony. It is considered a sanctuary for seabirds, but also hosts Pacific rats as an invasive species.

IUCN Red List of Threatened Species - Species found in PIPA

(source: <http://www.iucnredlist.org/>, cited March 6, 2008)

Critically endangered, endangered, vulnerable and near threatened as well as data deficient species found in Kiribati are listed below. Species found in the Phoenix Islands have been marked.

Species	Common Name	Status	PIPA
<i>Alopias vulpinus</i>	Thresher shark	Data deficient	?
<i>Birgus latro</i>	Coconut crab	Data deficient	+
<i>Bolbometopon muricatum</i>	Bumbhead parrotfish	Vulnerable	+
<i>Carcharhinus amblyrhynchos</i>	Gray reef shark	Low risk, near threatened	+
<i>Carcharhinus falciformis</i>	Silky shark	Low risk, least concern	?
<i>Carcharhinus melanopterus</i>	Blacktip reef shark	Low risk, near threatened	+
<i>Cheilinus undulatus</i>	Napoleon wrasse	Endangered	+
<i>Chelonia mydas</i>	Green turtle	Endangered	+
<i>Epinephelus lanceolatus</i>	Brindle bass	Vulnerable	+
<i>Eretmochelys imbricata</i>	Hawksbill turtle	Critically endangered	+
<i>Epinephelus timorensis</i>	Yellowspotted grouper	Data deficient	?
<i>Feresa attenuata</i>	Pygmy killer whale	Data deficient	?
<i>Galeocerdo cuvier</i>	Tiger shark	Low risk, near threatened	?
<i>Hippopus hippopus</i>	Bear paw clam	Lower risk, conservation dependent	?
<i>Isurus oxyrinchus</i>	Shortfin mako	Low risk, near threatened	?
<i>Lagenodelphis hosei</i>	Fraser's dolphin	Data deficient	?
<i>Mesoplodon densirostris</i>	Blainville's beaked whale	Data deficient	<i>Mesoplodon</i> sp. Observed
<i>Mesoplodon ginkgodens</i>	Ginkgo-toothed beaked whale	Data deficient	<i>Mesoplodon</i> sp. Observed
<i>Nesofregatta fuliginosa</i>	White-throated storm-petrel	Vulnerable	+
<i>Numenius tahitiensis</i>	Bristle-thighed curlew	Vulnerable	+
<i>Plectropomus areolatus</i>	Polkadot cod	Vulnerable	+
<i>Prionace glauca</i>	Blue shark	Low risk, near threatened	?
<i>Prosobonia cancellata</i>	Tuamotu sandpiper	Endangered	
<i>Pseudocarcharias kamoharai</i>	Crocodile shark	Low risk, near threatened	?
<i>Pterodroma alba</i>	Phoenix petrel	Endangered	+

Species	Common Name	Status	PIPA
<i>Rhincodon typus</i>	Whale shark	Vulnerable	+
<i>Sphyrna lewini</i>	Scalloped hammerhead	Low risk, near threatened	?
<i>Stenella longirostris</i>	Long-beaked dolphin	Lower risk, conservation dependent	+
<i>Steno bredanensis</i>	Rough-toothed dolphin	Data deficient	?
<i>Thunnus alalunga</i>	Albacore tuna	Data deficient	?
<i>Thunnus obesus</i>	Bigeye tuna	Vulnerable	+
<i>Triaenodon obesus</i>	Whitetip reef shark	Low risk, near threatened	+
<i>Tridacna gigas</i>	Giant clam	Vulnerable	+
<i>Tridacna maxima</i>	Small giant clam	Lower risk, conservation dependent	+
<i>Tridacna squamosa</i>	Fluted clam	Lower risk, conservation dependent	?
<i>Vini kuhlii</i>	Kuhl's lorikeet	Endangered	
<i>Xiphias gladius</i>	Swordfish	Data deficient	?

In addition to the above list, several Red Listed bird species feed or pass through PIPA during their migrations. These species include Cook's petrel (*Pterodroma cookii*) (EN), Pycroft's petrel (*Pterodroma pycrofti*) (Vu), Buller's shearwater (*Puffinus bulleri*) (Vu) or Least Concern species e.g. Streaked shearwater (*Calonectris leucomelas*) and Fleas-footed shearwater (*Puffinus carneipes*).

2. b) History and Development

Archeological evidence indicates that there have been a few settlements in the Phoenix Islands but because of their isolation from larger population centers, these early settlers never stayed for very long. For the early canoe explorers who originally mapped the South Pacific some 3000-5000 years ago the Phoenix Islands must have been diminutive in comparison to the lushness and largesse to other Pacific islands such as Fiji, Samoa and Hawaii. The Phoenix Islands show the typical legacy of temporary and sporadic human use and settlement over several hundreds years, with species introduction both of plants (e.g. coconuts) and animals (e.g. rats, rabbits), and remnants of guano mining. None of the islands have hosted long-term human settlements due to scarcity of terrestrial and freshwater resources. Only one island, Kanton, is currently inhabited.

The Phoenix Islands were inhabited by Polynesian settlers in varying periods during AD 950 to 1500. They left stone building foundations that resembled marae from eastern Polynesia. In addition to building foundations, ancient stone weirs and fish traps were also discovered on some of the Phoenix Islands. It was speculated that the Phoenix Islands were abandoned because of droughts. Evidence was also found that suggested the Phoenix Islands were visited by Caroline Islanders (Micronesians). Most archaeological structures have been found on Orona and Manra.

The islands may have been visited as early as 1794 by European and North American vessels. Western discovery of the Phoenix Islands began in earnest with the expansion of the American whale fleet into the Pacific in the early 1800s. Many of the Phoenix Islands were discovered by American or British whalers. However, the names and locations of each island were not a priority for whalers. There are varied accounts of who discovered which island and when they discovered it. It was not until the U.S. Exploring Expedition of 1838 to 1842, that the exact position of many of the Phoenix Islands was determined.

In the 1800s, American whalers from Nantucket and New Bedford, MA, discovered the rich concentration of sperm whales in the Pacific. Much of the historic whaling grounds were located in what were to become Kiribati waters. At times, more than 600 whale ships plied these waters and whalers were so effective that even today the waters surrounding the Phoenix Islands appear largely devoid of sperm whales. Relics of the whaling days litter the islands. Examples of these artifacts include: rusted iron grown into coral, ballast stones and muntz metal sheathing.

Based on his observations on his five-year voyage (1831-1836), Charles Darwin published an explanation for the creation of coral atolls in the South Pacific in 1842. In his descriptions of the various islands, Darwin specifically mentions Phoenix (Rawaki) and Sydney (Manra) islands. His explanation has been largely upheld as a correct interpretation.

Guano became an important agricultural input worldwide. The 1856 U.S. Guano Act allowed American citizens to claim previously unclaimed and uninhabited islands for guano extraction. Most of the Phoenix Islands were claimed and registered under this act. Guano was extracted from many of the Phoenix Islands. Some of the islands were knee-deep in birds and their phosphate-rich guano.

After major deposits had been depleted, leases were bought up by J.T. Arundel who was able to extract additional guano from some of the islands. After the guano era, J.T. Arundel focused on transforming the Phoenix Islands into coconut plantations. Coconut trees were planted, but many died due to drought conditions. The Phoenix Islands were transferred between various companies in the early 1900s.

After years of use by British and American guano mining and shipping companies, the Phoenix Islands were placed under the jurisdiction of the British Gilbert and Ellice Islands Colony in 1937. Two years later, the United States became interested in these islands, and claimed Kanton and Enderbury islands. Pan American Airways started using Kanton Island's lagoon as a refueling spot for seaplanes en route to New Zealand.

In 1937, Amelia Earhart and Fred Noonan tried to fly from Lae in Papua New Guinea to Howland Island, 400 miles north of the Phoenix Islands. Their plane disappeared on July 2, and no traces of it were ever found. The International Group for Historic Aircraft Recovery (TIGHAR) hypothesizes that Earhart took a wrong turn and crashed on Nikumaroro Island in the Phoenix Islands. TIGHAR has conducted five expeditions to the island since 1990, but has yet to find conclusive evidence that Earhart crashed there.

The United States and U.K. agreed to jointly control these islands for a period of 50 years, which started in 1939, and ended prematurely in 1979, when Kiribati declared independence. During this time, several plans to settle the Phoenix Islands were established as ways to relieve the imminent overcrowding on the Gilbert Islands or to start copra (dried coconut

meat) farms, but, by 1963, all had failed. These islands, unlike their southern counterparts, have inferior water sources, dooming long-term self-sufficient settlements.

Kanton atoll has seen the most use over the years, perhaps due to its relatively large size (8 square kilometers) and protected lagoon. During World War II, U.S. forces used Kanton as a base of operations in the Pacific and built a landing strip on the island. Later, NASA used Kanton as a satellite tracking station and the United States Air Force tracked missiles in the Pacific from this atoll until the mid 1970s. Remnants of all this activity over the years, including everything from whaling relics to decaying bulldozers to burial mounds, are still there.

At this point PIPA is nominated only for natural values but work is under way to determine the importance of the cultural values of PIPA and so whether those values are of ‘outstanding universal value’.

In summary, a number of identified cultural values that PIPA has include:

- Archaeological evidence, including walled structures, is evidence of early colonization by both Micronesians and Polynesians, providing an important cultural link and an example of island voyaging over time and the limits to which human settlement can extend – even into modern times. The Phoenix Islands could be considered an overlap area of these two important Pacific Islands peoples.
- The island Nikumaroro was named by Gilbertese settlers in 1937 in honour of the island of Nikumaroro, in the south of the Gilbert Group, from which the famous Gilbertese ancestress Nei Manganibuka came, bringing with her the traditional lore of deep-sea navigation and the first *buka* tree.
- Nikumaroro is possibly the site of the crash landing of Amelia Earhardt on her failed trans-Pacific flight in 1938. Remains of a well-documented World War II crash exist on the island of Manra.
- Several islands in the group hold archaeological remains of settlements, guano mining and whaling/transiting ships from the 19th and early 20th centuries.
- Archaeological remains of the 20th century world beyond the Phoenix Islands and Kiribati borders include British and United States military bases from the Second World War, the airfield markers and base for the Trans-Pacific Pan-Am Clipper seaplane flights of the mid 1940-50s, and the United States missile testing base SAMTEC.

In 1979, the Treaty of Friendship was signed between the USA and the Government of Kiribati (GoK). The USA gave up its claims to Kanton and Enderbury. After Kiribati independence in 1979, GoK the declared a 200 nautical mile EEZ around the Phoenix Islands. In 2001 the Kakai resettlement scheme on Orona was initiated. The scheme was not successful and was closed in 2004.

In the 2000s, New England Aquarium (NEAq) began periodic visits to the Phoenix Islands to document conditions on and around these islands. The result of NEAq studies was the March 2006 GoK declaration of the Phoenix Islands Protected Area (PIPA), which was later extended in early 2008 to become the largest marine protected area in the world.

Prior to the establishment of PIPA McKean, Birnie, and Rawaki (Phoenix) were designated protected under the wildlife conservation ordinance (GEIC 1977b). However they were not effectively patrolled due to limited resources and their remoteness.

The Government of Kiribati (GoK), New England Aquarium, and Conservation International (CI) signed a MOU in 2005 for the development of a management and financial plan to support the PIPA. GoK formally declared the PIPA at the Eighth Conference of the Parties to the Convention on Biological Diversity (March, 2006). CI's Global Conservation Fund and Australia's Regional Natural Heritage Programme have financially supported the design and establishment of the PIPA. There is also commitment by CI to begin the capitalization of the endowment to support the PIPA. An inter-agency steering committee (PIPA SC) was established by GoK to oversee PIPA development. In February 2008 GoK completed full legal establishment and regulations for PIPA, including its outer boundary making PIPA the largest MPA in the world.

SECTION 3. JUSTIFICATION OF INSCRIPTION

3. a) Criteria under which inscription is proposed

- (vii) *contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance:*

Superlative natural phenomena

Given the great extent to which modern human activities have detrimentally impacted on oceanic islands and marine ecosystems globally, the relative intactness or naturalness of PIPA is exceptional. Notwithstanding evidence of prehistoric and recent failed attempts at human colonisation on some of the atolls, the Phoenix group is sufficiently remote and inhospitable to human colonisation as to be exceptional in terms of the minimal evidence of the impacts of modern human activities both on the atolls and in the adjacent seas. PIPA, at 408,250 sq. km is more than 600 kms across, a very large protected area, even by marine standards, a vast wilderness domain where nature prevails and man is but an occasional visitor, still a superlative natural phenomenon.

The marine wilderness that is PIPA is further distinguished by containing a large suite of seamounts, huge and mysterious underwater volcanic mountains – natural phenomena that are all but hidden from the eyes of man. Although there are predicted to be tens of thousands of seamounts in the deeps of the world's oceans, our knowledge of their formation and their associated biota has been limited by their difficulty of access. Scientific research has confirmed the often distinctive or even unique biota of each seamount already studied – including in PIPA - but equally the exceptional fragility of their ecosystems. PIPA is the only major marine protected area to contain an extensive and diverse suite of seamounts, complete with a broad expanse of contextual abyssal plain – constituting a superlative natural phenomenon of global significance which hopefully will remain the province of nature and protected from the exploits of industrial fishing.

As a vast expanse of near pristine mid-ocean environment, replete with a suite of intact uninhabited* atolls, the PIPA is the largest marine protected area in the world (408,250 sq km) and so is a superlative natural phenomenon of global importance, truly an oceanic wilderness that we have only begun to understand and appreciate. *(none permanent, only small government post on one atoll)

Natural Beauty

Given the essentially pristine environment, outstanding underwater clarity, the spectacle of large groups of charismatic aquatic animals (e.g. bumphead parrotfish, Napolean wrasse, surgeonfishes, parrotfishes, groupers, maori wrasse, sharks, turtles, dolphins, manta rays, giant clams) in quantities rarely found elsewhere in the world, aesthetically outstanding coral reef features (e.g. giant clams, large coral heads) together with the spectacle of huge concentrations of seabirds on remote atolls, PIPA is a truly kaleidoscopic natural 'oceanscape' exhibiting exceptional natural beauty of global significance.

The exceptional mid-ocean remoteness, minimal evidence of human activity, exceptional ecological integrity and effective protection are major contributors to the abundance of tropical bird and marine life, including many charismatic species, which offer widespread, diverse and spectacularly bounteous displays of nature at its best – exceptional natural beauty of global significance. As such, PIPA – the Phoenix Islands Protected Area – is of outstanding universal value and meets criterion (vii).



Photo Credit: *Cat Holloway*

(ix) *be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;*

By global standards PIPA is a very large tract (408,250 sq km or more than 41 million ha) - the largest marine protected area in the world - of mid-oceanic environment with a bathymetric elevation range of over 6,000 metres – from deep abyssal plain ocean floor to atoll capped submerged volcanoes. The average depth of the water column is about 4,500 metres (4.5 kilometres) and maximum depth 6,147 metres. The ocean floor of the nominated area is punctuated by a series of massive seamounts (submerged mountains), some rising more than 5,000 metres from the ocean floor, eight of which reach the surface and are capped by emergent coral atolls. Several other major seamounts extend to within a few metres of the surface and are recognised as submerged reefs. A total of 14 major seamounts have been mapped using radar and formally recognised, some thirteen registered, nine officially named and still others predicted from bathymetric studies but not yet studied or explored.

PIPA is therefore not just the largest marine protected area in the world but it also exhibits a great diversity of habitat. The ecological diversity of the water column of this mid ocean protected area therefore ranges from a still largely unknown deep sea habitat where no light penetrates – a largely unexplored ‘inner space’ - through a sequence of ecological zones dictated by water depth and/or topographic position on the slopes of the diverse array of seamounts and, approaching the ocean surface, ultimately to the relatively well documented shallows of emergent coral atolls atop those 8 volcanic mountains which reach to the surface.

PIPA is the world’s first deep water, mid-ocean protected area to be nominated for World Heritage. Whereas the terrestrial and marine ecology of the coral atolls is relatively well known, knowledge of the deepwater ecology is inverse to the water depth and knowledge of the deepest waters will only be slowly revealed as logistics, technology and resources are available to facilitate the exploration of this ‘inner space’ – deep water in the middle of the world’s largest ocean. However the importance of protecting these highly vulnerable habitats is internationally recognized and seen as requiring considerable urgency, even before we know all the details about them. Already 25% of world’s seamounts are degraded, and many others are increasingly threatened. By contrast, PIPA’s seamounts can be expected to remain intact and pristine.

The large bathymetric range of the submerged seamount landscape provides bathymetrically differentiated habitat types and so is expected to broadly represent the mid oceanic biota. The widely recognized local endemism and distinctive species assemblages associated with seamounts generally, already demonstrable in PIPA, is evidence of on-going insitu evolution of marine ecosystems and communities of plants and animals.

PIPA, as a very remote, intact, protected oceanic environment, is of scientific importance as a global benchmark for identifying and monitoring the processes of sea level change, growth rates and age of reefs and reef builders, (both geologically and historically) and in evaluating effects from climate change and coral bleaching events without the confounding factors of pollution or resource extraction. The reef system is so remote from industrial activities that it can serve as a critical benchmark for understanding and potentially guiding restoration of other degraded hard coral ecosystems. The atolls and associated reef systems are acknowledged as critical sites for ongoing study of:

- global climate change, ocean acidification and sea-level events in that they are located in a region less affected by other anthropogenic stresses;
- growth of reefs, evolution of reef systems, biological behavioural studies, recruitment processes in isolation, size classes and population dynamics of all marine organism groups and reef species diversity studies.

As such, the PIPA has exceptional value as a natural laboratory for the study and understanding of the significant ongoing ecological and biological processes in the evolution and development of marine ecosystems of the Pacific, the world's largest ocean, indeed all oceans.

As a known breeding site for numerous nomadic, migratory and pelagic marine and terrestrial species, PIPA makes a significant contribution to on-going ecological and biological processes in the evolution and development of global marine ecosystems and communities of plants and animals. What sets PIPA apart in this context is the highly unusual opportunity to study and understand how the many component ecosystems that comprise PIPA, all in relatively pristine condition, interact with each other at an appropriate oceanic scale.

It is the known and confidently predicted high level of biodiversity and endemism associated with these isolated mid-ocean atolls, submerged reefs and seamounts of the nominated site that represents clearest evidence of outstanding examples “*representing significant ongoing ecological and biological processes in the evolution and development of marine ecosystems and communities of plants and animals*”. The PIPA nomination therefore readily meets criterion (ix).

(x) contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

Due to its extreme isolation PIPA occupies a unique position in the biogeography of the Pacific as a suite of critical stepping stone habitats for migratory bird and marine species. PIPA embraces a range of associated marine environments that display high levels of marine abundance as well as the full spectrum of age and size cohorts, presently unknown elsewhere in the tropics, and especially in the case of apex predator fish, sea turtles, sea birds, corals, giant clams, and coconut crabs, many of which have been seriously depleted elsewhere. The overall marine trophic dynamics for these island communities are better functioning (relatively intact) compared with other island systems where human extraction has

significantly altered the environment. PIPA also provides important refuges for marine mammals such as long-snouted spinner dolphins (*Stenella longirostris*) and bottlenose dolphins (*Tursiops truncatus*).

Although largely unexplored at depth, extrapolation from other better researched seamounts supports the belief that the outstanding suite of large seamounts in PIPA represent great potential for discovery of many more deeper water coral species and communities, including high levels of local and regional endemism. For example, the Stylasterid corals, one of the most diverse coral groups, are known to occur to depths up to 2,800 metres. New hypothesis now being tested provides compelling evidence that many typically shallow water organisms such as Stylasterid corals had their evolutionary origins in deep sea habitat.

A total of 14 large seamounts have been confirmed within the boundaries of PIPA and doubtless other smaller seamounts will be discovered as bathymetric exploration of the ‘inner space’ of deep ocean continues. The biological characteristics of most deep-sea species associated with seamount ecosystems render them particularly sensitive to human disturbance and exploitation. The slow growth rate, longevity, late sexual maturity, and restricted distribution of many of these species (for example, deep-sea corals, sponges and fish) make them particularly vulnerable to human impacts and the risk of extinction. With 25% of the worlds seamounts already degraded, almost entirely as a consequence of deep sea fishing, PIPA provides critical protection for a large suite of seamounts and their associated globally important and fragile ecosystems and associated species.

Birds

The Phoenix Islands, Kiribati, are located mid ocean in the central Pacific between Australia and Hawaii, close to the equator between latitudes 2-5deg S. They are identified as a Key Biodiversity Area (KBA) by Conservation International and currently being finalised as an Important Bird Area (IBA) of Birdlife International.

The islands of PIPA provide critical habitat for important seabird populations that are of global significance including 19 species of breeding seabirds, and several endangered species, such as the Phoenix Petrel (EN), White-throated (Polynesian) Storm Petrel (Vu) and Blue-grey Noddy (Pierce et al 2006). Rawaki and Enderbury are among the most important sea bird islands in the world, particularly for seabird nesting and feeding grounds for frigate birds, terns, boobies, White-throated storm-petrel and members of the petrel family (Ray Pierce, oral information).

The atolls and associated marine environments of PIPA are demonstrably important as significant habitat for a range of bird species, including long distance migratory species and local endemic species such as the Phoenix Petrel (EN), including for species that are globally threatened.



Photo: Gregory Stone

In addition, PIPA is a critical component of Pacific polar-tropical flyways for migratory seabirds and shorebird species. At least 15 transequatorial and other latitudinal migrants pass through this area particularly petrels (*Pterodroma* spp.) and shearwaters (*Puffinus* spp.) from the Australasian region, many of them also feeding. Notable species are Cook’s petrel (*Pterodroma cookii*) (EN), Pycroft’s petrel (*Pt pycrofti*) (Vu), *Pt inexpectata*, *Pt nigripennis*,

Pt leucoptera, *Pt brevipes*, *Pt externa*, *Pu griseus*, *Pu tenuirostris*, Buller's shearwater *Pu bulleri* (Vu), *Pu carneipes* and *Calonectris leucomelas*. It has been estimated (by Ray Pierce) that over 100,000 austral seabirds crossed during one day through the Tokelau-PIPA area on their northern migrations several of which are red listed. PIPA also hosts important wintering grounds and/or stepping stones for four Arctic breeding shorebirds species, including the vulnerable Bristle-thighed curlew. One cuckoo, the Long-tailed koel, visits the forested islands of PIPA annually from New Zealand.

Plants

Several of the islands in PIPA have suffered the introduction of non-native species of plants. However, a number of the smaller Phoenix Islands, notably Rawaki, Birnie, Enderbury, and McKean, are of exceptional importance from a vegetation viewpoint, including some of the best remaining examples of relatively intact natural atoll plant ecosystems in the world. Scientific study of these relatively simple, intact and remote eco-systems could provide greater understanding of more complex eco-systems such as found on large islands and continents.

Marine Reptiles

PIPA islands such as Kanton, Rawaki and Enderbury have important nesting beaches for threatened green turtles (Vu) and possibly also for hawksbill turtles (CR) as well as safe breeding and feeding sites for both species. Di Piazza and Pearthree (2004) and Pierce et al (2006) noted that Enderbury was among one of the most important green turtle (*Chelonia mydas*) nesting sites in the Central Pacific. Turtle nests have been found on other Phoenix Islands as well. Importantly, the absence of a permanent human population, the high level of protection and the general remoteness all contribute to the global importance of PIPA as habitat for these globally threatened species.

Fish

Currently 518 shallow reef fish species are recorded from PIPA while several remain unidentified. A formula for predicting the total reef fish fauna based on the number of species in six key indicator families (Allen, unpublished data) indicates that at least 576 species, over 50 more than currently listed, can be expected to occur in the coastal reef ecosystem of PIPA. Fish diversity of seamounts is unknown but expected to have high levels of endemism. PIPA is not only outstanding in its reef fish biodiversity but is outstanding for the extraordinary abundance and size of fish, indicative of the high habitat quality and level of protection.



Photo: Cat Holloway

Many fish species in PIPA are seen in exceptional sizes and occur in much higher densities than occur in many other localities in the Indo-Pacific region, noteworthy species including surgeonfishes (Holocentridae), *Eviota* (Gobiidae), and *Trimma* (Gobiidae) (*Acanthurus*

guttatus, *A. nigricans*, *A. triostegus*, *A. xanthopterus*, *Naso literatus*, and *Zebrasoma veliferum*) and parrotfishes (*Hipposcarus longiceps* and *Scarus ghobban*) further testimony to their general lack of exploitation and habitat quality occasioned by remoteness and formal protection. All of these species can be readily sighted in extraordinarily large aggregations in PIPA. Especially noteworthy are the huge spawning aggregations of longnose parrotfish (*Hipposcarus longiceps*) found at Kanton and large shoals (>200) of the threatened Bumphead Parrotfish (*Bulbometopon muricatum*) (Vu) seen on most dives at Orona, both in the lagoon and on outer reefs (Allen and Bailey). The lagoon at Orona is also notable for its population of juvenile Napoleon Wrasse (*Cheilinus undulatus*) (EN) thus providing a safe breeding area for this globally endangered species. Overall, the Phoenix Islands population of Napoleon Wrasse (*Cheilinus undulatus*), usually a good indicator of absence of local fishing pressure, is exceptional compared to other internationally recognized marine hotspots recently surveyed in the Indo-Pacific region by Conservation International (see also table on page 24).

PIPA hosts the highest regional diversity of corals and fish including a large proportion of regional (Central Pacific) and local endemic species, species new to science (Allen and Bailey), and unusual species assemblages. Spectacular mass spawnings by parrotfish and wrasse species have been observed and documented within PIPA. PIPA hosts spawning ground for the commercially important skipjack tuna. The near-pristine coral reefs provide important protected habitat for populations of higher predators such as sharks.

Molluscs

Kanton and Orona lagoons host spectacular giant clam (*Tridacna maxima* and *T. squamosa*) communities in sizes rarely seen elsewhere in the world. The density of these giant clams in Orona lagoon, the highest ever observed by the New England Aquarium expedition scientists (2002), is an outstanding feature of PIPA and augurs well for the long term conservation of this increasingly threatened species.

Coral reefs

Coral reefs flourish in shallow, tropical waters that are clear and nutrient poor (oligotrophic). "Occurring almost exclusively between 30 deg N and 30 deg S, they are concentrated in four large tracts: the Red Sea and the western Indian Ocean, the Indian Ocean and the western Pacific Ocean, the south Pacific Ocean, and the Caribbean Sea and western Atlantic Ocean " (Coral World, National Geographic, 2000).



Photo: Mary Jane Adams

The coral reefs of PIPA are among the least disturbed coral reefs in the world. Currently more than 200 coral species are known from PIPA but undoubtedly many more deep water coral species associated to seamounts remain unidentified within PIPA. The reef system is so remote and untouched by human activities that it can serve as a benchmark for understanding and potentially providing guidance for restoring other degraded hard coral ecosystems. The Phoenix Island reefs provide a model of what atoll reefs in this part of the Pacific Ocean are

like with minimal human disturbance. The PIPA coral reefs offer a unique opportunity for coral reef research and conservation which is important on an international scale.

Most coral species have been listed as threatened or near-threatened as a result of global warming. PIPA, lying in the equatorial Pacific where El Niño-Southern Oscillation (ENSO) cycles are generated, provide a unique geographic location for acclimatization and evolution of resistance to warming temperatures in corals. The widespread survival of corals in PIPA during unprecedented warming in 2005-6 suggests this region may hold a key role in the long term adaptation and survival of coral species. Their ability to regenerate is much better than reefs in more populated areas due to the general lack of other environmental stresses on the reefs. This provides an important and likely unsurpassed opportunity to research and understand climate change impacts on coral reef systems in the virtual absence of other anthropogenic factors.

Summary

PIPA provides very extensive and important natural habitats for in-situ conservation of globally important oceanic biological diversity, both marine and terrestrial. Current pest eradication on several of the islands (in progress) will ensure that all of the PIPA islands are secure habitats for productive breeding and recovery of 18-19 seabird species including the endangered Phoenix petrel and vulnerable White-throated storm-petrel. PIPA also provides important breeding, passage and/or wintering areas for a number of threatened migratory oceanic birds. PIPA represents very important habitat for the continued existence of a number of other globally endangered (e.g. Napoleon wrasse, hawksbill turtle), vulnerable (e.g. Bristle-thighed Curlew, green turtle, giant clam, bumphead parrotfish, polkadot cod, brindle bass) and numerous other globally depleted species, both marine and terrestrial, including for apex predators such as sharks and endemic and fragile species associated with seamounts. The remoteness of the area and absence of permanent human habitation provide a unique opportunity for a high standard of habitat protection for species and ecosystems of global importance to science and conservation.

The extreme remoteness of PIPA from industrialised human settlement – mid-ocean in the largest ocean – combined with the absence of permanent human habitation, largely intact existing natural condition and effective formal protection from threatening exploitation will ensure that the important natural habitat value of this major protected area will be maintained in the long term. PIPA therefore represents “*important and significant natural habitats for in-situ conservation of biological diversity, including threatened species of outstanding universal value from the point of view of science or conservation*”, thereby meeting criterion (x).

3. b) Statement of Significance

As a vast expanse of largely pristine mid-ocean, replete with a suite of largely intact uninhabited atolls, truly an oceanic wilderness, the PIPA, the largest marine protected area in the world (408,250 km²), is globally exceptional and as such is a superlative natural phenomenon of global importance.

The large bathymetric range of the submerged seamount landscape provides elevation defined habitat types broadly representative of the mid oceanic biota. The widely recognized local endemism and distinctive species assemblages associated with seamounts generally,

specifically demonstrable in PIPA, is evidence of on-going insitu evolution of marine ecosystems and communities of plants and animals.

PIPA is of crucial scientific importance in identifying and monitoring the processes of sea level change, growth rates and age of reefs and reef builders, (both geologically and historically) and in evaluating effects from climate change. The reef system is so remote and so little impacted by industrial man that it can serve as a critical benchmark for understanding and potentially restoring other degraded hard coral ecosystems. The islands are acknowledged as critical sites for ongoing study of: global climate change and sea-level events in that they are located in a region less affected by other anthropogenic stresses; the growth of reefs, evolution of reef systems, biological behavioural studies, recruitment processes in isolation, size classes and population dynamics of all marine organism groups and reef species diversity studies. As such, the oceanic Central Pacific islands are natural laboratories for understanding the natural history of the Pacific.

As a known breeding site for numerous nomadic, migratory and pelagic marine and terrestrial species, PIPA makes a significant contribution to on-going ecological and biological processes in the evolution and development of global marine ecosystems and communities of plants and animals.

Due to its remoteness and isolation, PIPA occupies a unique position in the biogeography of the Pacific as a critical stepping stone habitat for migratory and pelagic/planktonic species and for ocean currents in the region. PIPA embraces a range of associated marine environments that display high levels of marine abundance as well as the full spectrum of age and size cohorts, presently unknown elsewhere in the tropics for its sheer robustness and intactness across an archipelagic system, especially in the case of apex predator fish, sea turtles, sea birds, corals, giant clams, and coconut crabs, most which have been depleted elsewhere. The overall marine trophic dynamics for these island communities are better functioning (relatively intact) compared with other island systems where human extraction has significantly altered the environment.

PIPA provides important natural habitats for in-situ conservation of globally important oceanic biological diversity, both marine and terrestrial. It is the most important secure habitat of the local endemic and now endangered Phoenix petrel and serves as crucial breeding, feeding and resting area for a number of threatened seabirds and migratory birds. PIPA collectively provides very important habitat for the continued existence of a number of globally endangered (e.g. Napoleon wrasse, hawksbill turtle), vulnerable (e.g. White-throated storm petrel, Bristle-thighed curlew, green turtle, giant clam, bumblehead parrotfish) and numerous other globally depleted species, both marine and terrestrial, including for example apex predators such as sharks. The remoteness of the area and absence of permanent human inhabitants provide a unique opportunity for a high standard of habitat protection for species and ecosystems of global importance to science and conservation.

Management and protection requirements necessary to maintain these values are reflected both in the interim management measures and the draft management plan. Within this the values of PIPA are planned to be maintained and in some cases improved eg nesting seabirds/invasive species eradications will allow recovery of impacted bird populations. Key framework tools being used are:

- Zonation – in this currently 7 of the 8 atolls are fully protected as no take zones inclusive of terrestrial environments, lagoons, coral reefs and coastal habitat out to 12 nautical miles. One atoll, Kanton, has permissible harvest of resources for subsistence purposes only for the government caretaker population. In Phase 2 no take zones are to be increased by an additional 25% making PIPA NTZ approximately 28.5% of the entire area. Priorities for increase in NTZ coverage include full protection of the two submerged reefs and increasing protection of seamounts and around each atoll/reef island – this NTZ placement is currently being finalised as part of the management plan completion.
- Permits – all visitors (tourists, researchers) are required to have a permit and once in PIPA complete immigration requirements on Kanton. Permit information clearly approved and banned activities within PIPA.
- Atoll Restoration Programme – an assessment of atolls for invasive species and priority eradications to improve seabird/threatened species has been made in 2006. This first two priority eradications have been carried out and further are planned in coming years. The long term expectation is that the PIPA islands will fully recover to provide quality habitat for a suite of globally important seabirds and migratory bird species as described in the early 1960s.
- Fisheries management – in addition to the zonation provisions outlined above, GoK Fisheries now require 100% observer coverage on all DWFN vessels, VMS, partial time-based FAD bans, which together provide a suite of measures that will improve status of tuna stocks, including spawning grounds within PIPA. Strengthening surveillance and enforcement by Fisheries and Wildlife Conservation Unit capacity on Kanton is expected to significantly contribute to ensuring management and protection measures are adhered to.
- Research – much is unknown about PIPA eg seamount habitat. As resources and partnerships allow these habitats will be increasingly explored, for example a 2009 Deep sea Expedition is being lead by NEAq/Kiribati to further current deep sea survey effort (current survey effort has samped down to 900 metres).
- Climate Change – this is the one key issue that effort within PIPA cannot effectively address and provides a threat to PIPA’s values. The basic management strategy here is to remove all other anthropogenic stressors to the PIPA environment eg reduce fishing effort on the basis that PIPA would then have the best chance to cope with impacts of climate change. It is noted that the existing relatively anthropogenic stress-free environs of PIPA make this protected area important for understanding and research climate change.
- Sustainable financing – the establishment of a PIPA Trust and implementation of the agreed Endowment Strategy together with partner resources and other grants available eg GEF will ensure resources to meet the needs articulated above.

3. c) Comparative analysis (including state of conservation of similar properties)

The Phoenix Islands in a national context:

Kiribati is an ocean nation dotted by 33 islands spread over a total area 3,600,000km². The land area consists of three island groups: Gilbert, Phoenix and Line Islands. The Phoenix Islands Protected Area constitutes 11.34 % of Kiribati's Exclusive Economic zone. It is the largest marine protected area in the world. The diversity of its pristine coral reefs is better known and considered superior to the other island groups of Kiribati. The number of tropical sea bird species within PIPA is comparable only with the Line Islands of Kiribati. However the Phoenix Islands are almost uninhabited whereas some of the Line Islands are being developed. There have been few direct anthropogenic influences in the last several decades in PIPA. The remoteness has allowed the Phoenix Islands to revert to a natural state and to have basically intact marine and terrestrial living resources.

The globally endangered endemic Phoenix petrel is found both in the Phoenix Islands and Kiritimati Island in the Line Islands group. Kiritimati may still have a larger population of Phoenix petrel but following the eradications carried out in June 2008 in PIPA the habitat for Phoenix petrel is more secure within PIPA than at Kiritimati, where invasive species numbers and the human population are increasing.

A management plan is being developed for PIPA but there are already clear agreed interim management measures being implemented. PIPA will also benefit from a trust fund for its management. Therefore PIPA's islands and reefs more readily meet World Heritage integrity requirements than the Line Islands where no management plan is in place for the archipelago. However, some of the more remote Line Islands are conservation areas and in future they may be proposed as World Heritage as well. There is work in-process to establish MPAs and protected areas on Kiritimati and other Line Islands.

The Phoenix Islands Protected Area (PIPA) is by far the largest, best protected and most important marine protected area in Kiribati.

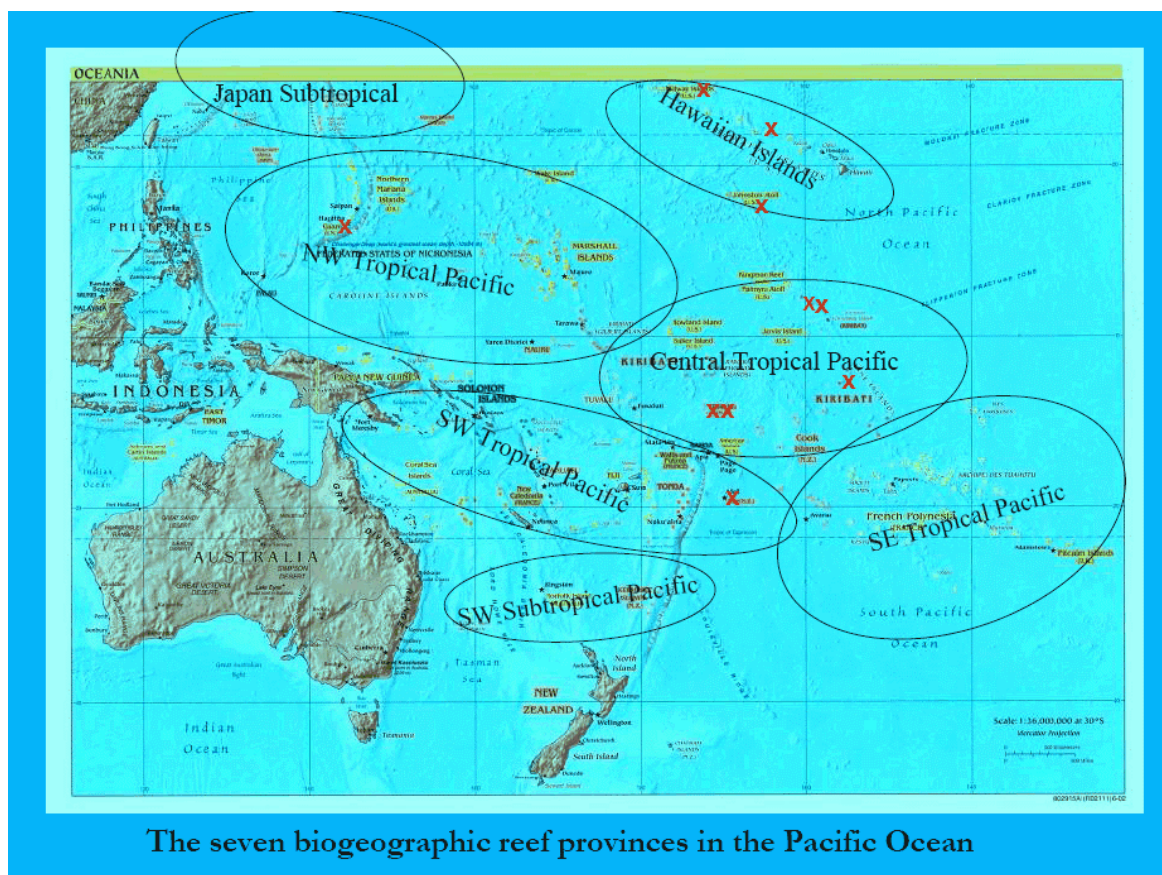
The Phoenix Islands in a Pacific context:

Maragos et al (Coral Reefs of the USA, 2008) has classified the tropical Pacific Ocean into five biogeographic provinces, excluding adjacent continents, based upon the distribution of atolls, reef islands and coral taxa as well as by previous work e.g. by Ekman (1953) based upon endemism and distribution patterns of key fauna within the Pacific. The provinces consist of:

Comparative Analysis of Geographic Profiles – World Heritage listed and nominated Marine Protected Areas

Name of Protected Area	Size (ha)	Oceanic region	Climatic region	Geographic context	Water depth - Average (m)	Water depth – Maximum (m)	Seamounts (number)	Atolls & reef islands (number)	High islands (number)
PIPA	40,825,000 (99+ % marine)	Pacific	Tropical	Deep Ocean	4,500	6,147	14+	8	-
Great Barrier Reef, Australia	34,870,000 (95% marine)	Pacific	Tropical	Continental shelf	35	NK	-	-	618
New Caledonia, France	1,574,300 (100% marine)	Pacific	Tropical	(sub) Continental shelf	<50	183	-	-	-
Papahānaumokuākea, Hawaii, USA <i>Nominated 2008</i>	35,688,107 (99+% marine)	Pacific	Subtropical	Volcanic hotspot ridge (Hawaii-Emperor)	NK	4,000+	Yes (No. NK)	3+	4+
Shark Bay, Australia	2,197,300 (31% marine)	Indian	Sub-tropical	Continental shelf	9	29+	-	-	3
Belize Barrier Reef, Belize	96,300 (50% marine)	Atlantic (Caribbean)	Tropical	Continental shelf	2-3	1,000+	-	2+	-
Cocos Island, Costa Rica	199,790 (97% marine)	Pacific	Tropical	Volcanic hotspot ridge	100m+	NK	-	-	1
Galapagos Islands, Ecuador	14,066,514 (95% marine)	Pacific	Tropical	Volcanic hotspot ridge	NK	3,600	NK	-	Circa17+
Coiba Island, Panama	430,825 (50% marine)	Pacific	Tropical	Continental shelf	NK	200+	1	-	38
Sian Ka'an, Mexico	528,000 (23% marine)	Atlantic (Caribbean)	Tropical	Continental shelf	<20	50			
Tubbataha Reef, Philippines	33,200 (99% marine)	Pacific (Sulu Sea)	Tropical	Atolls in Deep Sea	< 50	100	-	2	-
East Rennell, Solomon Islands	37,000 (plus marine)	Pacific	Tropical	Uplift Atoll in Deep Sea	<1,000	1,000	-	-	1
Aldabra Atoll, Seychelles	34,200 (41% marine)	Indian	Tropical ???	Atoll in Deep Sea	<1,000	NK	-	1	-
Socotra, Yemen	410,460 (32% marine)	Indian	Tropical	Continental shelf – near shore	Circa < 100	NK (circa <500)	-	-	3-5

- *The southeast tropical Pacific*: including scattered volcanic islands and 83 atolls and reef islets in French Polynesia and a few United Kingdom atolls.
- *The central tropical Pacific*: including collectively about 47 mostly isolated atolls and reef islets in eastern American Samoa, Phoenix and Line Island, northern Cook Islands, Tokelau, and Ellice Islands (Tuvalu).
- *The northwest tropical Pacific*: including a few volcanic islands, many raised reef islands, and approximately 90 atolls and reef islets in the Marshall Islands (including Wake Atoll), Gilbert Islands of Kiribati, Caroline Islands (Palau and Federated States of Micronesia), Mariana Islands, and Nauru.
- *The southwest tropical Pacific*: dominated by many large volcanic and continental islands, numerous raised reef islands, and approximately 69 atolls and reef islets in Papua New Guinea, Solomon Islands, Vanuatu, Fiji, Tonga, Samoan Islands, and New Caledonia.
- *Hawaiian Islands*: including ~20 large and small volcanic islands: seven atolls and reef islets; and Johnston Atoll in the isolated tropical/subtropical north Pacific.



Map courtesy of J. Maragos (unpublished).

According to this division there are no existing or proposed marine World Heritage sites in the “Central Tropical Pacific” biogeographic province other than PIPA.

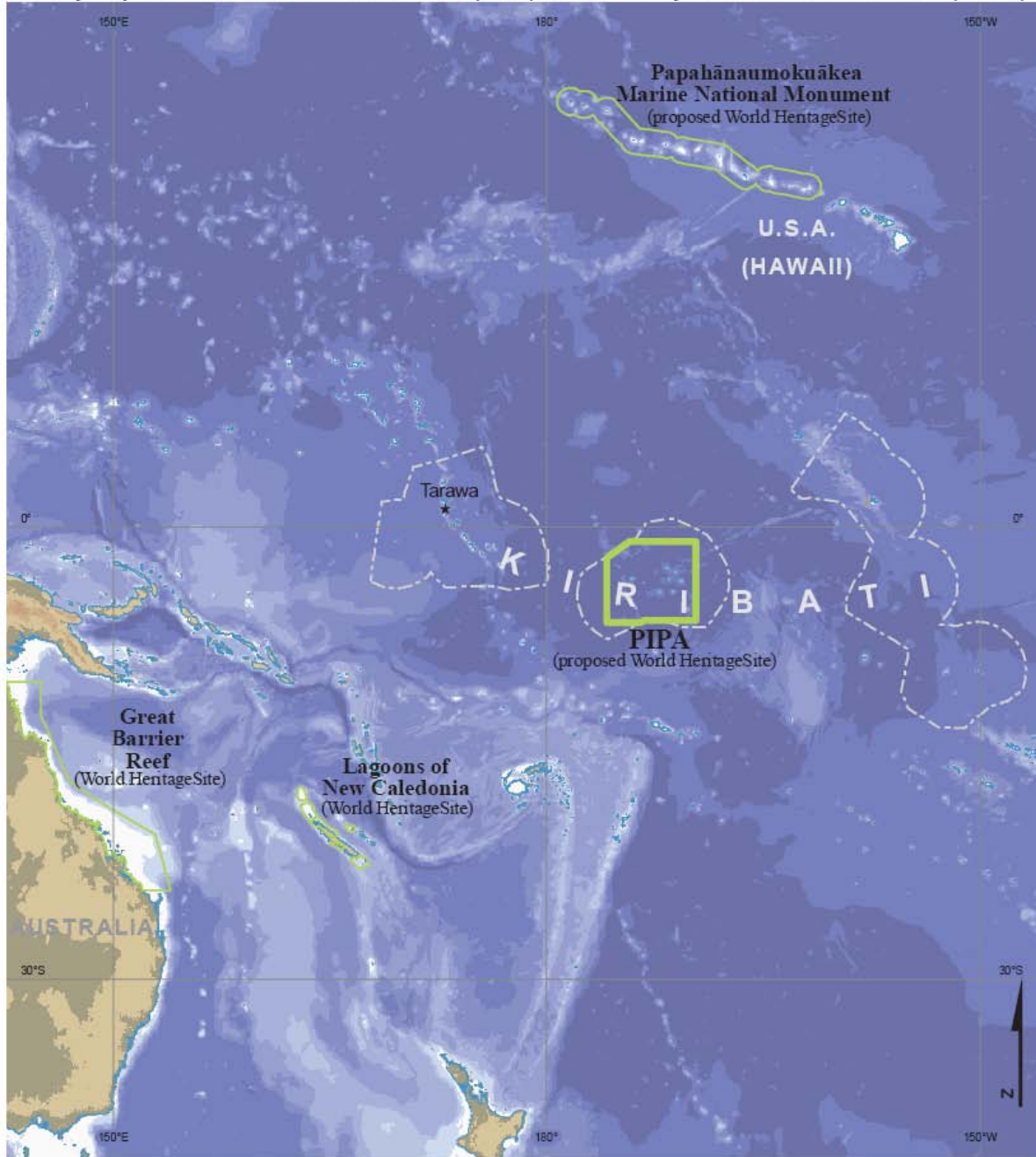
The Phoenix Islands group, adjacent to both the Equator (00° Latitude) and International Date Line (180° Longitude) are the last relatively pristine coral reef archipelago in the Pacific Ocean. The coral reefs and bird populations of the islands are unique, virtually untouched by man – a true wilderness of natural beauty whereas many populated islands in the Pacific region are often severely impacted by fishing, egg harvesting, development, pollution, introduced species and coral bleaching events. The Kiribati Phoenix group is the first large

marine protected area in the Central Pacific and also the first World Heritage nomination from the region.

PIPA hosts significant regional diversity of corals and fish as well as some endemic species. Ecologically, PIPA represents a glimpse into the Pacific's past times teeming with wildlife and crystalline waters, a true modern-day tropical island wildernesses.

Two World Heritage sites in the Pacific islands that are relevant to PIPA are East Rennell in the Solomon Islands and Henderson Island (U.K.) in the Southern Central Pacific. Both East Rennell and Henderson islands are limestone islands, formed from uplifted coral atolls. Only East Rennell retains a lagoon, indeed a perched lagoon of great scientific interest. Henderson Island vegetation and sea birds are comparable to some of the Phoenix Islands but the sea bird numbers are higher in PIPA. Both the Henderson Island and East Rennell World Heritage sites are small (3,700 ha. and 37,000 ha respectively) compared with PIPA (>40 million ha). Henderson is terrestrial and so does not include any marine section. East Rennell has an arbitrary 3km marine extension but the site is primarily terrestrial. PIPA is very different, comprising the largest marine protected area in the world and comprises the whole seascape from atoll tops to deepest ocean (until 6,147 m). PIPA includes eight superb examples of coral islands, technically classified as four atolls and four low reef islands.

Locality Map: Phoenix Islands Protected Area (PIPA) and other major Marine Protected Areas (MPA's)



Map extract courtesy Conservation International (2008) See Appendix 3.

Other natural World Heritage sites around the Pacific rim include Galapagos (Ecuador), Cocos Island (Costa Rica), Malpelo (Columbia) and Coiba (Panama) World Heritage sites along the Eastern rim of the Pacific Ocean, and New Caledonia, Lord Howe and the Great Barrier Reef World Heritage sites in the West. All those sites are situated in different biogeographic regions to PIPA and most are more continental and have very different geographic and geological features, ecosystems and species composition when compared with PIPA.

The four island based natural World Heritage sites in the Eastern Tropical Pacific (Galapagos (Ecuador), Cocos Island (Costa Rica), Malpelo (Columbia) and Coiba (Panama) are all centred on volcanic islands, contain no atolls and most have very limited coral reef

development. Coiba is immediately adjacent to mainland Central America and so is under continental influence. All have marine components, the largest of which is and impressive 140,665 sq. km in the Galapagos site, but none of the marine areas are directly comparable with the marine environment of PIPA. Malpelo has a marine component (8,755 sq. km) surrounding the island and includes one documented seamount, Bajo Bojarca.

Of the existing World Heritage sites situated in the Pacific only Galapagos contains an isolated archipelago, none of which are atolls. PIPA reaches down to 6147 metres depth thus containing all the deep sea habitats while the deepest areas in Galapagos World Heritage site are only 3,600 metres. Galapagos does not contain atolls or significant coral reefs. The formation of the Galapagos archipelago is more directly comparable with the Hawaiian archipelago, Papahānaumokuākea Marine National Monument in particular, sharing a hotspot genesis.

Of all these sites in the tropical and sub-tropical Pacific, PIPA is the only remote mid ocean site that includes and is predominantly deep ocean and which features a major suite of remote atolls and numerous large seamounts.

Quite unlike PIPA, the Great Barrier Reef and New Caledonia sites – indeed other barrier reef systems - are located on shallow continental or sub-continental shelves. Both contain extensive shallow water coral reefs. Their geographic form and proximity to land masses no doubt contributes to their known high species diversity – as well to on-going threats to their integrity. Notwithstanding PIPA's smaller area of shallow coral reefs, it excels in population sizes and size classes found within a number of species such as giant clams. Also the shallow reef formations are very different in New Caledonia and the Great Barrier Reef both being classic barrier reef systems while the reefs of PIPA are typical remote fringing reefs associated with atolls. The reefs of New Caledonia and Great Barrier Reef suffer from anthropogenic stresses and are at on-going risk of pollution (e.g. mining, eutrophication, shipping) due to their proximity to large land masses and shipping lanes while the reefs of PIPA are in near pristine state and far from any significant sources of pollutants and other threats. Coral reef ecosystems are predicted to decline globally due to climate change. This highlights the global importance of PIPA for safeguarding the fragile coral reef ecosystems well into the future.

On-going research is steadily revealing a previously unexpected high diversity of deepwater corals, albeit somewhat different formations to the shallow reef forming corals. The extensive seamount slopes on the more than 24 large submerged volcanoes (8 islands, 2 submerged reefs, 14 seamounts) extending down to the deep ocean PIPA offers great potential for discovery of many hitherto unknown deepwater marine organisms, including corals.

In comparing PIPA with the proposed Northern Marshall Islands Atolls (NMIA) World Heritage site, it is noteworthy that again the two proposed sites lie in different biogeographical areas, with the NMIA lying at the north-eastern corner of the Micronesian region, the "*Northwest Tropical Pacific*" region of Maragos et al 2008. While the NMIA reef system may exhibit higher species diversity, the degree of endemism is expected to be higher in the Phoenix Islands. While the NMIA has experienced human activity for a period of more than 3,000 years, the Phoenix Islands have remained largely undisturbed throughout most of their history and rank highly in terms of intactness and abundance and full functioning ecosystems.

The Marine Protected Area that deserves closest comparison with PIPA is the Papahānaumokuākea Marine National Monument of the United States given that together they are the two largest marine protected areas in the world and both situated in the Pacific Ocean. Both are on the World Heritage Tentative List and are being concurrently nominated to the World Heritage List. They are both archipelagos with little human use and situated far from continental influences and they are both predator dominated ecosystems, an indicator of their ecosystem health. However they are situated in different biogeographic regions, represent quite different geo-genesis and geomorphic features, Papahānaumokuākea is mostly in the sub-tropics whereas PIPA is equatorial. Not surprisingly their species compositions differ markedly. PIPA has more biomass due to its location in the tropics whereas Papahānaumokuākea is situated on the edge of the tropics. Hence also the reef fish and stony coral species numbers are higher in PIPA (518 versus 250 and over 200 versus 57, respectively). Both include very important seabird habitats but they protect a different set of species e.g. the endemic and endangered Phoenix petrel is only found in Kiribati.

Also the geological history is different; all the atolls within PIPA are true atolls, coral caps on large isolated volcanoes rising from the deep ocean floor while the islands and atolls within Papahānaumokuākea are aerial expressions of a well defined high volcanic ridge running northwest from Hawaii. PIPA, with an area of 40, 825,000 ha is significantly larger than Papahānaumokuākea at 35,688,107 ha. The maximum depth of Papahānaumokuākea is less than 4000 meters with extensive areas much shallower while PIPA extends down to 6,147 meters with a mean depth of around 4,500 metres. The elongate form of the nominated Papahānaumokuākea closely follows the well defined line of old volcanoes extending north west of Hawaii and so the extent of deep water environment is very limited. PIPA by contrast is predominantly deep water with a wider scatter of much older submerged volcanoes - seamounts.

In many respects, PIPA and Papahānaumokuākea are complementary and both are considered of outstanding universal value. Together they represent two very different oceanic environments; PIPA is more representative of the older remote deep ocean environment featuring a series of large extinct volcanoes in equatorial waters with only limited surface expression as atolls and low reef islands. By contrast, Papahānaumokuākea is dominated by a relatively shallow prominent ridge of recent volcanic origin culminating in the present day Hawaii islands with large active on-shore volcanoes in subtropical waters. The origins of the two chains of volcanoes are also different with the linear chain of Hawaiian Islands forming over a hotspot in the north central Pacific crust and the Phoenix Islands (as well as the Marshall Islands) probably originating as volcanoes growing in deep water from the mid oceanic ridge of the Pacific Ocean.

PIPA is uniquely situated in the centre of the ocean thus serving as a critical stepping stone for migratory and pelagic/planktonic species.

The Phoenix Islands in a global context:

PIPA is arguably one of the very few, if not the only essentially pristine oceanic coral reef archipelago remaining in the world – marine habitats and species assemblages which remain largely intact. A unique feature of the Phoenix archipelago, PIPA in particular, is the remoteness and essentially uninhabited status (except for Kanton atoll).

The Phoenix Islands Protected Area embraces a complex of a mid-oceanic reef island and atoll archipelago and a large array of associated massive seamounts whereas existing oceanic World Heritage sites consist of either single island units (Cocos, Malpelo, Coiba, Henderson, Lord Howe) or – in the case of Galapagos – a small archipelago.

Atolls are largely confined to the tropical regions of the Pacific and Indian Oceans. World Heritage listed Aldabra Atoll (Seychelles) in the Indian Ocean shares many similarities with East Rennell and Henderson Island World Heritage sites in the Pacific, comprising single limestone islands derived from uplift of atolls. Aldabra retains part of its once extensive lagoon still linked to the sea, East Rennell retains its lagoon, perched and no longer tidally linked, and Henderson has lost its lagoon. Both Aldabra and East Rennell sites include small marine extensions though East Rennell WHC site only includes part of the uplifted atoll. By contrast, the PIPA nomination includes not only an archipelago with 8 atoll islands (4 atolls, 4 reef islands), numerous seamounts, two submerged reefs but also a huge surrounding tract of deep sea and open ocean areas with all the associated depth ranges represented.

Currently over 200 coral species and 518 shallow-reef fish species have been identified in the Phoenix Islands, while undoubtedly many unidentified and unknown deepwater and seamount fish and coral species remain to be discovered. For example, a formula for predicting the total reef fish fauna based on the number of species in six key indicator families (Allen, unpublished data) indicates that at least 576 species, over 50 more than currently listed, can be expected to occur at the Phoenix Islands. In terms of species diversity of the existing World Heritage sites only the Great Barrier Reef, Tubbataha Reef, New Caledonia and Socotra have more coral species than PIPA and only the Great Barrier Reef, Islands and Protected Areas of the Gulf of California, Coiba, Socotra and New Caledonia have more fish species than PIPA. However this differential is explicable as largely the result of biogeography and the PIPA being located in a more species-poor region in the middle of the ocean remote from the influence of continents (Australia, Africa, North America) or continental fragments (New Caledonia). The state of conservation of PIPA is considered superior to other more continental sites based on PIPA's isolation and remoteness from anthropogenic and other stresses.

In addition, PIPA has a number of unique and endemic species and rare species assemblages not found elsewhere in the world. For example many of the fish species found in PIPA are present in outstanding numbers and sizes such as the Napoleon Wrasse (*Cheilinus undulatus*), usually a good indicator of minimal local fishing pressure, is exceptional compared to other internationally recognized marine hotspots recently surveyed in the Indo-Pacific region by Conservation International (see also table on page 24). PIPA also contains prime examples of pristine & near-pristine, dry equatorial island plant communities, for example the *Pisonia* forests of Orona. In the lagoons of Orona and Kanton large *Tridacna* clam communities can still be found whereas they are seriously depleted in most other locations in the world.

Together with Kiribati's Line Islands, the Phoenix Islands support among the largest assemblages of tropical seabirds in the world in terms of species diversity and total populations. PIPA hosts forested and arid seabird islands of high global significance (>40 breeding colonies with several of the world's largest seabird breeding populations). The islands support globally important breeding colonies or concentrations of the following species: Audubon's shearwater, Christmas shearwater, Phoenix petrel, white-throated storm-petrel, great frigatebird, lesser frigatebird, brown booby, masked booby, sooty tern, grey-backed tern and blue noddy.

The only other island groups with comparable seabird populations and diversity in the world's tropics and subtropics are the Kiribati Line Islands and the remote island refuges of the USA, viz. Northwest Hawaiian Islands, Jarvis, Palmyra (Line Islands), and Baker & Howland (USA part of the Phoenix Islands group). Tropical island groups with significant seabird populations & diversity include Galapagos (WH), Clipperton, Ducie, Henderson (WH) & Oeno (Pitcairn Group), Christmas Island (Indian Ocean -Australia), Gough Island (WH) & Tristan da Cunha and Ascension (Atlantic), Aldabra (WH) & a few other Seychelles Islands such as Aride & Cousin (Indian Ocean). However, these islands all protect a different suite of species than PIPA.

A document entitled *Seabird Islands of Global Importance* (2004) by Angela Kay Kepler, which is based largely on 1960s surveys, concludes that the Phoenix Islands (together with the Line Islands) have traditionally been recognized as the most prolific and globally important seabird islands in the world for decades. This is because they are little-modified and are largely uninhabited, in contrast to most other island groups. More recent surveys of the Phoenix Islands (Pierce et al. 2006) revealed that whilst there have been declines in the bird numbers in PIPA since the 1960s caused by invasive species, the full suite of breeding seabird species (19) are still present. Strategic eradications now underway have already begun to secure populations on smaller PIPA islands and progressively restore larger islands with bird numbers expected to increase again to previous levels. In particular, threatened and near-threatened species (Phoenix petrel, white-throated storm-petrel, blue noddy) and the sensitive shearwater and tern species will no longer rely upon just one single island (Rawaki) for their continued survival in the PIPA.

The PIPA also supports migratory shorebirds that breed in the Arctic and winter on the islands. The four commonest species in the PIPA are Bristle-thighed curlew (VU), Pacific golden plover, ruddy turnstone and wandering tattler, with the PIPA being a critically important safe wintering area for the curlew. The islands of the PIPA also provide important stepping stones for all four of these shorebird species between for example the Samoan and Tokelau Islands to the south and the NW Hawaiian Islands to the north. The forested southern islands of the PIPA also provide the northernmost wintering habitat for one landbird, the Long-tailed koel, which migrates here from its breeding grounds in New Zealand.

One of the recent estimate of seamounts in the world is 14,287, of which there are only 6739 seamounts (47%) within EEZs (and thus legally possible to protect and nominate as World Heritage), with the remainder (7548 or 53%) on the high seas. Collectively the total area of the oceans covered by seamounts is very small (probably less than 1%), since most seamounts are less than 20 kilometres in radius.

(From <http://www.ga.gov.au/ausgeonews/ausgeonews200706/marine.jsp>)

There are no other sites on the World Heritage List that are comparable to PIPA, being located in deep ocean environment and featuring so many large extinct volcanoes. The four island based natural World Heritage sites in the Eastern Tropical Pacific (Galapagos (Ecuador), Cocos Island (Costa Rica), Malpelo (Columbia) and Coiba (Panama) are all centred on volcanic islands, contain no atolls and most have very limited coral reef development. Coiba is immediately adjacent to mainland Central America and so is under continental influence. All have marine components, the largest of which is an impressive 140,665 sq. km in the Galapagos site, but none of the marine areas are directly comparable

with the marine environment of PIPA. Malpelo has a marine component (8,755 sq. km) surrounding the island and includes one documented seamount, Bajo Bojarca.

Of the existing World Heritage sites situated in the Pacific only Galapagos contains an isolated archipelago; however none of its islands are atolls. PIPA reaches down to 6147 metres depth thus containing all the deep sea habitats, the deepest areas in Galapagos World Heritage site is 3,600 metres. Galapagos does not contain atolls or significant coral reefs. The formation of the Galapagos archipelago is more directly comparable with the Hawaiian archipelago, Papahānaumokuākea Marine National Monument in particular, sharing a hotspot genesis.

PIPA contains at least 24 submerged volcanoes, 14 recognised as seamounts. Seamounts in the Galapagos site are really ridge extensions along continuous bathyscapes running out from the islands. Most of PIPA's volcanoes (atolls and seamounts) are often isolated, very large, some reaching up to 5,000 meters from the deep seafloor – submerged mountains of comparable scale to Mont Blanc in the European Alps.

There are very few Marine Protected Areas in the world that contain seamounts. These include the Bowie Seamount MPA in Canadian temperate waters and which has a bottom depth of nearly 3100 metres and which rises to within 25 metres of the ocean's surface compared with seamounts of in PIPA which may reach over 5000 metres from seafloor and up to 3-4 meters from surface (Carondelet Reef). Also some MPAs located in USA, New Zealand and Australian waters feature seamounts but like the Canadian MPA they feature small numbers of seamounts and all are situated in sub-tropical or temperate regions and thus host a very different set of species and ecosystems. By contrast PIPA contains about 24 large submerged volcanoes, eight of which reach the surface, two approach the surface and another 14 are technically recognised as seamounts reaching various depths in equatorial mid-ocean waters, (see bathymetry maps in Bathymetry and Seamounts chapter earlier in this nomination) whereas most other MPAs that do have seamounts only protect 1-2 seamounts per MPA (e.g. Malpelo WH site).

3. d) Integrity

As of January 2008 the boundaries of the Phoenix Islands Protected Area were extended to encompass a total area of 408,250 km² thus making it the largest Marine Protected Area (MPA) in the world. The whole of the MPA and hence the nomination is within Kiribati's Exclusive Economic Zone (EEZ). PIPA is the first truly large scale oceanic World Heritage nomination, a predominantly deep ocean environment but including as well an array of large and ancient volcanoes rising from deep ocean floor. At least 24 large volcanoes have been identified, ranging from the eight that rise to the surface and are capped by coral (4 atolls, 4 reef islands), two which reach to within metres of the surface, the summits of which are classified as submerged reefs and 14 other identified large volcanoes classified as seamounts. Other smaller seamounts are likely to be identified as deep sea exploration continues.

PIPA is therefore of sufficient size and diversity to be fully representative of the landforms of deep oceanic environments.

The full representation of the marine landforms and landscape components of a deep ocean region ensures that PIPA incorporates a full representation of all habitat types from the terrestrial habitat of eight oceanic islands, through shallow fringing coral reefs, deeper

submerged reefs, seamount summits, the extensive slopes of the seamounts and down to the very extensive ocean floor habitats peaking at 6,147 metres, together of course with the full range of water column habitats above, including the open ocean. There is therefore full vertical and lateral connectivity between terrestrial, ocean floor and open ocean habitats within the nominated property.

The nominated property is therefore of sufficient size, exhibits excellent connectivity, and embraces all the key components needed to maintain the long-term integrity and ecological functioning of the property.

There are two other islands that are considered part of the Phoenix Islands group, Howland and Baker (northern Phoenix Islands). Both are U.S. territories and are part of the U.S. Fish and Wildlife Service refuge system and designated protected areas. This is important buffering, further enhancing the effective integrity of PIPA.

The very large tract of marine habitat of PIPA provides feeding grounds for resident and migratory seabirds and protection for wide-ranging marine species. Therefore PIPA contains all the habitats needed to maintain the most diverse flora and fauna characteristic of the Central Pacific biogeographic region, the central core of the world's largest ocean. PIPA seamounts exhibit a full range of elevation/height (hence ecological diversity) - from those that reach the surface (over 5,000 metres high) and have classic atoll collars or caps, those that reach within metres of the surface and have no tidal atoll collar and those whose summits are at various depths and only known from remote sensing.

PIPA has almost negligible evidence of immediate and on-going threats, including crown-of-thorns seastars, and land-based pollutants – in stark contrast to other reefs environments in close proximity of human populations, both in Kiribati and tropical countries. Large predators, particularly sharks, trevally, tuna and Napoleon wrasse are still abundant within PIPA and the densities of Napoleon wrasse are the highest recorded in the Indo-Pacific region, all indicators of a high ecological integrity.

Perhaps the greatest current threats to the ecological integrity of PIPA are the terrestrial invasive species that threaten the seabird populations and native vegetation on the atolls. However an eradication programme has already commenced (2008) on the most critical islands (McKean and Rawaki) and the programme is planned to continue with support by a number of partners and governments. A high level of success is anticipated in the near future.

PIPA is located in the core region from which strong El Niño events are generated in the Central Pacific. This has two contrasting effects. One is that very long periods of warmer surface waters can occur, as occurred in 2002-3, causing a great degree of stress to ecosystems. The widespread coral bleaching in 2002 is an indicator of this. Conversely, since the region has historically experienced these longer warm periods, species and ecosystems here may have higher tolerance levels to warming than from other locations, and resident species may have evolved much higher resistance levels to temperature increases, and could therefore prove to be an important gene pool for genetic diversity in a warming world. The high survival rate and rapid recovery of corals from the 2002-3 bleaching event is an indicator of this.

The Government of Kiribati is committed to the conservation of PIPA. The property is protected by the declaration in 2006 and its subsequent extension by Cabinet decision in

January 2008 with new and supporting legislation. PIPA regulations were enacted in February 2008 and are attached to this nomination. An agreed set of interim management actions have been prepared to guide management while the management plan is being prepared for finalisation by February 2009 as required by the PIPA regulations. Financing for the management and future conservation of the site has been secured through the ongoing Phoenix Islands Protected Area project, which has set up a national project office, in operation since 2005. Other sources of financing include proposed GEF, CEPF projects and support from other nations such as Australia and New Zealand. More information is given in the financing section of this nomination. An endowment fund is in a process of being set up to ensure the site's long-term sustainability and viability. The fund already has US\$ 2.5 million of committed funds. It is expected that the potential threats to the site as described later in this nomination will be significantly reduced as a result with implementation of PIPA's management plan.

In summary, PIPA is in an interim stage of its management and development with clearly agreed interim management measures and actions. Clearly a number of significant and outstanding achievements (e.g. eradication of invasive species in 2008) have been made during this time. Additional resources have been secured and new partnerships are being actively fostered. At the time of nomination all activities related to the Phoenix Islands are reviewed and recommended as appropriate by the PIPA office, decided upon by the multi agency PIPA Management Committee and with official approval required by the Minister of Environment, Lands, and Agricultural Development (MELAD). This includes any research, economic development or other activity.

The Line and Phoenix Islands of Kiribati have been discussed as a part of the World Heritage Central Pacific Project which has the long-term goal of establishing a transboundary and serial World Heritage site extending from the reefs and islands of the Central and South Pacific US territories, through Kiribati and Cook Islands to French Polynesia. Eventually all these sites could be included in one serial and transboundary World Heritage site. PIPA could logically be considered as the first stage of such serial and transboundary nomination. Notwithstanding future decisions about serial and transboundary nominations, PIPA has the values and integrity that ensure it can stand alone as being a site of outstanding universal value, World Heritage.

SECTION 4. STATE OF CONSERVATION AND FACTORS AFFECTING THE PROPERTY

4. a) Present State of Conservation

At present PIPA is in an excellent state of conservation due to its remoteness and proactive management of the fish resources. Taken as a whole the marine conservation values of PIPA are outstanding on an international scale. There are few coastal areas in the world that can be observed in a virtually unfished state, by industrial or domestic fishing operations. The PIPA offers us this precious opportunity.

The main threats to PIPA are represented by invasive species on terrestrial habitats that have reduced nesting bird numbers on some of the islands, vulnerability to illegal shark finning, potential over fishing by DWFN for tuna resources, potential ship groundings, and coral bleaching. All are discussed in greater detail below.

Indicators for monitoring these and other trends are presented under monitoring section of this document.



Photo: *Mary Jane Adams*

A summary of the present condition of some the property's key natural values from the draft management plan is presented below:

(1) Pristine coral reefs with natural populations of higher predators (sharks, large fish) – Coral reefs are near-pristine from human impacts. In the early 2000s, legal and illegal shark fishing occurred in many of the Phoenix Islands. After the PIPA declaration in 2006, all shark fishing was terminated. In 2006, one illegal shark fishing vessel was identified and apprehended. There has been no inshore fishery in the Phoenix Islands since the termination of the Kakai scheme in the early 2000s, except for some subsistence fishing by the government caretakers and their families on Kanton (maximum 50 inhabitants). Coral reefs were impacted by a global bleaching event in 2002. These bleaching events do not appear to have impacted fish populations or diversity. Coral recovery appeared to be much quicker than in more stressed environments that are heavily influenced by anthropogenic factors, possibly because human activities in the Phoenix Islands are minimal. Spectacular giant clam communities exist, a rarity in most other atoll lagoons where there is human habitation or exploitation.

(2) Important marine turtle nesting beaches (Enderbury and Kanton) and breeding/feeding sites – The Phoenix Islands is an important nesting area for marine turtles. It has been speculated that the recently noted decline in sea turtle populations may be attributable to the illegal shark fishing operations in the early 2000s. With the 2006 capture of an illegal shark fishing vessel, the termination of all inshore commercial fishing projects, and the declaration of PIPA, sea turtle populations have a better chance to recover.

(3) Significant coconut crab populations on Nikumaroro – Coconut crabs exist on several of the Phoenix Islands, but are most abundant on Nikumaroro. In the past, coconut crabs have been harvested and numbers depleted but with the declaration of PIPA, their harvest has been

banned. This protective action has seen coconut crab populations once again flourishing on Nikumaroro.

(4) Traditional Kiribati medicinal plants now rare in the Gilbert Islands still exist in the Phoenix Islands – There are several species of plants that are used for traditional Kiribati medicines. With population increases, land clearing, and urbanization of the Gilbert Islands, especially Tarawa, these plants are quickly disappearing. Several of these species still exist in the Phoenix Islands where they are not collected. As such PIPA can serve as a genetic depository for these important traditional medicinal plants.

(5) Important seabird rookeries (particularly on Rawaki and Enderbury) especially for greater/lesser frigate birds, terns and boobies – An initial assessment of threatening exotic species was completed by Pierce et al in 2006. Plans have been approved for a phased approach to removal of the most threatening species throughout the Phoenix Islands. Support funding has been secured from New Zealand for the first phase of eradications. As harmful exotic species, including mammalian predators are removed; seabird rookeries are confidently expected to recover. The first eradications took place in June 2008. The removal of harmful Persistent Organic Pollutants (POP) from Kanton in 2006 should also be beneficial to bird populations and other wildlife on Kanton.

(6) A large number of seamounts – Seamounts are known to have a high level of endemism and often contain high percentages of species that are new to science. Seamount ecosystems are of very special interest for conservation. Seamounts are particularly vulnerable to serious impact and local extinctions as a consequence of concentrated commercial fishing. It is estimated that as much as 25% of the world's seamounts have already been degraded by deep sea fishing.

A total of 24 large underwater volcanoes have so far been identified within the boundaries of the nominated property, at least 14 of which are technically classified as seamounts. Seamounts are proving to be of exceptional interest and value for conservation, often exhibiting a high degree of local endemism and unique local species assemblages. PIPA is fortunate in being so remote that the PIPA seamounts have escaped deep sea fishing and so their biota is believed intact and with protection remain so, a valuable conservation asset. PIPA's seamounts represent the largest suite of protected intact seamounts in the world's tropics and their conservation and scientific importance is now assured by the high level of on-going protection now in place.

4. b) Factors affecting the property

(i) Development Pressures

Fishing:

Offshore fisheries

Interest in offshore fisheries resources (tuna) around the Phoenix Islands began after WWII and was stimulated by Hawaiian fishing interests. The Kiribati longline fishery began in the 1950s. By the mid-1960s the Korean longline fleet entered the fishery and concentrated effort in the Line and Phoenix EEZ area. Since the mid-1970s, the Korean longline fleet has

dominated this fishery. Korean longline fishing effort from the Phoenix EEZ area from about 1980 to 2000 was about 20 percent of their total Kiribati EEZ effort.

The offshore fisheries (tuna) were active prior to Kiribati independence in 1979. However, Kiribati Government control over its waters was not established until 1979 when the 200 nautical mile EEZ was declared. This included waters around the Phoenix Islands. In 1987, the USA and certain Pacific Island states entered into a Multilateral Treaty on Fisheries. This allowed US purse seiners to operate in Kiribati waters (including the Phoenix Islands). Data indicate that periodically during certain years the Kiribati EEZ around the Phoenix Islands is a significant source of tuna. Apparently during periods of El Niño, sea surface temperatures increase in the Phoenix Islands along with skipjack landings. Low catches were related to La Niña, while high purse seine catches were related to El Niño conditions. The Phoenix and Line EEZ areas represent the eastern extremity of the distribution of skipjack; therefore the availability of this species was more sensitive to La Niña conditions.

Langley (2003) reported that about 20 percent of total purse seine landings within the Kiribati EEZ came from the Phoenix EEZ area. Most of this effort was by the U.S. purse seine fleet under the Multilateral Fishing Treaty.

With the establishment of the management plan and the trust fund, tuna fishing will be phased out within the PIPA boundaries under a 'reverse fishing license' whereby the interest from the endowment will increasingly compensate for lost DWFN access fee revenue. More information on fishing restrictions is provided in the Protection and Management Section of this nomination.

Inshore fisheries

As small isolated islands, the Phoenix Islands are vulnerable to resource extraction from inshore fisheries by unlicensed illegal foreign vessels. High-value fisheries such as the live reef fish trade, aquarium fish, shark fin and sea cucumbers pose significant threats.

The inshore fisheries in the Phoenix Islands have been limited. Various trial gillnet, rod, handline, and spear fishing surveys were conducted in the 1970s to 1990s on select Phoenix Islands. In the 2000s, large indicator fish were surveyed by different researchers. Results from various surveys have indicated that beche-de-mer resources were too small to support any commercial exploitation. In the early 1990s, there were recreational fishing trials on Kanton for bonefish. This generated much interest in the development of Kanton as a recreational fishing destination. Plans were made, but nothing was developed.

The islands have been targeted by shark fin fishers. According to New England Aquarium research in 2002, the abundance of reef sharks showed a clear and highly significant difference among the islands. Enderbury, Nikumaroro and Birnie had high shark populations, at 1.2 ± 1.2 per 150m^2 , while Rawaki, Manra, Kanton and Orona had significantly lower shark populations of 0.05 ± 0.1 per 150m^2 . At the low-abundance islands, sharks were completely absent at several sites, most dramatically at Kanton and Orona. At the latter, not a single shark was recorded in circular transects in 2002.

In the interval between the 2000 and 2002 surveys, fisheries for shark fin started in the Phoenix Islands, and caused the declines in large predator species, including tuna. Two fishing initiatives were started:

1. Two hundred villagers were settled on Orona Island early in 2001, with one of their primary activities being to catch sharks for the shark fin market.
2. A fishing vessel based in American Samoa, the *Maddee*, obtained permission to harvest shark fin in the Phoenix Islands, visiting Kanton, Manra, Rawaki and Orona.

As a result of these fishing efforts, shark populations at those islands that were fished declined dramatically to near-zero levels. Fished sites lost almost all of their small sharks, leaving the populations with low renewal and regeneration potential. The results demonstrate how quickly shark populations on small remote islands can be decimated.

Following the PIPA declaration in 2006, all shark fishing has been terminated. In 2006, one illegal shark fishing vessel was identified and caught. Nowadays there is no inshore fishery in the Phoenix Islands since the termination of the Kakai scheme in the early 2000s, except for some subsistence fishing by the government caretakers and their families on Kanton (maximum 50 inhabitants).

Information on fishing restrictions is provided in the Protection and Management Section of this nomination.

Invasive species:

As with many small oceanic islands, Phoenix Islands suffer from a number of invasive mammal species, most notably rats and rabbits that pose a threat to nesting bird populations and to native vegetation.

Pierce et al (2006) summarized significant seabird population changes in the Phoenix Islands since the 1960s. Species with similar population sizes from 1960s to 2006 included both locally-breeding tropicbird species, all three species of locally-breeding booby, sooty tern, and black noddy. Species with serious decline (2 to 10 fold decline) included all three locally-breeding shearwater species, Phoenix petrel, both locally-breeding frigatebirds, grey-backed tern, brown noddy, blue noddy, and white tern. Species that experienced catastrophic declines (over 10 fold) included the Bulwer's petrel, and white-throated storm petrel. Invasive species, mainly rats and rabbits are recognised as the cause of declines. Plans for pest eradication have been prepared and adopted to deal with these threats. (See later in this dossier as well as in the management plan). First critical eradications on Rawaki and McKean were conducted in June 2008.

There have been significant changes in the status of mammal and bird species in the Phoenix Islands since the last comprehensive fauna surveys in the 1960s. The greatest change has been on McKean where the large Asian rat (*Rattus tanezumi*) arrived recently, coinciding with a 40% decline in seabird species diversity, including the total loss of blue noddies (blue-grey ternlets; (*Procelsterna caerulea*) and most procellariiform species. Most of the seabird species that were still persisting on McKean in 2006 were present in greatly reduced numbers and were generally breeding unsuccessfully. Fortunately, some pest species have disappeared from at least two of the larger islands including house cat (*Felis catus*) from Enderbury and Nikumaroro, and apparently Pacific rats (*Rattus exulans*) from Orona, but the precise status of pests on the last two islands need confirmation. Pacific rats are present on Birnie. (Pierce et al 2006).

The island with the highest diversity (18 species) of seabirds in 2006 was Rawaki. This is the only island in the Phoenix group that still supports a breeding population of blue noddies and the endangered Phoenix petrel (*Pterodroma alba*) and the vulnerable White-throated storm petrel (*Nesofregatta albigularis*), while many other species also breed there, as was the case in the 1960s. These seabird populations on Rawaki are critically important. The very high density of rabbits (*Oryctolagus cuniculus*) has impacted on many seabirds on Rawaki through competition for burrows and shaded shelters with associated trampling of eggs and nestlings. Rabbits were also impacting on the vegetation with the loss or decline of the more palatable species; this in turn reduces nest site availability and burrow stability for burrowing seabirds and impacts on the ecosystem as a whole. (Pierce et al 2006). Rabbits were eradicated from Rawaki in June 2008 but monitoring is required to confirm success.

Pierce et al (2006) reported that with the introduction of the Asian rat, *Rattus tanezumi*, to McKean, there was a 40 percent decline in seabird species diversity. Breeding success has been very low.

Pierce et al (2006) recommended ground operations to target pests on the smaller islands and aerial applications of rat poison on some of the larger islands. Operational plans for pest eradication from Rawaki, McKean and Birnie have been prepared and included in the draft PIPA management plan. Priority eradications were undertaken successfully in June 2008 for McKean and Rawaki.

Invasive mammal species in the Phoenix Islands previously recorded and recorded in 2006. (Source: Pierce et al 2006)

Island	Previously recorded species ¹	Species recorded in 2006 survey	2006 survey effort
Rawaki	Rabbit <i>Oryctolagus cuniculus</i>	Rabbit	3 days' sightings. 7761m transects (2 nights). 4 hrs night sightings (2 nights). Feeding sign & droppings. 27 rabbits captured.
Birnie	Pacific rat <i>Rattus exulans</i>	Unidentified rodents (probably Pacific rat)	3 hours day search, 0 seen. Feeding sign. Droppings (rare).
McKean	Probably Pacific rat or none (King 1973)	Pacific rat absent Asian ship rat <i>Rattus tanezumi</i>	4 days' sightings. 9903m transects (3 nights). 5 hrs night sightings (3 nights). Feeding sign, droppings, tracks & pathways. 22 Asian ship rats captured.
Enderbury	Pacific rat	Pacific rat	3 days' sightings. 9053m transects (2 nights). 5 hrs night sightings (2 nights). Cat trapping (1 night). Cat baiting (2 nights). Feeding sign & droppings. 8 Pacific rats captured.
	Cat <i>Felis catus</i>	cat not found	
Orona	Pacific rat	Pacific rat/mouse? (one possible sighting)	3 days' sightings. 3410m transects (1 night). 2 hours night sightings (1 night). Rodent trapping. Incidental observations (1 rodent, 4 cats sighted). Cat feeding sign & footprints.
	Cat	Cat	
	Dog <i>Canis familiaris</i>	dog not present	
	Pig <i>Sus scrofa</i>	pig not present	
Nikumaroro	Pacific rat	Pacific rat	2 days' sightings. 2791m transects (1 night). 2.25 hrs night sightings (1 night). Feeding sign. Cat and dog footprint searches. 3 Pacific rats captured.
	Cat	cat not present? (no sign seen)	
	Dog	dog not present? (no sign seen)	

¹ Information from Garnett (1983)

Note in Table: Pacific rat (kiore) confirmed present on Birnie in 2008 (Ray Pierce, oral information). Eradication will be scheduled.

Population estimates of mammal species in the Phoenix Islands, 2006.

(source: Pierce et al 2006)

Island	Species	Estimated 2006 population mean density ha ⁻¹ and 95% confidence interval
Rawaki	Rabbit	41.5 ± 15.6
Birnie	Pacific rat	Low
McKean	Pacific rat	0
	Asian rat	41.3 ± 7.3
Enderbury	Pacific rat	77.7 ± 16.3
	Cat	0
Orona	Pacific rat/mouse?	<0.1
	Cat	4 seen. Total population c. 10-15 animals
	Dog	0
	Pig	0
Nikumaroro	Pacific rat	11.7 ± 13.8
	Cat	0?

Likely impacts of different pests on seabirds in the Phoenix Islands.

(source: Pierce et al 2006)

Severity of impact	Rabbit	Pacific rat	<i>Rattus tanezumi</i>	Cat
Low-moderate	Most species	Pelecaniformes – all 6 local species	Pelecaniformes, except red-tailed tropicbird (serious)	Possibly tree nesters, i.e. red-footed booby, black noddy, white tern
Serious	Procellariiforms, blue noddy, perhaps red-tailed tropicbird	Procellariiforms (except perhaps wedge-tailed shearwater), terns	Tropicbirds, all terns, brown and black noddies (or higher impact)	All other seabird species are at this level of impact or higher
Catastrophic		Storm-petrel, blue noddy	Blue noddy, all procellariiforms, possibly all 6 spp. of terns and noddies	Procellariiforms, ground-nesting pelecaniforms, blue noddy, most terns/brown noddy

The highest priority actions for exotic species eradication in the Phoenix Islands have been determined to be:

- 1) Incorporate pest eradication plans into the conservation management plan including biosecurity measures to prevent reinvasion of mammals and invasive ants and plant pests.
- 2) Eradicate the rabbit, *Oryctolagus cuniculus*, from Rawaki (completed June 2008).
- 3) Eradicate the Asian rat, *Rattus tanezumi*, from McKean (completed June 2008).
- 4) Eradicate the Pacific rat, *Rattus exulans*, from Birnie.

Second level priority actions for exotic species in the Phoenix Islands:

- 1) Eradicate the Pacific rat, *Rattus exulans*, from Enderbury.
- 2) Complete follow-up surveys to confirm pest status on Orona, Nikumaroro, and Manra, and seabird diversity on Kanton and Manra.
- 3) Monitor seabird populations on above islands. 4) Eradicate cats (and rodents if present) on Orona.

Finally, after priority issues are completed, eradication plans will be developed for pests on Nikumaroro, Manra, and the small islets inside the entrance to Kanton lagoon.

The first two urgent eradications listed above - to eradicate rabbits from Rawaki and Asian rats from McKean were undertaken in May-June 2008. The final success of these operations will not be known until the next survey in 2009. This project was managed by the PIPA MELAD office together with the New Zealand Department of Conservation, funded by the New Zealand Government's International Aid and Development Agency and overseen by the Pacific Invasives Initiative. A team of eradication experts, led by Dr. Ray Pierce, included members of the Kiribati Wildlife Conservation Unit and Department of Agriculture. Financial and technical resources for the eradications were also provided by Conservation International.

The long-term aim is to rid the Phoenix of all invasive species and prevent any new introductions. Eradicating invasive species is the first step in restoring these atolls. The work includes training PIPA management staff on further eradication efforts and raising awareness in Kiribati and the wider region about the threat of invasive species and to promote stronger biosecurity.

Toxic wastes:

Various toxic materials were left by the US military on Kanton after WWII. Some of these materials had leaked from their containers and had spilled onto concrete floors. Asbestos strips were common at former military sites on Kanton. Polychlorinated Biphenyls (PCB's) were found in transformers and probably also was present in switches and other electronic equipment. Toxic wastes were inventoried in 2002 and most were removed in 2006.

An explosives ocean dumping area was established south-westward of Kanton at the end of WWII. Coordinates for the dumping area are 3°09'S to 3°28'S, and 171°53'W and 172°13'W.

Vessel Groundings and Oil Spills:

The Phoenix Islands have had numerous vessel groundings over the years. One of the earliest recorded groundings was the whaler *Canton* on the island now called Kanton in 1854. Undoubtedly, there have been other groundings that were not permanent, did not result in vessel loss, or were not reported. Ships have caused localised coral damage during grounding and break-up. Ship grounding was also the most likely means by which the Asian rat was introduced to McKean Island.

(ii) *Environmental Pressures*

Climate change and sea level rise:

The effects of global climate change and global warming are expected to be experienced even in the remote areas such as PIPA. In fact PIPA is located in the part of the Central Pacific from which warm surface waters that drive the El Niño phenomenon originate. There have been various meteorological studies that suggested that the Phoenix Islands region is ideally placed for monitoring changes in weather patterns, especially ENSO activities in the central Pacific. The impacts of these changes could be amplified in the frail and unique ecosystems of the Phoenix Islands. Rising sea levels could submerge these atolls (though individual islands may be rising tectonically) and warming sea surface temperatures can result in coral bleaching.

Sea level rise is well documented throughout the world's oceans, but local data at the Phoenix Islands is lacking. Thus, the magnitude of changes in sea level and their impacts on PIPA ecosystems are currently speculative. The impacts of changes in atmospheric and oceanic chemical concentrations are also mostly unknown. However, the islands of PIPA could provide unique baselines for monitoring future changes at the Equator. In addition, analysis of coral cores from reefs never affected by prolonged human use or habitation may reveal historical patterns of variation in environmental factors.

In 2002, the Phoenix Islands experienced a bleaching event. Inside the lagoon of Kanton the luxuriant community of *Acropora spp.* corals suffered near 100% mortality and there was an estimated 62% mortality of corals along the reefs outside the lagoon. The fish populations were not as noticeably affected and a total of 153 species of fish were identified along transects. There is little or no significant input from any source of land based pollution on Kanton and no obvious populations of coral predators such as *Acanthaster planci*. The most plausible explanation for the mass mortality of coral species and coverage is death due to persistent, excessive water temperatures recorded in the Phoenix Islands by NOAA/NESDIS (www.osdpd.noaa.gov) from the months of August 2002 through March 2003. This case study is extremely important because these corals were devastated by a planetary phenomenon, not a local one.

The Phoenix coral reefs have shown spectacular and rapid signs of recovery. Very likely the healthy fish populations were helping to keep the reef from becoming an algae garden, and this significant vector assisted the reef to recover. Also, deeper water corals stayed in good shape during the bleaching event, species of fish remained robust, and there were signs of regeneration on even the most badly hit reefs shortly after the bleaching occurred. That is taken to be a positive sign and suggests both the resilience of the Phoenix Islands reefs to global climate change and the value of these remote island reefs as global benchmarks.

With the predictions of accelerated global warming, the tragic example of massive coral mortality in Kanton is both a clear example that global warming can have devastating implications for life and as well as a case study of how this reef and its fish populations may adapt and recover. Support should be given to conduct repeat studies on Kanton in order to closely observe the progress of the reef's recovery, and to support the Government of Kiribati with their exemplary efforts over the years to protect their reefs and fish stocks.

With the extent of damage which has occurred to corals after the bleaching in 2002, McKean Island offers a unique opportunity to learn about the recovery capacity of these islands following coral die-off events. The adaptation of the reef system to the drastic change in the coral community is another dynamic that warrants investigation. It could be argued that the scenario of catastrophic coral damage and recovery apparent now at McKean Island will become more the norm in a warming global environment, and thus McKean Island offers us an early preview of the consequences of this change (Pierce et al 2006).

Coral reef ecosystems are predicted to decline globally due to climate change. Signs of this are visible already even at well protected areas such as the Great Barrier Reef World Heritage site. The Phoenix Islands are situated far from anthropogenic stresses and pollution sources that often contribute to the destruction of reefs. This highlights the global importance of Phoenix Islands for safeguarding these fragile coral reef ecosystems for future generations.

Climate change is considered the most significant environmental risk to Kiribati as a nation and this includes significant potential risk to the development and integrity of the PIPA. The proposed GEF investment strategy for PIPA includes assessment and understanding of PIPA's ecosystem in order to incorporate strategies for resilience and adaptation in PIPA design and implementation. In essence the PIPA is a 'biological insurance policy' for Kiribati. The opportunity to conserve the resources of the Phoenix Islands, largely due to their isolation and absence of significant population, means that 1 of the 3 Kiribati island groups, the largest atoll nation in the world, can act as a significant storehouse of conserved resources and a buffer against environmental changes for the people of Kiribati.

(iii) Natural disasters and risk preparedness

Risk for sudden natural disasters in the Phoenix Islands is minimal. Main threats are occasional high waves washed ashore. In future sea level raise may also occur.

Phoenix Islands appear to be the focal point of El Nino in the Central Pacific. Effects are amplified there which can be seen in the great variation in annual rain fall and periods (years) of drought that have been experienced in various Phoenix Islands. This is also why the resettlement efforts in the late 1930s failed: no rain, drought, no freshwater.

Periodically emergencies and disasters could occur within the PIPA area. These include events such as hazardous material spills and vessel groundings. Both of these events can cause major environmental impacts to the sensitive marine and terrestrial resources in the Phoenix Islands. It is the responsibility of the vessel captain and vessel owner to clear their mess or meet costs incurred. Mechanisms need to be developed to deal with such emergencies. A chain of command is needed and protocols on how to assess and minimize the impacts of these occurrences need to be established before such events occur. The new management plan has a goal to develop an emergency disaster protocol for events such as hazardous material spills and vessel groundings within the PIPA area.

(iv) Visitor/Tourism Pressure

Currently very few visitors visit the Phoenix Islands and there are presently no regular tourism operations. Occasional visitors are normally ocean going yachts and by special boat charters for recreational divers and various researchers.

There may be a number of unregulated visitors to the Phoenix Islands. These are primarily private yachts that may anchor and stay on one of the Phoenix Islands for extended periods. All visitors are supposed to clear Customs and Immigration on Kanton upon arrival and departure from the country. However, this may not always be the case.

There are environmental concerns with unregulated visitors. These include: disposal of sewage and wastes, anchor damage to coral reefs, illegal collection and harvest of terrestrial and marine resources, disturbance of bird populations and potential introduction of invasive species. Yoshinaga (2002) reported that egg poaching was a significant activity on Kanton from residents and passing boats.

Future terrestrial threats include the potential for unplanned settlements and tourism developments, and possibly high-tech facilities related to satellite communication or space programs. However with the new management plan these threats will be addressed and regulated.

Due to the fragile nature of the islands, even short term exploitation can cause negative impacts. For example coconut crab populations were allegedly severely depleted by expeditions related to the search for the remains of Amelia Earhart on Nikumaroro but the coconut crabs have since recovered.

(v) Number of inhabitants within the property and the buffer zone

The only habitants on Phoenix Islands are government caretakers and their families (population approximately 50 people) on Kanton.

SECTION 5. PROTECTION AND MANAGEMENT OF THE PROPERTY

5. a) Ownership

The property is owned by the Sovereign State of Kiribati.

5. b) Protective Designation

Protected Area Status

The initial authority for designating PIPA as a Marine Protected Area was by decision of the GoK Cabinet in early 2006. This authorized the Minister of Environment, Lands and Agricultural Development, the Hon. Martin Puta Tofinga to declare the PIPA at the Biodiversity Convention COP8 meeting in March 2006 in Brazil. A copy of the announcement is attached to this nomination.

The PIPA was fully legally established in early 2008 with the adoption by the GoK Cabinet of the Phoenix Islands Protected Area Regulations 2008 under the Environment Act (1999) and its Environment (Amendment) Act 2007. At this time the Cabinet approved extension of the PIPA area from the originally declared 187,600 sq km to 408,250 sq km making PIPA the world's largest marine protected area. The PIPA Regulations 2008 as approved by the GoK Cabinet decision are attached to the nomination dossier.

Kiribati's main law relevant to protected areas is the Environment Act (1999) and its subsequent Amendment in 2007. Specific guidance is provided in the Act's Division 2 – Protected Areas (Sections 42 to 48) including for protected areas that are listed for World Heritage (Section 48). PIPA is established under sections 43(1) and 86(1) of the Act. A copy of the Environment (Amendment) Act 2007 is attached to this nomination.

It is important to note that the Environment (Amendment) Act 2007 gives special recognition and protection to listed World Heritage sites (Section 48) with a fine provision of up to \$100,000AUD and a maximum of 5 years in prison for an offence relating to a listed Kiribati World Heritage site (Section 28).

The PIPA Regulations 2008 have three key objectives:

- (1) "... to prescribe a protected area for the terrestrial and marine resources of the Phoenix Islands,
- (2) .. to prescribe particular license and permits for regulating certain activities in the PIPA and to establish a schedule of penalties..
- (3) ..to approve the nomination of PIPA to the World Heritage list."

The PIPA Regulations 2008 came into force in February 2008 and provide the commitment for PIPA to be nominated to the World Heritage List and gives specifications for PIPA's Management Plan consistent with furthering the obligations of the World Heritage Convention. These regulations give protected area status to all 8 atoll/islands, their lagoons and internal waters, adjacent Kiribati territorial sea and exclusive economic zone (EEZ) to the outer boundary specified. PIPA is considered to be Category Ib under IUCN protected areas categories: Wilderness Area: protected area managed mainly for wilderness protection. The PIPA Regulations specify the following:

- (1) Requirements of the PIPA management plan;
- (2) The PIPA Management Committee;
- (3) General conservation and management measures;
- (4) PIPA permit, licence and penalty provisions;
- (4) The status of DWFN fishing access agreements; and
- (5) Reporting requirements for the state on PIPA.

Additionally, Kiribati has codified national legal instruments regarding coastal and marine resource conservation. These are listed in the table below and have relevance for PIPA.

National legal instruments relating to marine and coastal resources in Kiribati/Phoenix Islands

Closed District Act ^{*4}	1990
Environmental Act ^{*1}	1999
Fisheries (Pacific Islands States' Treaty with the USA) Act ^{*2}	1988
Fisheries (Processing and Export) Regulations ^{*1}	1981
Fisheries (Vessel Licenses) Regulation (No. 1) ^{*1}	1982
Fisheries (Vessel Licenses) Regulations ^{*1}	1981
Fisheries Act ^{*1}	1977
Fisheries Amendment Act ^{*1}	1984
Fisheries Conservation and Protection Regulations ^{*1}	1979
Fisheries Ordinance ^{*1}	1977
Fisheries Regulations ^{*1}	1981
Foreshore and Land Reclamation Ordinance ^{*1,2}	1973
Importation of Animals Ordinance ^{*2}	1964
Land Planning Ordinance ^{*2}	1973
Local Government Act ^{*2}	1984
Marine Zones (Declaration) Act ^{*1,2}	1983
Merchant Shipping (oil pollution) ^{*2}	1975
Native Lands Ordinance ^{*2}	1956
Plant Ordinance ^{*2}	1975
Prohibited Areas Ordinance ^{*2}	1957
Prohibited Fishing Areas (Designation) Regulations ^{*1}	1978
Quarantine Ordinance ^{*2}	1931
Wildlife Conservation Ordinance (cap 100) ^{*1,2,3}	1975

*source:

1. Mangubhai (2002);
2. MLPID (1999);
3. Garnett (1983c); and
4. Pulea and Farrier (1993).

Closed District Act - The Closed District Act 1990 was a re-enactment of a 1936 ordinance and followed the Constitutional (Laws Adaptation) Order 1980 (Pulea and Farrier 1993). Under this law, Kanton, as well as Kiritimati, Tabuaeran, and Teraina were declared closed areas. Access was limited to permit holders. This was rescinded during President Tito's administration (in the mid 1990s).

Environment Act - Environment Act of 1999 and as amended in the Environment (Amendment) Act 2007.

The Fisheries (Pacific Island States' Treaty with the USA) Act - The Fisheries Act gave effect to the Treaty on Fisheries between the Governments of certain Pacific Island States and the Government of the USA (MLPID 1999). The Treaty allowed tuna purse seine vessels from the USA to fish in Kiribati waters (including the Kiribati EEZ around the Phoenix Islands).

The Fisheries Ordinances of 1977 and amendments, and the Fisheries Act of 1984 – These regulations and laws relate to marine tenure and resource use (MLPID 1999).

The Fisheries Act provided the regulatory framework for the operation of the fishery in Kiribati (Sharp n.d.). However, the Fisheries Act provided no guidance on fisheries conservation or sustainable development. Other key points of the Fisheries Act included:

- 1) Vessels over 7 m require a license;
- 2) Foreign vessels must have a permit prior to entry into the fishery; and
- 3) Fishing permits were issued annually with fees subject to negotiation.

Vessels involved in transshipping must also be registered and licensed and must pay transshipment fees (Sharp n.d.).

According to the Fisheries Act, the Minister has the power to make regulations on closed seasons, closed areas, size limits, gear limitations, and other measures as appropriate. Various fisheries regulations have been promulgated to manage the fishery including regulations for processing and export of fishery products and for vessel licensing. Kiribati Fisheries have implemented a zonation for the Phoenix Islands which includes a 60 nautical mile purse seine ban around Kanton Island and 12 nautical mile bans around all 8 atolls which close these waters to Distant Water Fishing Nations (DWFN).

In 2005 under the Fisheries Ordinance, Kiribati instituted the Line and Phoenix Islands Prohibited Fishing (Protection of Bonefish) Regulations. These provide strict regulations for local and tourist fishing of bone fish together with catch limits permit fees (tourists), gear ban (e.g. nets) and release of fish caught.

Foreshore and Land Reclamation Ordinance - The Foreshore and Land Reclamation Ordinance included the general provision that the State owns the foreshore and the seabed (MLPID 1999). However, the public has the right of navigation, fishing and passing over the foreshore.

Importation of Animals Ordinance – The Importation of Animals Ordinance regulated the importation of animals (MLPID 1999).

Land Planning Ordinance - The Land Planning Ordinance provided for control of development and use of land (MLPID 1999).

Local Government Act - The Local Government Act gave the local island councils wide-ranging functions, including regulation of local fisheries (MLPID 1999).

Marine Zone (Declaration) Act – The Marine Zone (Declaration) Act related to the internal waters, archipelagic waters, territorial sea, the EEZ, and the contiguous zone of Kiribati (MLPID 1999).

Merchant Shipping (oil pollution) Order - The Merchant Shipping (oil pollution) Order was the application of the UK Merchant Shipping (oil pollution) Act of 1971 (MLPID 1999).

Native Lands Ordinance of 1956 – The Native Lands Ordinance relates to land tenure (MLPID 1999).

Plant Ordinance - The Plant Ordinance provided for the protection of endangered or culturally important plant species (MLPID 1999).

Prohibited Areas Ordinance 1957 – The Prohibited Areas Ordinance had a provision for setting aside areas for nature conservation purposes (Pulea and Farrier 1993). Unauthorized persons were not allowed into prohibited areas (GEIC 1977a). Under this ordinance, Birnie, Kanton, Enderbury and Orona (Hull) were declared protected areas (L.N. 46/72; see GEIC 1977a).

Quarantine Ordinance - The Quarantine Ordinance regulated importation of agricultural and other products that may harbour dangerous pathogens (MLPID1999).

Wildlife Conservation Ordinance of 1975, amended in 1979 – The Wildlife Conservation Ordinance covered the conservation of wildlife (Anon. 1985). For a full text of the Wildlife Conservation Laws (Chapter 100) see GoK (1977), and GEIC (1977b).

The Environment Act Amendment (2007) has attempted to harmonise previous laws and regulations related to the environment. There may still be some inconsistencies between various laws, regulations, and treaties that are related to the Phoenix Islands. Rationalisation is provided for in the PIPA Management Committee established under regulation and inclusive of all government agencies with a responsibility/stakeholder interest in the Phoenix Islands. Capacity to effectively implement existing laws and regulations is limited; however, PIPA is seen as an opportunity to integrate management of the Phoenix Islands, inclusive of all sectoral interest.

International and Regional agreements and instruments relating to marine and coastal resources in Kiribati/Phoenix Islands

Additionally, Kiribati has made various commitments to international and regional, legal instruments regarding biodiversity and coastal and marine resource conservation. These international and regional agreements are listed in the table below.

Legal Instrument	Year
International	
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention)	1982
Nuclear Non-Proliferation Treaty	1985
Convention on Biological Diversity	1992
UNFCCC United Nations Framework Convention on Climate Change	1993
World Heritage Convention	2000
Maritime Pollution Convention (MARPOL)	
International Convention for the Control and Management of Ships' Ballast Water and Sediment (BWM Convention)	2007
Regional	
Convention on Conservation of Nature in the South Pacific (Apia Convention)	1976
Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest	1982
Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (SPREP Convention)	1986
South Pacific Nuclear Free Zone Treaty (Rarotonga Treaty)	1986
Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the USA	1987
Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific (Tarawa Declaration)	1992
Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific (Niue Treaty)	1993

Kiribati has announced PIPA as one of its primary commitments to obligations under the CBD (2006). At this time Kiribati also placed PIPA as its first commitment to GLISPA (Global Island Partnership) which is internationally recognized as an important implementation mechanism for the CBD Island Biodiversity Programme of Work.

Protected Status of Phoenix Islands Resources:

Protected Species have been prescribed by the Wildlife Conservation Ordinance 1975. The current situation with regard to species protection in the Phoenix Islands is presented below drawn from existing laws and regulations and measures agreed in PIPA's interim management. The new management plan (preparation and approval required by PIPA Regulations by February 2009) will support these and add further protection for key species within PIPA.

Birds -. In Schedule 1 of the Wildlife Conservation Ordinance, fully protected birds are listed (table below).

Birds fully protected throughout Kiribati (including the Phoenix Islands).

(Source: GEIC 1977b)

Local Name	English Name	Scientific Name
1. Te Eitei, Katafa	Great Frigatebird	<i>Fregata minor</i>
2. Te Eitei	Lesser Frigatebird	<i>Fregata ariel</i>
3. Te Taake	Red-tailed Tropicbird	<i>Phaethon rubricauda</i>
4. Te Ngutu	White-tailed Tropicbird	<i>Phaethon lepturus</i>
5. Te Mouakena	Masked or Bluefaced Booby	<i>Sula dactylatra</i>
6. Te Kibui	Brown Booby	<i>Sula leucogaster</i>
7. Te Kota, Makitaba	Red-footed Booby	<i>Sula sula</i>
8. Te Korobaro	Wedge-tailed Shearwater	<i>Puffinua pacificus</i>
9. Te Tinebu	Christmas Island Shearwater	<i>Puffinus nativitatus</i>
10. Te Nna	Audubon's Shearwater	<i>Puffinus inherminieri</i>
11. Te Tangiuoua, Ruru	Phoenix Petrel	<i>Pterodroma alba</i>
12. -	Bulwer's Petrel	<i>Bulweria bulweri</i>
13. Te Bwebwe ni marawa	White-throated Storm Petrel	<i>Nesofregata albigularis.</i>
14. Te Tiriwenei	Pintail Duck	<i>Anas acuta</i>
15. Te Kaai	Reef Heron	<i>Demigretta sacra</i>
16. Te Mangkiri, Takiri	Black or Whitecapped Noddy	<i>Anous tenuirostris</i>
17. Te Kunei, Io	Brown or Common Noddy	<i>Anous stolidus</i>
18. -	Blue-grey Noddy	<i>Proceisterna caerulea</i>
19. Te Tarariki, Kereekere	Sooty Tern	<i>Sterna fuscata</i>
20. Te Tarangongo	Grey-backed Tern	<i>Sterna lunata</i>
21. Te Kiakia	Black-naped Tern	<i>Sterna sumatrana</i>
22. Te Karakara	Crested Tern	<i>Thalasseus bergi</i>
23. Te Matawa	White or Fairy Tern	<i>Gygis alba</i>
24. Te Kun	Pacific Golden Plover	<i>Pluvialis dominica</i>
25. Te Kitiba, Kolili	Rudy Turnstone	<i>Arenaria interpres</i>
26. Te Kewe	Bristle-thighed Curlew	<i>Numenius tahitiensis</i>
27. Te Kiriri	Wandering Tattler	<i>Heteroscelus incanus</i>
28. Te Kaka	Bar-tailed Godwit	<i>Limosa lapponica</i>

Green turtles - Under the Wildlife Conservation Ordinance (Chapter 100 Wildlife Conservation), green turtles - their eggs and nests, were protected in most of the Phoenix Islands, excluding Kanton and Enderbury (Anon. 1985; see also Dahl 1980; see also GoK 1977 and GEIC 1977b). According to Pulea and Farrier (1993), the green turtle was fully protected in the following designated areas: Birnie, Nikumaroro (Gardner), Orona (Orana, Hull), McKean, Rawaki (Phoenix), and Manra (Sydney). Prohibited acts included: (1) hunting, killing or capturing, (2) possession of any part, (3) searching for, taking, or wilfully

destroying or damaging eggs and nests, and (4) possession, acquiring, selling or giving eggs or nests. Pulea and Farrier (1993) note that green turtles were protected on certain Phoenix Islands, but were not protected at sea.

Other turtle species - Other marine turtles were protected on land by Section 7 of the Wildlife Conservation Ordinance (Pulea and Farrier 1993). Hunting, capture, and killing other marine turtles while on land were prohibited without a permit. However, like the green turtle, they were not protected at sea.

Tuna – Under Kiribati’s Fisheries law a 60 nautical mile purse seine exclusion zone applies around Kanton Atoll. Additionally all DWFN effort is banned in a 12 nautical mile zone around each of the Phoenix Islands atolls. Further under recent sub regional arrangements (Nauru Agreement) Kiribati has agreed to ban the use of FADs for fishing for 3 months (July to September) for all DWFN and instituted a mandatory 100% observer coverage. These and related measures are now in force under the 3rd Arrangement under the Nauru Agreement and are being progressively phased in as DWFN licenses (largely annual except for USA purse seiners) expire.

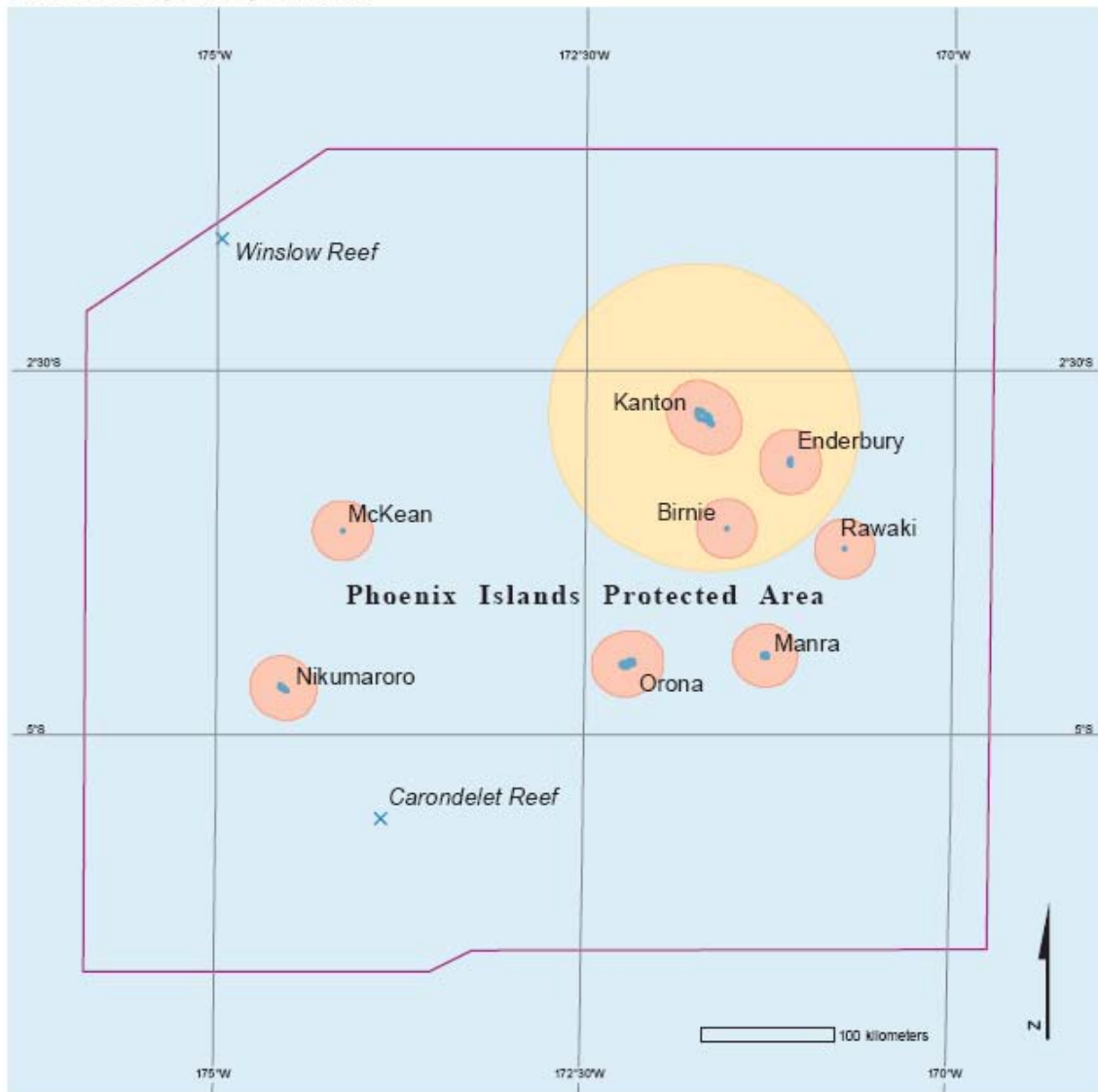
Bonefish – Under the Fisheries Ordinance the catching of bone fish was strictly regulated in 2005, restrictions include method (gear type) and amount of catch, catch and release and fees for tourism fishing.

Additional protective measures taken as part of PIPA’s interim management:

As part of PIPA Permitting and Biosecurity measures under implementation during the management plan process additional restrictions on visitors (researchers, tourists, and operators) have been made (refer to PIPA Visitor Guidelines attached). This includes a fee structure and specific rules consistent with the current PIPA Zonation (see below). Six permits have been issued to date under this interim regime: TIGHAR (2), Pacific Expeditions (2), NEAq (1) and the University of Hawaii (1).

PIPA Zonation Phase 1 – the current PIPA Zonation is given below.

PIPA Phase 1 (current) Zonation



A more detailed version of this map is given in Appendix 5.

The management implications of the current zonation are summarised below.

1. All 8 atolls, and their internal waters and lagoons (if any), are now designated as protected areas for the purposes of conservation and sustainable use. Only one atoll Kanton is inhabited and it is this atoll where take of natural resources is allowable for subsistence purposes by the government caretaker population (<50 people).
2. In the area within 12 nautical miles around each of the Phoenix Islands, except Kanton, all fishing is banned, except for catch and release of bonefish by rod and reel. However, a visitor should obtain a permit to conduct this type of activity.
3. A 60 nautical mile purse seine exclusion zone around Kanton is designated.

4. The area between 12 nautical miles and the outer boundary of the PIPA allows fishing by DWFN as per their license or agreement provisions (note 3 above). Other visitors (researchers, tourists) are allowed to fish for tuna species for subsistence purposes while in PIPA, other species must be released (e.g. billfish).
5. The area within 12 nautical miles of any of the eight Phoenix Islands and Winslow and Carondelet reefs are designated areas to avoid. Vessels that are solely transiting the PIPA area are to avoid these areas; however, a visitor can obtain a permit for recreational activities.
6. The area within 12 nautical miles of any of the eight Phoenix Islands is designated for no discharge of ballast or sewage water, or rubbish.

Phase 2 Zonation parameters have also been agreed by PIPA MoU partners (GoK, CI, NEAq) (see attached draft Map for Phase 2 Appendix 6)), however the exact placement of additional no-take zones is under discussion at the time of the nomination file's preparation and the map is considered as the current draft favored option only and will require the agreement of the GoK. Pelagic no-take zones will be further extended beyond the 12 nm as resources from the endowment allow. Three further phases are envisaged. Phase 2 objective is to designate an additional 25% of PIPA as a no-take zone to Phase 1 (current) Zonation. This conservation design will focus on complete protection of 7 atolls/islands and associated coral reef systems, the two semi-submerged reef systems, and seamounts. Kanton atoll will receive further attention and more detailed zonation as a multiple use area to accommodate the subsistence needs of the caretaker population. Other areas where fishing would be allowed are the shallow tuna fisheries in epi-pelagic zones, which are the only licensed activities. This zonation plan completely protects and manages the coral reef communities and creates a de facto buffer zone around the archipelago, but initially allows some extraction from the more productive pelagic tuna fisheries. This objective is broadly consistent with the example set by Australia's Great Barrier Reef Marine Park, where about 30% of the MPA is a no-take zone. The additional 25% no take zone added to the PIPA Phase 1 (current) Zonation will mean that just over 28% of the PIPA area is completely protected from commercial fishing.

5. c) Means of implementing protective measures

PIPA Management 2005-2007

In August 2005 the GoK and partners NEAq and CI agreed a MOU to design and establish PIPA. This was based on results of two scientific expeditions and extensive consultations amongst the partners. GoK formally declared PIPA in March 2006. From 2006 until February 2008 all activities in PIPA were overseen and decided upon the Phoenix Islands Steering Committee (PISC). Whilst the focus of this Committee's effort was on the design and full establishment of PIPA numerous management decisions and protective measures were also instigated during this time including:

- 2005 assessment of coral reef bleaching recovery and associated reef and atoll monitoring
- 2006 assessment of status of protected bird species
- 2006 assessment of impact of invasive species and feasibility of priority eradications, and
- 2006 prosecution of illegal shark finning

PIPA Management 2008- 2009

PIPA is established under the Environment (Amendment) Act 2007 and is covered by all legal processes under this law. Any infraction of the law is subject to fines or imprisonment (the standard court procedure).

The PIPA Regulations (2008) have given full legal establishment to PIPA. Under the Regulations the PISC is now formally established under law as the Phoenix Islands Protected Area Management Committee. Its membership is based on the earlier PISC and is inclusive of all government agencies (12) with a responsibility for the Phoenix Islands (refer to attached PIPA Regulations). The PIPA-MC is chaired by the Secretary of Ministry of Environment, Lands, and Agricultural Development (MELAD) and it meets regularly with meeting decisions and follow-up implementation well documented and reported by the PIPA Director. It is noted that significant government (12 agencies) and NGO staff time from within Kiribati has been given to the PIPA developments to date.

The PIPA Management Committee is tasked with finalizing a PIPA Management Plan within one year of the coming into force of the PIPA Regulations (i.e. by February 2009). A draft Management Plan has been prepared (attached to nomination) and is on track for finalization by this time. A companion draft Implementation Plan has also been prepared and a preliminary cost analysis has been conducted made.

In the interim the PIPA Management Committee has agreed and successfully implemented, with various partners, management actions which implement PIPA Regulations (2008) and are aimed at increasing protection of PIPA. These include:

- Successful 2008 Invasive Species Eradication Mission (NZODA, NZ-DOC, MELAD, Pacific Invasives Initiative, Pacific Expeditions)
- Visitor Permit system and associated Rules, Regulations and Fees
- Research Permit System and associated Rules, Regulations and Fees
- Tourism Operator Permit system and associated Rules, Regulations and Fees, and
- Completion of PIPA Resource Valuation, Endowment Strategy and draft Trust fund legislation

The 2008 Invasives Eradication Mission led by Dr Ray Pierce has eradicated rabbits from Rawaki Island and Asian rats from McKean Island. Additionally there has been significant training and capacity building undertaken to improve biosecurity in both Line Islands (Kirimati) and as part of the Phoenix eradication mission. Follow up visits and monitoring is scheduled for 2009 to ensure that the eradications have long term success in removal of these pest species. Eradications of these pests paves the way for atoll restoration and seabird recovery (18 species) in not only these two atolls but also more widely in the Phoenix Islands.

Further, the current zonation plan (see above) has been agreed and is being used. Fisheries surveillance and enforcement has continued during this time as well as the annual GoK patrol vessel visits. Currently the Governments of Australia, New Zealand and France provide aerial surveillance of the Phoenix Islands area and positive discussions indicate that Australia and New Zealand will consider increasing surveillance and enforcement effort. Specific cooperation to assist with surveillance and enforcement technology and capacity building is under discussion with the USA's Papahānaumokuākea Marine National Monument. Through discussions with Fisheries and the FFA (Forum Fisheries Agency) a 'geofence' will be

instituted around the PIPA boundary alerting Fisheries officials in the regional agency and in Kiribati to the entry /exit/location in real time of any VMS vessel in PIPA. Further, under the 3rd Arrangement to the Nauru Agreement Kiribati has instituted, together with 7 other Pacific Island states, a mandatory 100% observer coverage on DWFN vessels. This is now being phased in with all new licenses (largely annual). For PIPA this means that all legal vessels will have observer coverage and be able to be tracked (VMS) in real time, they can also act as an additional surveillance tool to detect illegal/non licensed vessels.

Additionally, Kiribati has signed a Declaration on Deep-Sea Bottom Trawling to Protect Biodiversity in the High Seas (Nadi Communiqué, Pacific Islands Forum, October 2006) which commits the members of the Pacific Islands Forum to urgently take actions consistent with international law to prevent destructive fishing practices on seamounts in the Western Tropical Pacific Islands Area.

Visitors (researchers, tourists) to PIPA are now required under their permit to report other vessels and key research trips also undertake follow up monitoring and observations for PIPA management on areas beyond their primary objective e.g. the June 2008 invasive species eradication mission also made marine mammal/turtle observations and reported fishing vessels they saw in the area.

Surveillance and enforcement are a key priority in PIPA. Maximal use of resources and support has been made to date; with the expected operation of the GEF Pacific Alliance for Sustainability PIPA project in 2009 -2011 further capacity and resources are targeted to this area. It is noted that in this isolated area vessels go there for a purpose – they do not merely transit as it is too ‘off the track’ – thus this isolation point alone restricts vessels coming to PIPA.

No development permits are being issued by the GoK at this time and are not envisioned until the management plan is finalised. Those activities compatible with conservation are being approved (primarily research).

Kiribati’s management of PIPA to date has continually demonstrated significant commitment of their domestic resources (e.g. staff time) and effective use of currently limited financial resources and capacity to achieve outstanding gains in protected area management. Further, in Kiribati there is increased interest from civil society to engage with PIPA (FSP, KANGO, Theo, EcoCare). However it is recognised that this is not yet sufficient and work is well underway for a significant increase in resources and capacity and tools to ensure effective PIPA management. This currently includes:

- Finalization of PIPA Management Plan (by February 2009, required by Regulation) and associated finalization of first Implementation Plan.
- Establishment of PIPA Trust Fund and associated structures under Kiribati Law (draft legislation has been prepared and is expected to be adopted in early 2009).
- Implementation of agreed Phased Approach to capitalization of the PIPA Endowment and terms of Conservation Contract which cover compensation to GoK for tuna fishing access fees (commensurate with 25% closure additional to current zonation) and management plan implementation costs not covered by other grants.
- Extension of PIPA GoK/NEAq/CI MOU - extends work on the Trust Fund, Endowment, Research and Management Plan implementation for a further 2 years with core resources secured from CI’s Global Conservation Fund (GCF) and NEAq

(>\$420,000 USD from 2008-2010). This is in addition to the original \$450,000 commitment to date by CI's GCF.

- Finalisation of GEF Pacific Alliance for Sustainability (PAS) – PIPA project. GEF PAS have made a provisional commitment of \$1 Million USD to the PIPA with UNEP as the agreed Implementation Agency. The PIPA Project Identification Form (PIF) has been finalized and project documentation is in preparation.

Discussions on further support are also underway with existing and potential partners as follows:

- Government of New Zealand – technical and financial support to further atoll restoration initiatives in the Phoenix and Line Islands.
- Government of Australia – assistance with World Heritage nomination of PIPA, technical and financial support to further atoll restoration initiatives, further technical advice from GBRMPA.
- Government of the USA – partnership for entire Phoenix archipelago management (USA has northern Howland and Baker atolls) under the 1979 USA Kiribati Treaty of Friendship, cooperation discussions with Papahānaumokuākea Marine National Monument, investigation of cooperation with the proposed new USA Marine National Monument in the central Pacific which includes Howland and Baker in the Phoenix archipelago.
- Critical Ecosystem Partnership Fund – Polynesia/Micronesia Hotspot for invasive and threatened species actions.

Under the GoK/NEAq/CI MOU partners are actively fund raising for the agreed first phase of the PIPA Endowment. CI's GCF has confirmed an initial \$2.5 million USD subject to matching funding.

In summary, PIPA is in an interim stage of its management and development with clearly agreed interim management measures and follow up actions undertaken with significant success to date. Clearly a number of significant and outstanding achievements e.g. eradications of invasive species have been made during this time. Additional resources have been secured and new partnerships are being actively fostered. A draft Management Plan has been developed and is being revised to ensure full consistency with the new PIPA regulations. At the current time all activities related to the Phoenix Islands are reviewed and approved as appropriate by the PIPA office and PIPA-MC with official approval by the Minister of Environment, Lands, and Agricultural Development (MELAD). This includes any research, economic development or other activity.

5. d) Existing plans related to municipality and region in which the proposed property is located (e.g. regional or local plan, conservation plan, tourism development plan)

The only previous management plan for the Phoenix Islands was prepared by Garnett in 1983. It focused mainly on terrestrial resources and was never effectively implemented.

Pierce et al (2006) developed pest eradication plans for the Phoenix Islands. The plans are partially implemented (first priority eradications) and follow up is included in the draft management plan attached to this nomination.

Permit conditions for researchers, tourism operators and visitors to PIPA have been instituted (see above) together with fees and related rules.

GoK is developing a new national tourism plan and the development of PIPA's tourism is being integrated into this plan together with tourism issues being addressed by the new Management Plan.

The PIPA Management Committee is finalizing the first PIPA Management Plan by February 2009 consistent with the PIPA Regulations (2008). In the interim an agreed set of management activities have been endorsed and are being implemented (see above).

5. e) Property management plan or other management system

The first PIPA Management Plan is under preparation and the draft is attached to the nomination. The PIPA Regulations 2008 require its finalization by February 2009 and it is on track to achieve this. The Regulations stipulate that pending adoption of the management plan, no activity that takes place in or effects the PIPA or places at risk the ecological integrity of the PIPA shall be licensed, approved or undertaken by any public authority without the express written authorization of the Minister. As described above a series of interim management measures have been agreed have been acted on whilst the plan is being finalized.

PIPA Regulations 2008: Key Management Provisions	Interim Management Measures/Response	Draft Management Plan
5(1) New outer boundary updated in regulations	New boundary basis for management	New boundary is now basis for management
5(3) Nomination to World Heritage listing	Nomination file preparation 2007-2008 with submission planned by 1 February 2009	Currently reflects nomination process in first phase of management plan implementation.
5(4) recognised & managed as IUCN Category 1b Wilderness Area	All interim measures checked for consistency with 1b categorization.	Recognises this categorization and provides mechanism to sustain these wilderness values.
6 (1) PIPA Management Committee	Established and operational.	Will continue to operate as per Regulations with additional management capacity planned.
6(2a) Management Plan	Interim management measures agreed and actions during plan preparation.	Management Plan required to be completed by February 2009, the draft plan was prepared in advance of Regulations and agreement of phased Endowment Strategy and the draft Management Plan is currently been updated to be fully consistent with the regulations and agreements and to reflect new resource availability (e.g. GEF PAS).
6(4) Zonation	Phase 1 (current) Zonation agreed & under implementation (Map attached) Phase 2 Zonation parameters of additional 25% no take zone agreed (draft Map attached) & rationalized against the agreed Endowment	Will continue to implement Phase 1 (current) Zonation & implement Phase 2 Zonation as endowment resources allow (expected time frame for transition 3 years). Further increase in no take zones enabled under regulations and revisions of management plan as resources

	Capitalisation Strategy	(endowment) allow.
6(6) Monitoring Programme	Climate change and coral bleaching – long term temperature loggers in place since 2002, marine monitoring and survey expeditions June 2005, and part of Atoll Restoration and monitoring in June 2006, August 2008. Atoll Restoration and monitoring PIPA baseline and monitoring trips (June 2006, June 2008 – eradications, August 2008, planned partial in October 2008, June 2009) – these are secured Marine mammals and turtle monitoring covered in 2005/6/8 (2)/and proposed for 2009. Deep sea base line assessment and monitoring programme resourced for first survey in 2009.	Monitoring programme is a key part of the draft Management Plan
8(2) Management Principles/Objectives	These guide current interim management.	Reflected in draft management plan.
10 PIPA permit, license and penalties.	Visitor (researcher, tourist, tourism operator) PIPA permit, license and fees together with required conditions (e.g. biosecurity) developed and being used (4 permits issued to date).	The current permit process will be the basis for this activity in the Management Plan; will need to ensure capacity on Kanton to participate in PIPA permit process.
11. Savings & Transitional - Fisheries Management	3 rd arrangement under Nauru Agreement has come into force and provides for additional pelagic fisheries conservation measures including: <ul style="list-style-type: none"> • 100% observer coverage (at DWFN cost) • Ban on purse seine use of FADs (Fisheries Aggregation Devices) from July to September each year - this protects juvenile tuna • Restrictions on DWFN in adjacent high seas if they want to fish in Kiribati EEZ 	Draft Management Plan will be updated to reflect new pelagic fisheries management measures

Please refer to draft Management Plan for more detail on the above aspects. This Management Plan will be finalized during the WHC nomination process and will be provided to WHC when completed.

The following summarizes the draft PIPA Management Plan contents.

The **vision** for PIPA is:

“to conserve and manage the natural and cultural heritage of the Phoenix Islands for the sustained benefit of the peoples of the Republic of Kiribati and the world.”

There are a number of **guiding principles** that form the foundation of the plan, namely: intergenerational equity, ecological sustainability, the precautionary principle, integrated planning and management, stakeholder consultation and participation, capacity-building and technology transfer, adaptive management, ecosystem approach, resilience, and transparency of decision making. These are explained in further detail in the draft management plan.

The draft plan has several **goals and objectives**. These include the following:

- (1) to protect and manage substantial examples of marine and terrestrial systems to ensure their long-term viability and to maintain the distinctive genetic diversity and natural values and beauty;
- (2) to protect depleted, threatened, rare or endangered species and populations such as whales, green turtles, and migratory seabirds, and, in particular, to preserve natural habitats considered critical for the survival of such species;
- (3) to protect and manage areas of significance to the lifecycles of economically important species such as tuna;
- (4) to prevent outside activities from detrimentally affecting the marine and terrestrial protected areas such as nesting sites for green turtles and migratory birds;
- (5) to preserve, protect, and manage historical and cultural sites such as the ancient Polynesian marae structures in the Phoenix Islands and natural aesthetic values and beauty of marine and terrestrial areas, for present and future generations;
- (6) to facilitate the interpretation of marine and terrestrial systems for the purposes of conservation, education, and tourism;
- (7) to accommodate within appropriate management regimes a broad spectrum of human activities compatible, including ecologically sound tourism and economic development, with the primary goal of preservation of the marine and terrestrial environment, naturalness, beauty, and distinctive habitats and species of the PIPA;
- (8) to provide for research and training, and for monitoring the environmental effects of human activities, including the direct and indirect effects of development activities.

The objectives listed above will be achieved by the application of specific management strategies. These include:

- (1) PIPA Management Committee/Authority;
- (2) PIPA Managing Director;
- (3) Advisory committees;
- (4) Interagency agreements or agreements with private agencies;
- (5) Boundaries;
- (6) IUCN category;
- (7) Zonation;
- (8) Cooperation and collaboration;
- (9) Laws, regulations and rules;
- (10) Resource studies;
- (11) Resource management; and
- (12) Interpretation of resources.

The draft plan gives detailed guidance on conservation and management measures for PIPA. These include environmentally significant activities that require an environmental license

under the Environment (Amendment) Act 2007, fisheries conservation, vessel operations, use of living and non-living resources, and visitors. Permit and license requirements for specific activities such as research, recreational fishing and visitation are provided for.

Since the PIPA area is so large, the task of effective management (including surveillance and enforcement) is a significant but not insurmountable challenge. In addition to surveillance support from the NZ and Australian programmes and regional fisheries agencies (FFA) and in order to assist in the detection of illegal activities, visitors and residents are also required to assist with monitoring, control and surveillance and to report any suspicious activities. It is also noted that the mandatory 100% observer coverage being instituted by Kiribati under the 3rd Arrangement of the Nauru Agreement will significantly help surveillance. Adequate enforcement capacity in the Phoenix Islands supported by capacity in Tarawa and Kiritimati Island are a key challenge for the management plan to be resourced and effectively implemented.

Also separate to the management plan are the efforts to establish a Trust Fund to support PIPA operations and to compensate GoK for lost DWFN access fees from fishing fleets that fished in the PIPA area (see below).

5.f) Sources and levels of finance

PIPA has been developed and resourced to date under a partnership (MOU) between the Government of Kiribati, New England Aquarium and Conservation International. In this arrangement the partners have committed significant resources that can be summarised as:

- GoK – significant staff time from more than 12 government agencies in the design, establishment and operation of the PIPA to date. This includes senior level commitments e.g. the Secretary of MELAD chairs the PIPA Management Committee, hosting the PIPA office at MELAD, facilitating endowment negotiations (Secretary to Cabinet) to key operational staff e.g. Wildlife Conservation Unit and Agriculture staff working on PIPA invasive species eradications. GoK has also expressed strong interest to contribute, from its existing national Trust Fund, a contribution to the PIPA Trust Fund.
- NEAq – has provided and facilitated scientific and legal advice and secured resources from key foundations e.g. Oak Foundation for PIPA work. NEAq has also continued to provide significant staff time to the PIPA project.
- Conservation International – CI's Global Conservation Fund and Pacific Islands Programme continue to commit resources for PIPA design and operation. From 2004-2008 this amounted to more than \$450,000USD and consisted of key PIPA office operations, technical and planning support, research and monitoring costs. CI has committed a further \$420,000USD for core PIPA operation from 2008-2010. CI's GCF has secured a first contribution to the PIPA Trust Fund of \$2.5 Million USD (subject to match provisions) and together with GoK and NEAq is actively fund raising. A further \$57,000 USD has been secured from CI's Marine Managed Area Science Programme for deep sea assessments and connectivity analyses.
- Critical Ecosystem Partnership Fund (Governments of Japan, France, MacArthur Foundation, CI, GEF) has provided initial funding for invasive species and seabird assessments (\$80,000USD). In the second phase of the CEPF in this region further support is envisaged for follow up atoll restoration and biosecurity measures.

- Government of Australia – has been a consistent and strong supporter of the PIPA throughout its genesis. In 2006 Australia’s RNHP (Regional Natural Heritage Programme) granted \$240,000 AUD for PIPA design and establishment costs. Further Australia provided funding and expertise for a joint Kiribati and Australia mission to the Phoenix Islands that successfully removed toxic chemical wastes (POPs) in 2005. Australia has also provided expertise and related funding to support the PIPA WHC nomination.
- Government of New Zealand – NZODA has been the primary donor to the atoll restoration with a commitment of more than \$360,000 NZD.
- UNESCO World Heritage Centre – Netherland Funds in Trust has provided more than \$30,000 USD and significant staff time to the PIPA nomination process. Previously World Heritage Fund and France-UNESCO Convention have provided support for Kiribati’s tentative listing process for approximately \$ 40,000 USD.
- GEF Pacific Alliance for Sustainability – has committed \$1Million USD to the PIPA – project documents are currently in preparation.

In order to ensure the long-term sustainability of the PIPA, the MOU partners (GoK, NEA and CI’s Global Conservation Fund) have agreed to jointly establish a Trust Fund, which will be an autonomous long-term financing vehicle with an independent governance and management structure. The Trust will:

- (1) be the licensee under the ‘reverse fishing license’ / ‘conservation contract’ with the GoK, under which the Trust will compensate the GoK for certain lost fishing revenues resulting from the creation of the PIPA;
- (2) issue annual grants to the GoK to assist with the costs of managing the PIPA; and
- (3) seek to generate and coordinate international, national and local support for the protection of the marine and terrestrial ecosystems in and around the PIPA.

Trust Fund legislation has been drafted and scheduled for submission to Parliament in December 2008.

The MOU partners are currently in the final stages of fully realizing the PIPA. This stage has three components: (1) the creation of the PIPA (completed) and the management plan (in draft); (2) the resource valuation (completed); and (3) the creation of the Trust (draft legislation based on agreed design together with agreed phased endowment strategy). Key elements of the endowment strategy in its first phase aim for a US\$ 25 million endowment and 25% no-take zone in addition to the existing zonation. This would completely protect the atoll terrestrial environs, core coral reefs associated with the atolls and submerged reef systems, noting that the subsistence use of resources from Kanton Atoll by the local caretakers will remain. This endowment strategy will also support the PIPA Trust Fund operation and Management Plan implementation costs (prioritized and in addition to grant funding).

5. g) Sources of expertise and training in conservation and management techniques

The Phoenix Islands are the focus of a joint conservation management project between the Government of Kiribati and the New England Aquarium and Conservation International (CI), which will provide support for protection of the islands’ World Heritage values. The attached MOU gives further details on this and parties have agreed to extend the MOU for a further two years from October 2008.

GoK's PIPA Director Mr. Tukabu Teroroko has more than 35 years working experience with GoK, including as Secretary of the Ministry of Fisheries and MELAD and as such is superbly placed expertise for PIPA development.

Both CI and NEAq continue to prioritise significant staff resources to support the PIPA process. NEAq's Dr Greg Stone gives international leadership and profile to the PIPA project together with international expertise from NEAq scientists. CI's regional programme allocated 35% time of the CI Pacific Islands Marine Director (Sue Miller Tabei) to the PIPA. Ms. Tabei has more than 20 years working experience in MPAs in the Pacific Islands region including working for and with (GEF, World Bank, SPREP, UNDP, IUCN, WWF, IFAW, CRISP and CI). Further CI has donated significant trust fund and legal expertise to the process.

All projects and partnerships fostered under the PIPA programme have an in-built expertise sourcing, training and capacity building components e.g. the PIPA 2008 invasive species eradication programme.

Additionally expertise and training opportunities have been accessed from SPREP, SPC (Secretariat of the Pacific Community), MIC (Micronesians in Island Conservation), The Nature Conservancy, University of the South Pacific, Governments of Australia, New Zealand and USA. PIPA continues to foster these opportunities to build local capacity for PIPA's conservation and management.

5. h) Visitor facilities and statistics

Currently very few visitors arrive to Phoenix Islands. No regular tourism visits are arranged at the moment. Occasional visitors are normally ocean going yachts and by special boat charters for recreational divers and various researchers. There may be a number of unregulated visitors to the Phoenix Islands. These are primarily private yachts. All visitors are mandated to apply for permits from the PIPA office (with associated fees) and to clear Customs and Immigration on Kanton upon arrival and departure from the country. This is working well for research and tourism operators but is as yet not sufficient for private recreational vessels visiting PIPA. The PIPA website is being updated to help address this. A database has been developed to keep records of visitors to PIPA.

There are no facilities for visitors except for the local community's hospitality and some very old buildings left from WWII and the 1950s in Kanton. There is also an old runway for large aircrafts and a port there that is still functional and used by inter-island vessels.

5. i) Policies and programmes related to the presentation and promotion of the property

PIPA, as the strategy for conservation and sustainable use of the Phoenix Islands is recognised and supported at the highest levels of government (e.g. President Tong's Policy Statement) and reflected in the new National Development Strategy (NDS) and in Kiribati's National Biodiversity Strategy and Action Plan (NBSAP).

PIPA is the declared first substantial commitment by Kiribati to the implementation of the Convention on Biological Diversity and has received priority attention in the GEF Pacific Alliance for Sustainability, indeed it is the only named protected area for support which

recognizes this new scale of investment in PAs in the region under this programme. PIPA is a direct fit and unparalleled opportunity to work at meaningful scale (integrated whole island archipelago management) with significant contribution in PIPA's first phase across 5 GEF Strategic Programmes (BD-SP1-PA Financing, BD-SP2-Marine PA, BD-SP7-Invasive Spp, IW-SP1-Coastal Marine Fisheries, CC-SP8-Climate Change Adaptation). In this first stage of GEF support to PIPA funding will be received under the Biodiversity Focal Area.

PIPA is also Kiribati's commitment to the Global Island Partnership (GLISPA) - a partnership between Island jurisdictions that developed during the Mauritius International Meeting in January of 2005 and is recognized as a key implementation mechanism for the CBD's Islands Biodiversity Programme of Work. The importance of the Phoenix Islands is also recognised in the World Heritage Pacific 2009 Strategy and proposed Central Pacific Transboundary Site. PIPA is a recognized demonstration site for the NZ funded PII (Pacific Invasives Initiative). PIPA is also CRISP (Coral Reef Initiatives in the Pacific) supported site through CI co financing as part of CI's commitment to CRISP Component 1 MPAs and Watersheds.

At the regional level the PIPA partnership works with related initiatives in the region such as SPREP's Coastal Management, Marine Species and Invasive Species programmes. It has also received significant technical support from the region's fisheries agencies (Secretariat of the Pacific Commission (SPC) Fisheries, FFA (Forum Fisheries Agency) and bilateral programmes (e.g. Australia's RNHP (Regional Natural Heritage Programme)). Overall PIPA and its partners have invested significant effort over 3 years in planning to ensure that the PIPA is well coordinated, benefits from, and contributes to related initiatives at the national, regional and global levels.

Current PIPA Management is focused on interim management measures, completion of the management plan, atoll restoration, climate change adaptation research, tourism development surveillance and enforcement, and marine research and monitoring. The draft management plan foresees development of an interpretation plan for local and international public as well as a visitor information program. More details of these plans are presented in the management plan but they include radio and television programmes, posters, website (implemented), stamps (implemented), DVD (implemented) fact sheets (regularly updated) books etc.

The local population of Kiribati needs to be kept informed about the special features of the Phoenix Islands, and about progress in managing this resource. To facilitate this, a special radio programme of 10 minutes was initiated in November 2008. Local support for PIPA is essential for its success. In addition, the global community is most interested in PIPA developments and its many unique features. Many know of the declaration of PIPA, but many more need to be made aware of the unique resources and features of the Phoenix Islands. Finally, visitors to the Phoenix Islands need to be informed about PIPA. They can also be enlisted to assist in monitoring activities on the islands. Internationally the Phoenix Islands have been featured for example in the National Geographic magazine (Feb 2004).

5. j) Staffing levels (professional, technical, maintenance)

The PIPA Office and Director are based in Tarawa at MELAD in order to ensure full government process and engagement in the PIPA design, operation and management.

Within PIPA there are about 50 people living on Kanton. This is currently the only inhabited Phoenix Island. These people are either government employees or their families. These are caretakers and are assigned to the Phoenix Islands for a fixed period of time (circa 3 years). Included in this group is a police officer. The police officer keeps order and also acts as the immigration agent for visitors so that they can clear customs and immigration when visiting the Phoenix Islands.

As part of the draft PIPA Management Plan there are job descriptions and skill requirements for foreseen personnel of the PIPA management authority. During Phase I (years 1 to 5), the PIPA-MELAD office (staffed by the managing director, accountant, and public education specialist) and a surveillance specialist at the National Surveillance Center in Police Headquarters, Betio are planned. This is complemented by extra resources and capacity building to the Wildlife Conservation Unit (WCU) on Kirimati Island and proposed WCU/PIPA staff person on Phoenix Islands (Kanton atoll). Extra staff and capacity are also planned for as resources allow.

SECTION 6. MONITORING

6. a) Key indicators for measuring state of conservation

Section 6(2d) of the PIPA Regulations requires that the PIPA Management Committee monitor the management of PIPA and Section 6(6) further requires that a monitoring programme be implemented in accordance with the Environment Act, PIPA Regulations and Management Plan. This monitoring programme is being finalised as part of the PIPA Management Plan.

Existing monitoring since the establishment of PIPA has included water temperature loggers and monitoring of pre and post coral bleaching, assessment and follow up monitoring of key seabird and invasive species populations as part of the atoll restoration programme, marine and terrestrial surveys and observations as part of boat visits to PIPA, and ongoing fisheries surveillance of Kiribati's EEZ (inclusive of PIPA). Information and effort cost from existing monitoring efforts are being factored into the integrated monitoring programme under current design.

The draft management plan envisages that the Minister, in consultation with the PIPA Management Committee and the Principal Environment Officer, shall issue a report on the state of the PIPA every four years.

The report would include the following environmental and management indicators:

- i. Bird population trends;
- ii. Bird nesting pairs population trends;
- iii. Live coral cover trends;
- iv. Selected reef fish population trends;
- v. Reef shark population trends;
- vi. Turtle population trends;
- vii. pelagic conditions within the PIPA, including fisheries landing trends;
- viii. annual visitor number trends; and
- ix. such other matters as the PIPA MC shall choose to report

All records will be located within the Ministry of Environment, Lands and Agricultural Development in Tarawa, Kiribati.

A summary table of monitoring effort and proposed parameters is given below. This will be finalised in the PIPA Management Plan. It is noted that there four yearly periodicity is considered a minimum and many parameters will be more frequently measured opportunistically as part of research, other surveys and visitor programmes to the site.

1. Marine Ecosystem Monitoring

Indicator	Parameter	Periodicity	Location of Record
Coral Reef Health	Coral cover, benthic cover	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
	Coral Diversity and Health (Disease, Bleaching)	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
	Water temperatures	Continuous water temperature loggers since 2000, satellite data, continuous since 1990s.	PIPA Office, MELAD NEAq, CI
Selected indicator Reef Fish and threatened species e.g. clams	Diversity, Abundance, Size class structure, Endemism	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
Sharks	Diversity Abundance Lagoon nursery populations	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
Turtles	Diversity Abundance – nesting surveys	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
Tuna/Offshore Fishing	Effort Catch Bycatch	Continuous by GoK Fisheries as part of DWFN management, note 100% observer coverage is now mandatory in Kiribati waters.	Fisheries, SPC/FFA, PIPA Office, MELAD
Submerged Reefs/Seamounts	Baseline surveys Species diversity And abundance	2002 (partial survey down to 900 m) Effort will be based on resources available – deep sea mission planned for mid 2009.	NEAq, PIPA Office, MELAD

2. Terrestrial Ecosystem Monitoring

Indicator	Parameter	Periodicity	Location of Record
Seabirds	Species Diversity and relative abundance using pelagic transects and fly-on surveys of key indicator species Population Surveys by prescribed counts of colonies and nesting pairs	Previous (1960s, 2006, 2008), Future - species diversity opportunistically Population counts at least every 3-5 years	PIPA Office, MELAD NEAq, EcoOceania, CI
Terrestrial biota	Vegetation – photo-points, plant lists Vertebrate fauna (lizards, land-birds, shorebirds) - relative abundance, counts	Previously 1960s, 2006 2008 Future – at least every 3-5 years	PIPA, MELAD, EcoOceania
Invasive species	Species presence and abundance Eradication monitoring Monitoring key indicator species amongst seabirds (above)	Previous (2000,2002,2006, 2008) Future annually as part of atoll restoration until at least 2012 then every 3-5 years where possible using existing charters and biosecurity patrols.	PIPA Office, MELAD NEAq, EcoOceania, CI
Visitor Number Trends	Permit Monitoring (tourism, research)	Continuous	Kanton Immigration, PIPA Office MELAD, CI

Actual field work will be contracted out and/or or completed in collaboration with local and other agencies under the direction of the PIPA Management Committee and PIPA Director. All opportunities for local capacity building in these surveys will be made to benefit Kiribati more widely. For bird and invasive species surveys, the Government of Kiribati Wildlife Unit under MELAD is on Kiritimati Island. The WCU already participates in bird or wildlife surveys for PIPA. Regional organizations, such as the University of the South Pacific (with the Atoll Research Unit in Tarawa, and main campus in Suva, Fiji), are willing to assist in field work. PIPA partners NEAq and CI will continue to assist in expertise and resources for surveys and monitoring. The PIPA office is seen as a catalyst or coordinating body, rather than a large organization doing all the research and monitoring surveys itself. These reports and the raw data will be housed within the PIPA office. Ultimately, it is the responsibility of the PIPA Director to ensure that all field data and survey reports are provided to the PIPA Management Committee (as part of any research permit).

Several terrestrial and marine surveys have been conducted over the past decades in the Phoenix Islands. Results for many of these surveys are available. However, since the methodologies used by researchers were different, it is difficult to compare results over time to document changes to these resources. Another difficulty in past surveys is that many were not quantitative. With the new management plan the objective is to standardize quantitative methods for each key species or group of organisms so that results can be comparable over time. The process is explained in further detail in the management plan as well as tasks relating to a monitoring plan.

6. b) Administrative arrangements for monitoring property

Give the name and contact information of the agency(ies) responsible for the monitoring referenced in 6.a.

Phoenix Islands Protected Area (PIPA) Office
Ministry of Environment Lands and Agricultural Development
P.O Box 234
Bikenibeu, Tarawa
Republic of Kiribati

Telephone: (686) 28211 and 686-29762

Fax: (686) 28334

Email: ttoroko@phoenixislands.org (or tukabuttravel@yahoo.com)

6. c) Results of previous reporting exercises

There have been various expeditions to the Phoenix Islands to collect marine specimens and conduct scientific studies of marine and terrestrial life. The first expedition that collected marine specimens was the U.S. Exploring Expedition in 1838 to 1842. The first comprehensive surveys of marine flora and fauna for the Phoenix Islands were conducted in 2000. All of the Phoenix Islands were surveyed except McKean. Previous studies were limited to one or two islands or notes on a species.

Some of the coral reefs of the Phoenix Islands were studied by Charles Darwin for his 1842 work on the structure and distribution of coral reefs. In the early 1970s, extensive surveys and studies were carried out primarily on the coral reefs of Kanton as part of the USAF's efforts to document environmental impacts on that island. Since then, several other surveys and

studies have been conducted on the corals of the Phoenix Islands. In 2002, a hot-spot was reported over the Phoenix Islands and coral bleaching and mortality was subsequently surveyed and reported. By 2006, recovery of coral was reported.

Marine turtles and their nests have been routinely reported in the Phoenix Islands. Initial surveys were conducted in the mid-1970s on Kanton. Subsequent surveys were conducted in the 2000s by various researchers. Sightings and observations were primarily of green and hawksbill turtles. Enderbury was considered an important turtle nesting area for the central Pacific.

The scientific literature on the Phoenix Islands is limited (Lovell *et al.* 2000, Stone *et al.* 2001), and is primarily derived from survey expeditions during the last century and assessments related to military use and decommissioning of the islands following the Second World War (Degener and Gillaspay 1955, Degener and Degener 1959), the Smithsonian Institution's Pacific programme and the first collection of fish from the island group in 1939 (Schultz 1943) and limited marine assessments of Kanton Atoll in the 1970s and 80s (Maragos and Jokiel 1978, Jokiel and Maragos 1978, Maragos and Jokiel 1986).

The first full account of the marine environments of the whole archipelago was compiled by the Phoenix Islands Expedition of the New England Aquarium in 2000 (G. Stone and D. Obura *et al.*). The second New England expedition took place in 2002 to prepare terrestrial and marine assessments. A third expedition by New England Aquarium took place in 2006 to follow up on coral bleaching recovery monitoring. These NEAq visits were of key importance and led to establishment of PIPA and the Phoenix Islands Project to support management of PIPA.

Terrestrial and seabird studies were conducted extensively in the 1960s and 70s by the Smithsonian Institution and reported in the Atoll Research Bulletin (Clapp 1964). More recently, The International Group for Historic Aircraft Recovery (TIGHAR) has conducted a number of expeditions to Nikumaroro Island searching for Amelia Earhart's plane wreckage hypothesized to have crashed there in 1937, resulting in some terrestrial and marine records (Holloway 1999, King *et al.* 2001). A report on economic options for the Phoenix Islands has been prepared by the Phoenix Islands Expedition (Mangubhai 2002) outlining the potential benefits and threats to the islands' biota from different types of resource use and development.

The Pacific Ocean Biological Survey Programme undertook comprehensive biological Surveys of the Phoenix Islands between March-July 1965 including multiple visits to some islands (Clabb and Sibley 1967), although the results of this work remain largely unpublished (A. Kepler, pers. comm.). Most of the recent accounts of Phoenix biota, including the Phoenix Islands Management Plan (Garnett 1983) and some other publications on frigate birds and unusual sightings (Sibley and Clapp 1967) are derived from the 1960s surveys. Vegetation surveys have been carried out by Stoddart 1994.

Two significant recent surveys of avifauna took place in January 2000 and March 2002. The first of these was the Millennium Sunrise Line and Phoenix Islands Expedition (Kepler 2000) which enabled bird observers to land for a few hours on each of four islands – Kanton, Manra, Orona and Nikumaroro. The second was a Kiribati Government expedition (Bukaireiti and Rabaua 2002) which enabled ornithological counts to be made during a few hours on most of the 8 Phoenix Islands. Although these two expeditions were limited to

daytime surveys (and so excluded complete assessment of procellariiform species in particular) and to a few hours per island, they nevertheless provided accurate data on many Phoenix Islands avifauna species. The findings of the latter report assisted in the interpretation of changed pest status, particularly in the case of McKean Island.

Ray Pierce et al (2006) carried out Phoenix Islands conservation survey and assessment of restoration feasibility to determine the feasibility of pest eradication from the Phoenix Islands and to collect information in particular on sea birds and invasive species. The mission recommended priority eradications of which first were carried out in 2008. The key recommendations and results of this survey are presented earlier in this nomination.

Uwate and Teroroko (2007) have prepared a summary of over 600 publications and reports related to the Phoenix Islands with a list of references. A DVD has been created and is attached to this nomination dossier.

SECTION 7. DOCUMENTATION

7. a) *Photographs, slides, image inventory and authorization table and other audiovisual materials*

IMAGE INVENTORY AND PHOTOGRAPH AND AUDIOVISUAL AUTHORIZATION FORM

Id. No	Format (slide/print/video)	Caption	Date of Photo (mo/yr)	Photographer/Director of the video	Copyright owner (if different than photographer/director of video)	Contact details of copyright owner (Name, address, tel/fax, and e-mail)	Non exclusive cession of rights
1	Slide	Moray Eel	2002	Mary Jane Adams		Mary Jane Adams divepng@yahoo.com	yes
2	Slide	Butterflyfish feeding	2002	Cat Holloway/Naia		Cat Holloway cat@naia.com.fj	yes
3	Slide	Barracuda School	2002	David Obura		David Obura dobura@neaq.org	yes
4	slide	Seabird Colony	2002	Paul Nicklen	National Geographic Image Collection	Wendy Glassmire Account Executive, Image Collection/Sales National Geographic Society 1145 17th Street, NW Washington, DC 20036-4688 Tel: 202-857-7560 Fax: 202-429-5776	yes
5	slide	PIPA lagoon invertebrates	2002	Paul Nicklen	National Geographic Image Collection	Wendy Glassmire Account Executive, Image Collection/Sales National Geographic Society 1145 17th Street, NW Washington, DC 20036-4688 Tel: 202-857-7560 Fax: 202-429-5776	yes
6	DVD		2005	New England Aquarium		New England Aquarium Central Wharf Boston, MA 02110 Attn: KC Stover 617-226-2196	yes

7. b) *Texts relating to protective designation, copies of property management plans or documented management systems and extracts of other plans relevant to the property*

Attached

7. c) *Form and date of most recent records or inventory of property*

Roger Uwate and Tukabu Teroroko (2007): Compilation of reports related to the Phoenix Islands. PIPA Technical Report No 1. 530 pages.- a DVD is attached to the nomination.

Pierce, R.J., T. Etei, V. Kerr, E. Saul, A. Teatata, M. Thorsen, and G. Wragg. 2006. Phoenix Islands conservation survey and assessment of restoration feasibility: Kiribati. Report prepared for: Pacific Invasives Initiative, CEPF and Conservation International, Samoa.

Allen, G, Bailey, S. Reef fishes of the Phoenix Islands, Central Pacific Ocean. Results of survey in the Phoenix Islands June/July 2002.

David Obura and Gregory S. Stone (Editors) 2002. Phoenix Islands, Summary of Marine and Terrestrial Assessments, Conducted in the Republic of Kiribati, June 5-July 10, 2002

Primal Ocean Project Technical Report: NEAq-03-02

Nielson, P, Obura, D. Observations on the terrestrial fauna and flora of the Phoenix Islands, 2002

Gregory Stone, David Obura, Steven Bailey, Austen Yoshinaga, Cat Holloway, Robert Barrel, Sangeeta Mangubhai 2000. Marine Biological Journeys of the Phoenix Islands, Summary of Expedition Conducted from June 24 – July 15, 2000

Obura, D, O, Stone, G, Mangubhai, S, Bailey, S, Yoshinaga, A, Holloway, C, Barrel, R. Baseline marine biological surveys of the Phoenix Islands, July 2000.

Obura, D.O. Coral reef structure and zonation of the Phoenix Islands

Obura, D.O, Mangubhai, S. Yoshinaga, A. Sea turtles of the Phoenix Islands, 2000-2002

Uwate, K.R., W. FitzGerald, and T. Teroroko. Draft. Valuation of Phoenix Islands Marine and Fisheries Resources. Phoenix Islands Protected Area, Ministry of Environment, Lands and Agricultural Development, Government of Kiribati. 116 + xiii ms pages.

“Uwate, K.R., and T. Teroroko. Draft. Phoenix Islands Protected Area – Stakeholder opinions. Phoenix Islands Protected Area, Ministry of Environment, Lands and Agricultural Development, Government of Kiribati, Bikenibeu, Tarawa, Republic of Kiribati. 8 + iv ms pages.

7.d Address where inventory, records and archives are held

Phoenix Islands Protected Area (PIPA) Office
Ministry of Environment Lands and Agricultural Development
P.O Box 234
Bikenibeu, Tarawa
Republic of Kiribati

Telephone: (686) 28211 and 686-29762

Fax: (686) 28334

Email: tutoroko@phoenixislands.org (or tukabuttravel@yahoo.com)

7. e) Bibliography

Roger Uwate and Tukabu Teroroko (2007): Compilation of reports related to the Phoenix Islands. PIPA Technical Report No 1.

A DVD including the above document is attached to the nomination dossier. This document includes a list (73 pages) of published references in relation to Phoenix Islands, including those sited within this nomination text. Therefore all the references used within text are not repeated here or in section 7.c.

SECTION 8. CONTACT INFORMATION OF RESPONSIBLE AUTHORITIES

8. a) Preparer

Name: Tukabu Teroroko
Title: Director of PIPA
Address: P.O Box 234
City, Province/State, Country: Bikenibeu, Tarawa
Republic of Kiribati
E-mail: terroroko@phoenixislands.org (or tukabuttravel@yahoo.com)

Assistance was provided by a group of international experts and the Kiribati PIPA Management Committee.

8. b) Official Local Institution/Agency

Mrs. Tarsu Murdoch
Secretary
Ministry of Environment Lands and Agricultural Development
P.O. Box 234
Bikenibeu, Tarawa
Republic of Kiribati
Telephone: (686) 28211 and 686-29762
Fax: (686) 28334
Email: tarsumurdoch@yahoo.com

Mr. Tukabu Teroroko
PIPA Director
Phoenix Islands Protected Area (PIPA) Office
Ministry of Environment Lands and Agricultural Development
P.O. Box 234
Bikenibeu, Tarawa
Republic of Kiribati
Telephone: (686) 28211 and 686-29762
Fax: (686) 28334
Email: terroroko@phoenixislands.org (or tukabuttravel@yahoo.com)

8. c) Other Local Institutions

Visitor Centre (Tourism Office):
Mr. Tarataake Teannaki
Tel: 686 26003
Fax: 686 26193
e-mail: sto@mict.gov.ki

Museum (Cultural Centre):
Mr. Tekautu Ioane
Tel: 686 28283
Fax: 686 29267 (CDSD)
e-mail: tekautun@yahoo.com

8. d) *Official Web address*

http:// <http://www.phoenixislands.org>

Contact name: Tukabu Teroroko

E-mail: tukabutravel@yahoo.com

SECTION 9. SIGNATURE ON BEHALF OF THE STATE PARTY

Hon. Tetabo Nakara
Minister of Environment, Lands and Agricultural Development

SECTION 10. APPENDICES – PIPA MAPS

Appendix 1. Location of the Phoenix Islands Protected Area (PIPA) within the Pacific Ocean.

Appendix 2. Location of the Phoenix Islands Protected Area (PIPA) within Kiribati.

Appendix 3. PIPA Locality Map in relation to other major MPAs.

Appendix 4. Bathymetry of PIPA.




Appendix 5. PIPA Phase 1 (current) Zonation.

Appendix 6. PIPA Phase 2 draft proposed Zonation map.

Appendix 1. Location of the Phoenix Islands Protected Area (PIPA) within the Pacific Ocean.

Location of the Phoenix Islands Protected Area



 PIPA boundary
 submerged reef
 EEZ boundary
 ©2008 K.Koenig, CI Maps

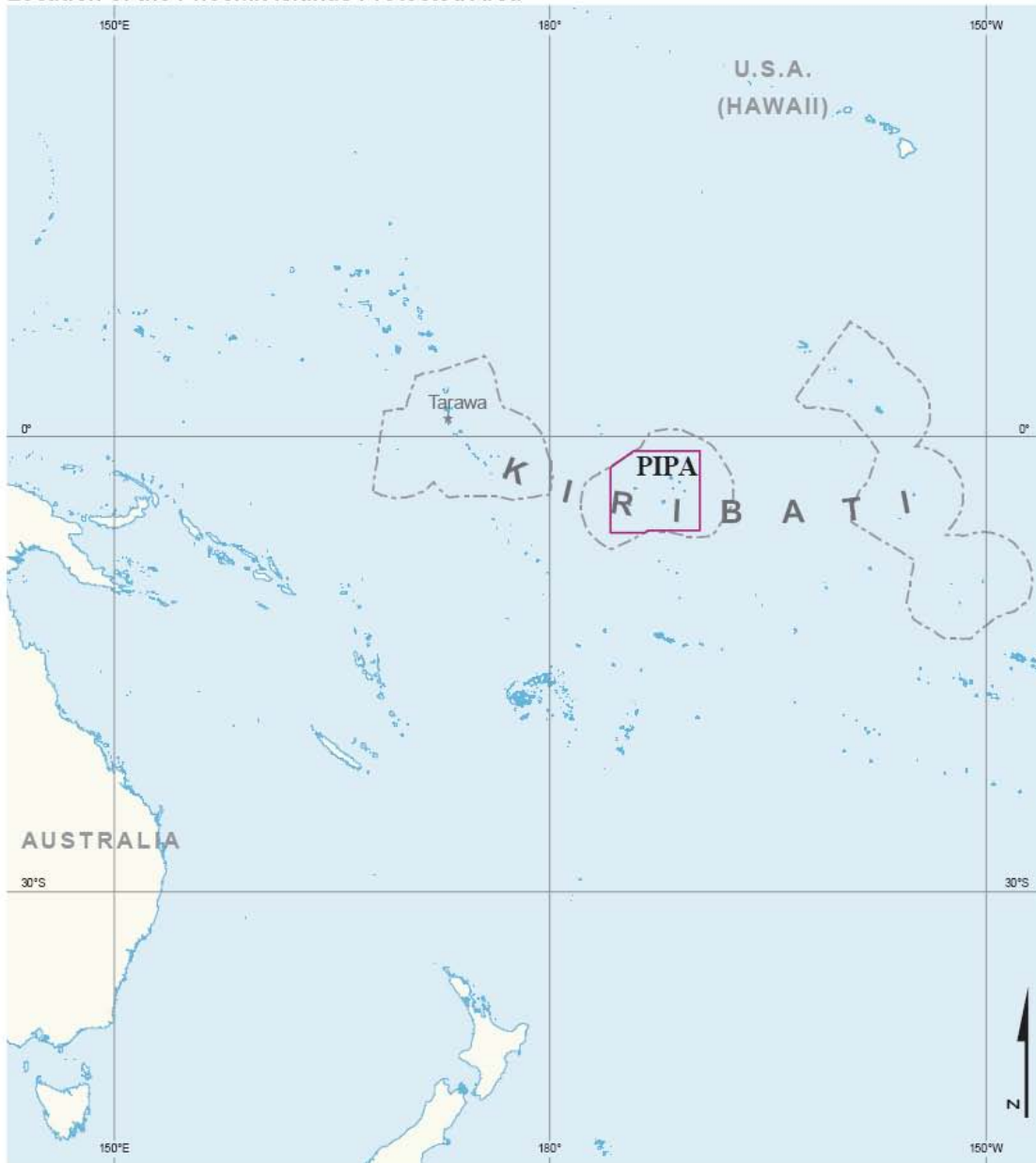
scale: 1/23,000,000
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 central meridian: 180°
 datum: WGS84
 acknowledgements:
 New England Aquarium



data:
 Conservation International -
 Pacific Islands
 EEZs of the World, Flanders
 Marine Institute
 VMap0, National Geospatial
 Intelligence Agency

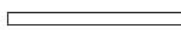


Appendix 2. Location of the Phoenix Islands Protected Area (PIPA) within Kiribati.

Location of the Phoenix Islands Protected Area



-  PIPA boundary
-  EEZ boundary

 25,000 kilometers

scale: 1/50,000,000
 projection: Mercator
 central meridian: 180°
 datum: WGS84

data:
 Conservation International -
 Pacific Islands
 EEZs of the World, Flanders
 Marine Institute
 VMap0, National Geospatial
 Intelligence Agency

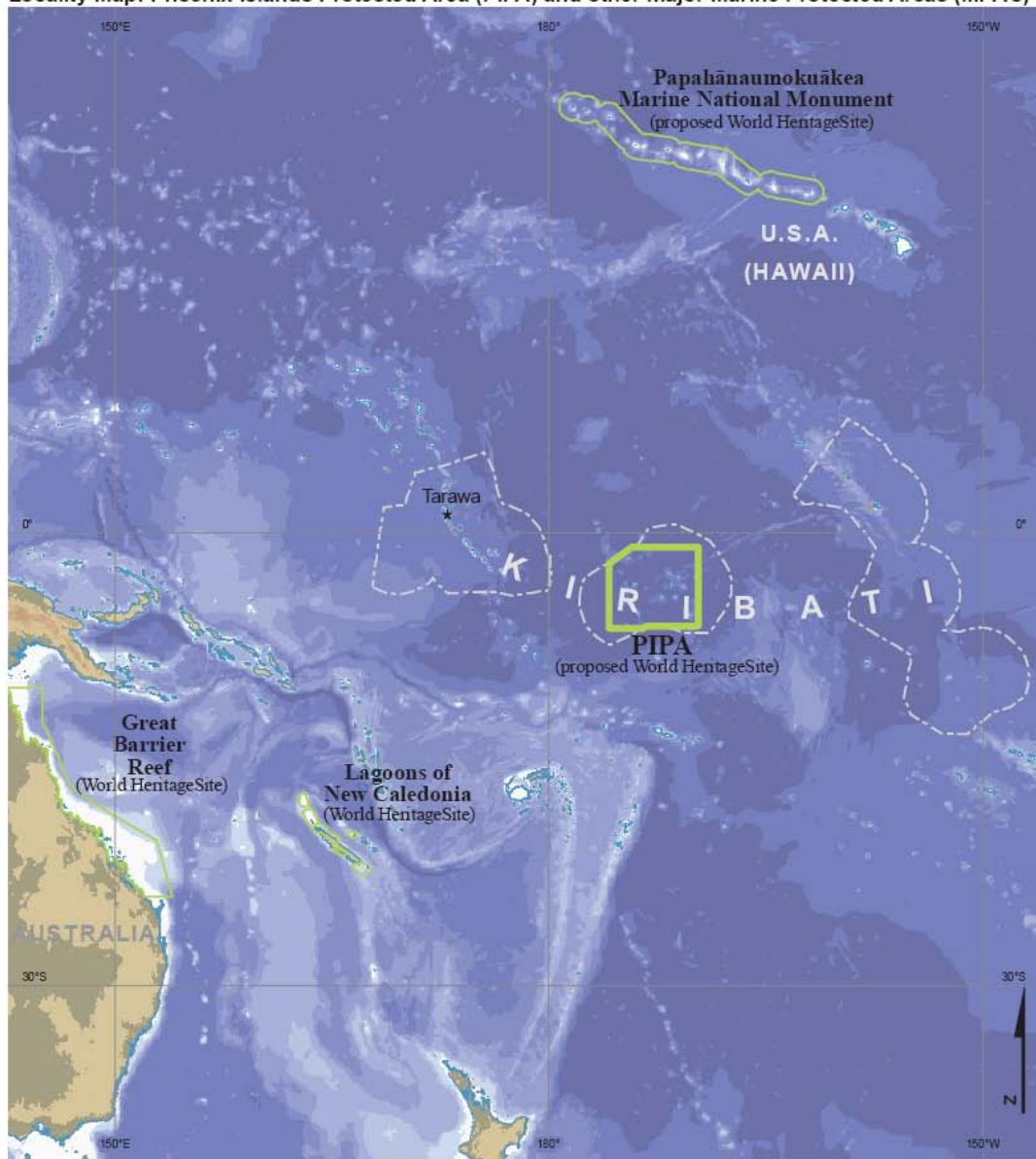
acknowledgements:
 New England Aquarium

©2008 K.Koenig, CI Maps




Appendix 3. PIPA Locality Map in relation to other major MPAs.

Locality Map: Phoenix Islands Protected Area (PIPA) and other major Marine Protected Areas (MPA's)



-  PIPA
-  EEZ boundary

-  other marine protected area

 25,000 kilometers

scale: 1/50,000,000
 projection: Mercator
 central meridian: 180°
 datum: WGS84

acknowledgements:
 New England Aquarium

©2008 K. Koenig, CI Maps

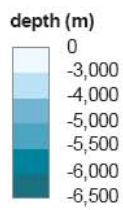
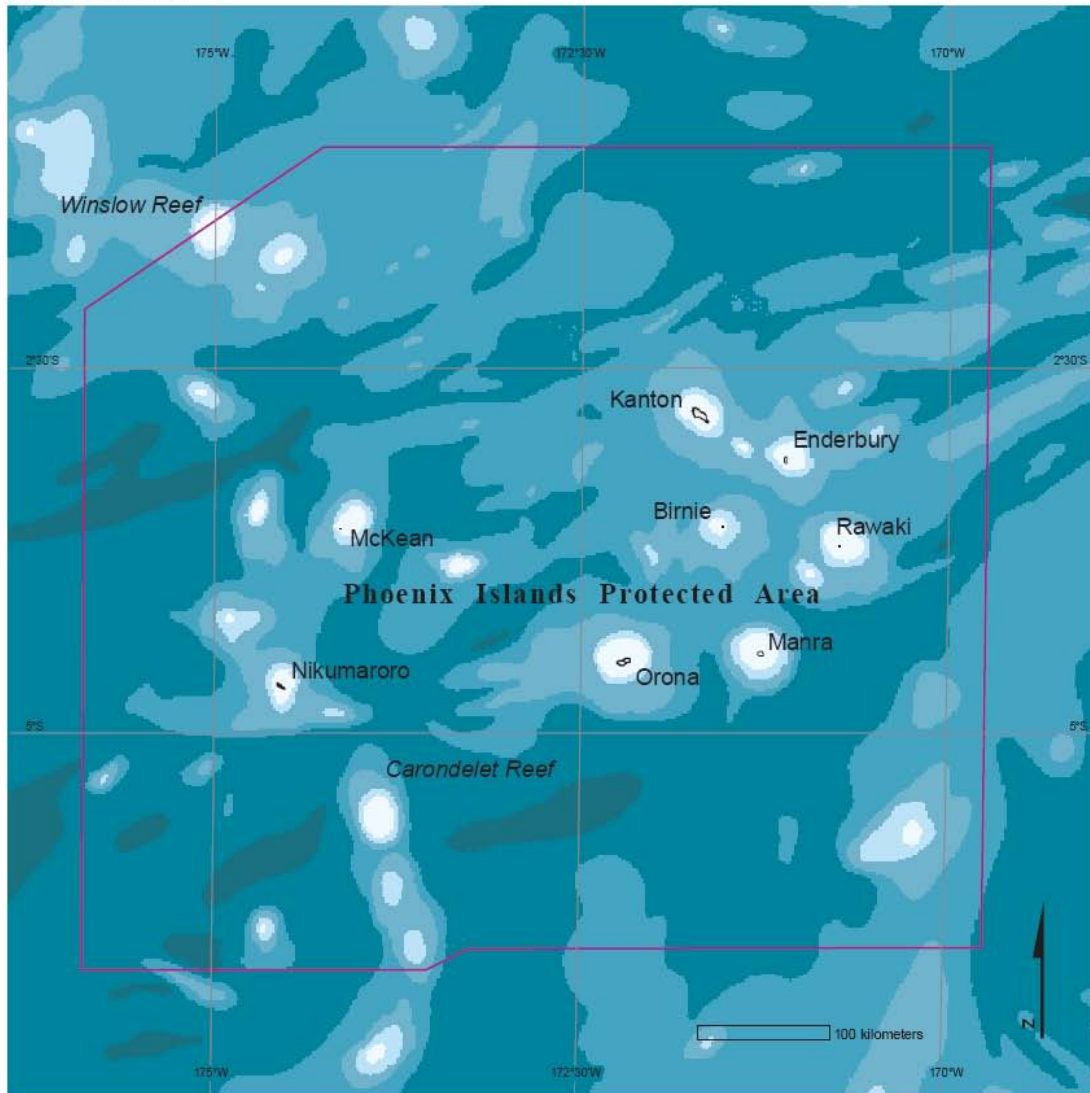
Note location of PIPA in mid ocean, deep sea location compared with other MPA's located in shallower shelf and ridge waters.

data:
 Conservation International - Pacific Islands
 EEZs of the World, Flanders Marine Institute
 GEBCO Digital Atlas
 VMap0, National Geospatial Intelligence Agency



Appendix 4. Bathymetry of PIPA.

PIPA Bathymetry



scale: 1/5,000,000
 projection: Sinusoidal
 central meridian: 180°
 datum: WGS84



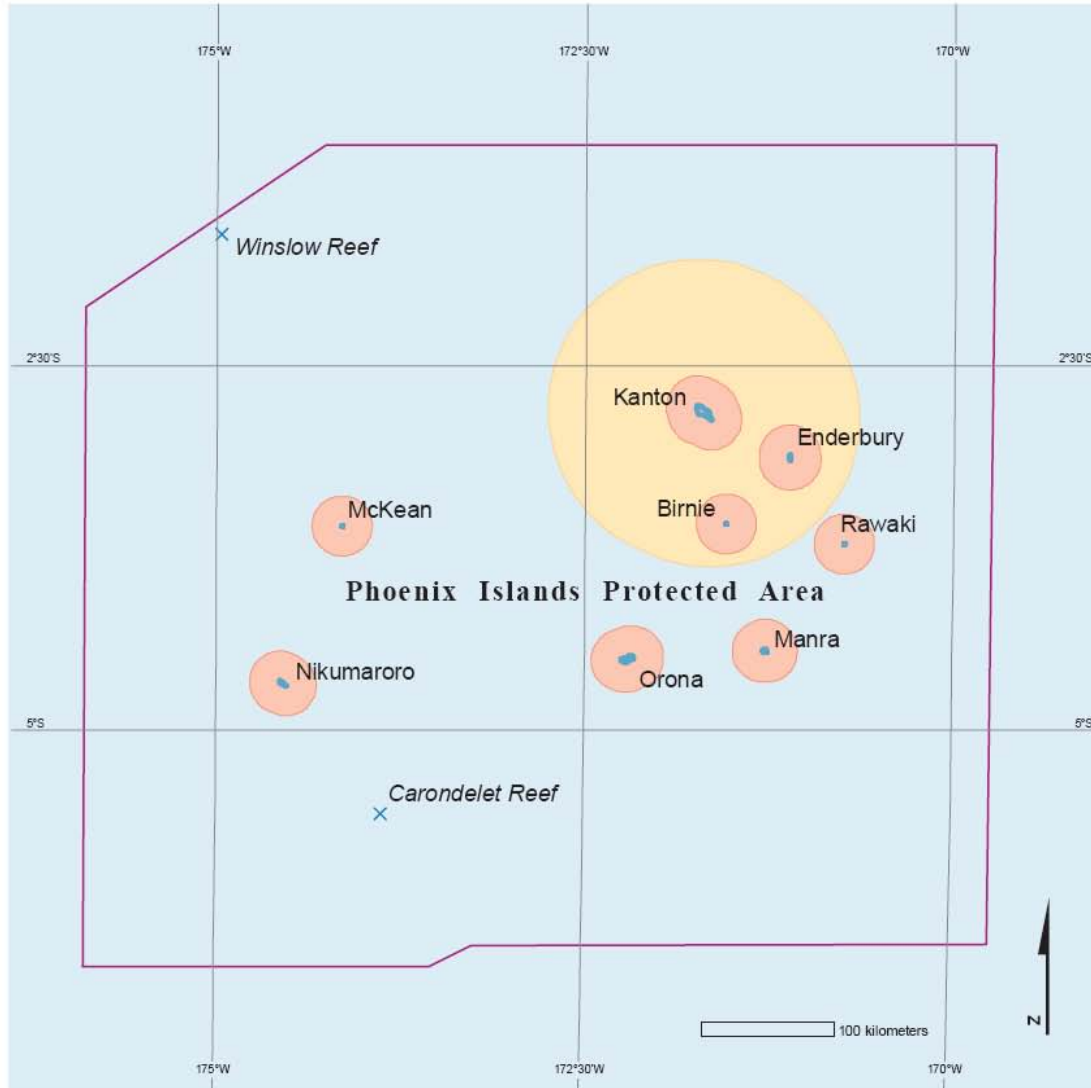
PHOENIX ISLANDS PROTECTED AREA






data:
 Conservation International - Pacific Islands
 General Bathymetric Chart of the Oceans (GEBCO)

acknowledgement:
 New England Aquarium
 © 2008 K.Koenig, CI Maps

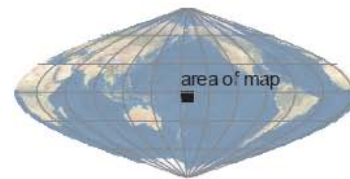
Appendix 5. PIPA Phase 1 (current) Zonation

PIPA Phase 1 (current) Zonation



- 
no take zone
The area within 12 nm of any of the eight Phoenix Islands are no fishing zones and also ban discharge of ballast, sewage or rubbish. Vessels that are solely transiting the PIPA area are to avoid these areas. Permits are required to land on all atolls, except Kanton.
note: Kanton Atoll terrestrial and coastal marine resources are available for subsistence use by the Government of Kiribati caretakers and their families
total area: 15,020 km², or 3.7% of PIPA
- 
purse seine exclusion zone
No purse seine tuna fishery is allowed within 60 nautical miles around Kanton.
total area: 42,800 km², or 10.5% of PIPA
- 
PIPA boundary
total area: 408,250 km²
- 
atoll
note: All atolls (terrestrial habitat) are no take zones and prioritized for atoll restoration.
- 
submerged reef

scale: 1/5,000,000
 projection: Sinusoidal
 central meridian: 180°
 datum: WGS84

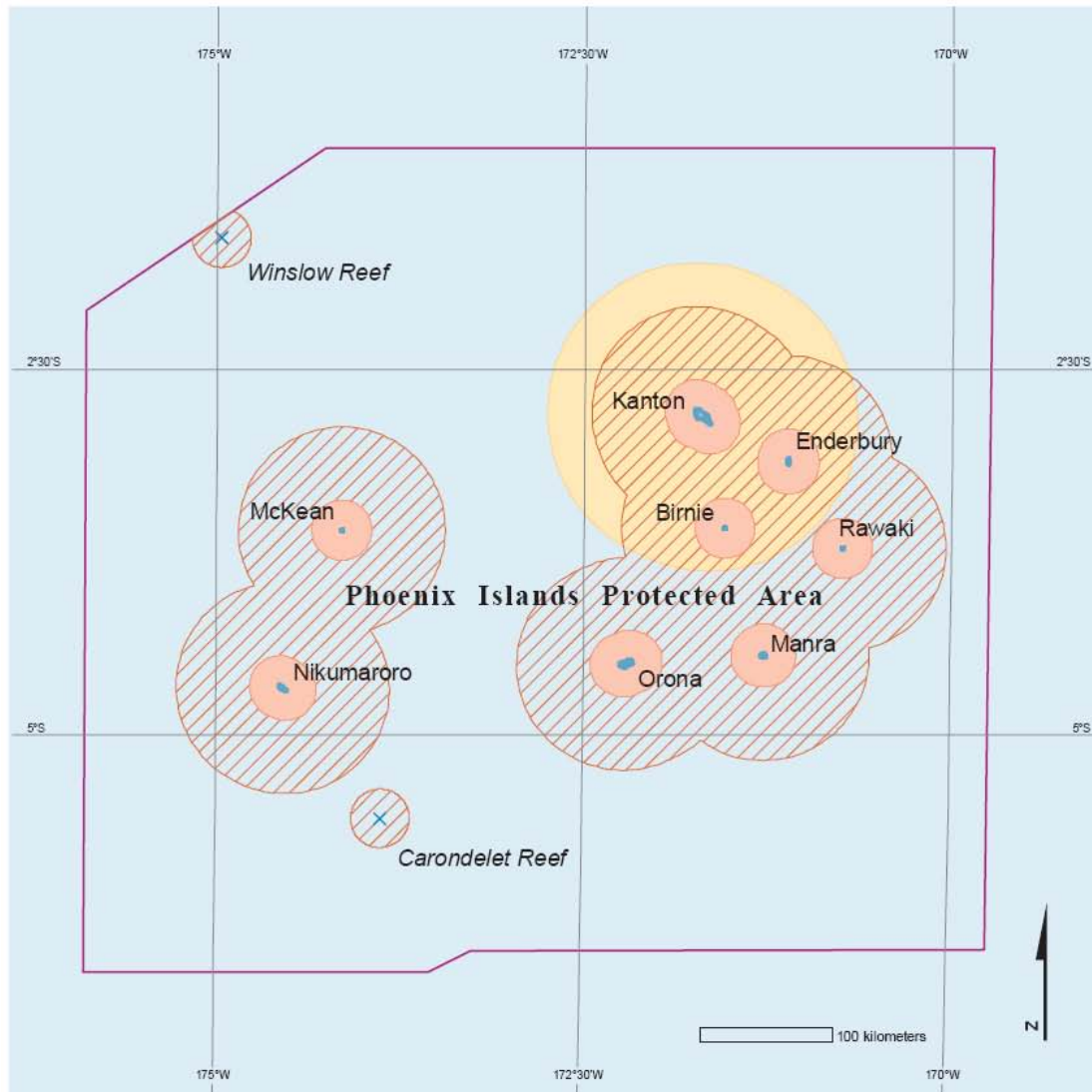








data:
 Conservation International - Pacific Islands
 VMap0, National Geospatial Intelligence Agency

acknowledgement:
 New England Aquarium
 © 2008 K.Koenig, CI Maps

Appendix 6. PIPA Phase 2 Zonation map - draft proposed.

Proposed PIPA Phase 2 Zonation – additional 25% marine no take zone



- 
proposed no take zone
No fishing would be allowed in this area, which would expand to 42 nautical miles around the eight Phoenix Islands, and 12 nautical miles around the submerged reefs.
additional area: 102,500 km², or 25% of PIPA
- 
current no take zone
note: Kanton Atoll terrestrial and coastal marine resources are available for subsistence use by the Government of Kiribati caretakers and their families
total area: 15,020 km², or 3.7% of PIPA
- 
purse seine exclusion zone
No purse seine tuna fishery is allowed within 60 nautical miles around Kanton.
total area: 42,800 km², or 10.5% of PIPA
- 
PIPA boundary
total area: 408,250 km²
- 
atoll
note: All atolls (terrestrial habitat) are no take zones and prioritized for atoll restoration. There will be more detailed terrestrial zonation of Kanton to accommodate needed subsistence resource use and possible tourism.
- 
submerged reef

scale: 1/5,000,000
 projection: Sinusoidal
 central meridian: 180°
 datum: WGS84



data:
 Conservation International - Pacific Islands
 VMap0, National Geospatial Intelligence Agency

acknowledgement:
 New England Aquarium
 © 2008 K.Koenig, CI Maps

SECTION 11. LIST OF ANNEXES

These documents and materials are annexed to the nomination dossier:

Annex 1. Draft PIPA Management Plan

Annex 2. Phoenix Islands Protected Area Regulations 2008, Republic of Kiribati, Environment Act 1999

Annex 3. Environment (Amendment) Act 2007

Annex 4. PIPA announcement at CBD COP8

Annex 5. PIPA Visitor Guidelines

Annex 5a. PIPA Visitor Permit

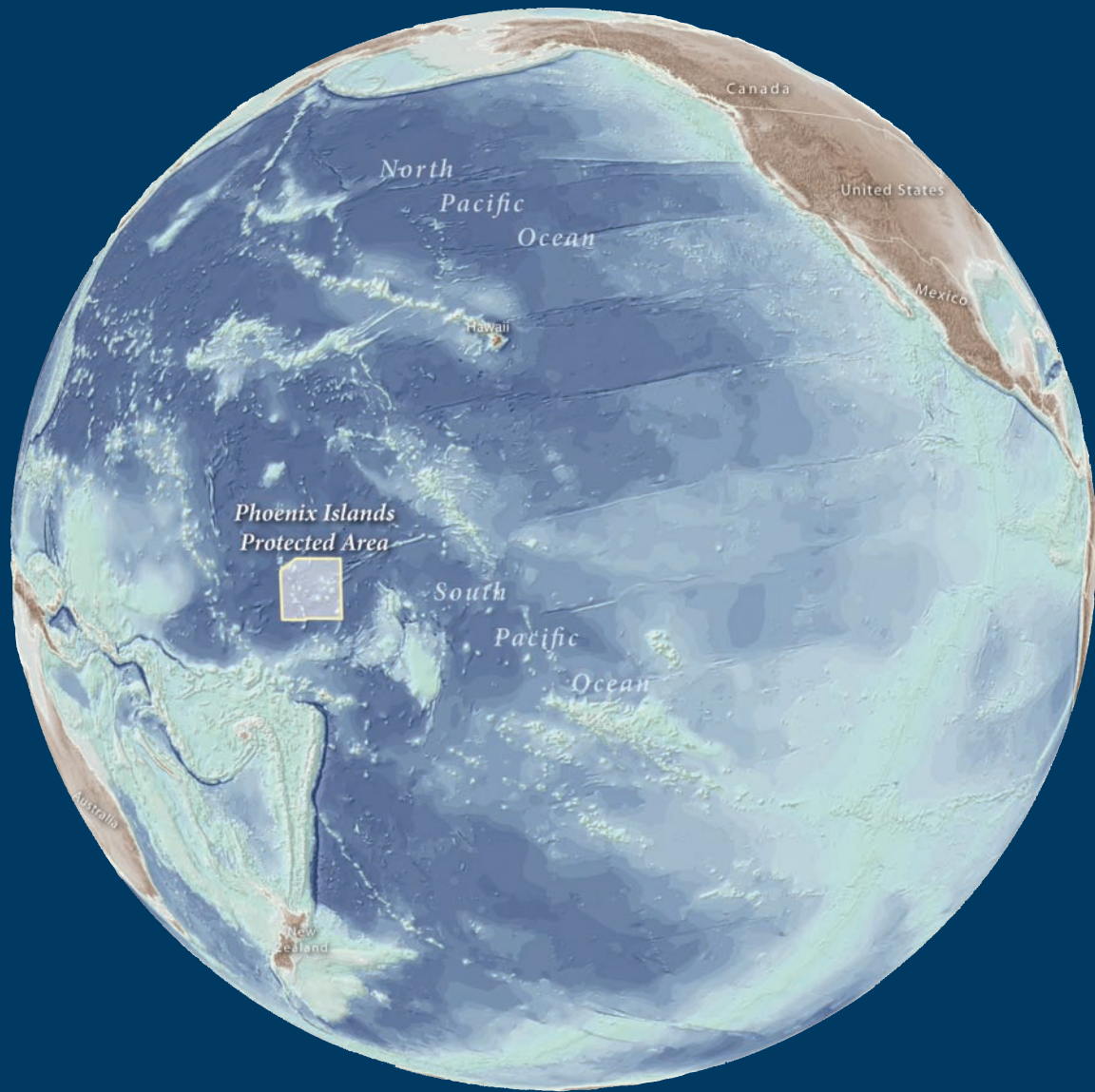
Annex 6. MOU & MOU extension between the Government of Kiribati, Conservation International and New England Aquarium

Annex 7. Species Lists for the Phoenix Islands Protected Area

Annex 8. DVDs of Uwate & Teroroko 2007 Compilation of Reports Related to the Phoenix Islands (Separate – in folder)

Annex 9. DVD of Phoenix Islands References (PIPA Office) Greenstone Digital Library (Separate – in folder)

Annex 10. DVD movie of Phoenix Islands (NEAq) (Separate – in folder)



PHOENIX ISLANDS PROTECTED AREA (PIPA) OFFICE
Ministry of Environment, Lands & Agricultural Development
P.O. Box 234, Bikenibeu, Tarawa, Kiribati
Telephone Number: (686) 29762, Fax Number: (686) 29762

WHC REGISTRATION	
Date	20.01.09
Id N°	1325
Copy	1 Item 03



PHOENIX ISLANDS PROTECTED AREA KIRIBATI

Nomination for a
World Heritage site 2009

Annexes

Annex 1. Draft PIPA Management Plan

Annex 2. Phoenix Islands Protected Area Regulations 2008, Republic of Kiribati, Environment Act 1999

Annex 3. Environment (Amendment) Act 2007

Annex 4. PIPA announcement at CBD COP8

Annex 5. PIPA Visitor Guidelines

Annex 5a. PIPA Visitor Permit

Annex 6. MOU & MOU extension between the Government of Kiribati, Conservation International and New England Aquarium

Annex 7. Species Lists for the Phoenix Islands Protected Area

Annex 8. DVD of Uwate & Teroroko 2007 Compilation of Reports Related to the Phoenix Islands (included with nomination materials)

Annex 9. DVD of Phoenix Islands References (PIPA Office) Greenstone Digital Library (included with nomination materials)

Annex 10. DVD movie of Phoenix Islands (NEAq) (included with nomination materials)



PHOENIX ISLANDS PROTECTED AREA KIRIBATI

Nomination for a
World Heritage site 2009

Annex 1

Draft PIPA Management Plan

Note: This document will be included with the submission materials but bound separately due to its current draft form.



DRAFT
PHOENIX ISLANDS PROTECTED AREA

KIRIBATI

Draft Management Plan
2009 – 2014

IMPORTANT: THIS MANAGEMENT PLAN IS DRAFT AND IS UNDER A PROCESS OF COMPLETION REQUIRED BY THE PHOENIX ISLANDS REGULATIONS 2008. THE MANAGEMENT PLAN IS DUE FOR COMPLETION IN EARLY 2009 (March 2009) AND A FINAL COPY OF THE PLAN WILL BE FORWARDED TO UNESCO WHC AT THAT TIME.

Draft
PHOENIX ISLANDS PROTECTED AREA
MANAGEMENT PLAN
2009-2014

CHAPTER 1. The Phoenix Islands Protected Area (PIPA)

CHAPTER 2 PIPA Human Uses, Issues and Challenges

CHAPTER 3. PIPA Vision, Guiding Principles, Management Objectives and 2009-2014 Strategic Programme Framework Summary

CHAPTER 4. PIPA Strategic Programme Framework and Targets 2009-2014

SPF 1. PIPA Decision making, Administration, Management and Resourcing

- GOK MELAD Minister and Cabinet
- PIPA Management Committee
- PIPA Director and Office
- PIPA Partnerships
- PIPA Sustainable Financing

SPF 2. PIPA 'Issues to Actions' Programmes

- PIPA Atoll & Reef Islands Restoration & Biosecurity Programme
- PIPA Coral Reefs and Coastal Management Programme
- PIPA Offshore Fisheries Programme
- PIPA Endangered and Threatened Species Programme
- PIPA Seamount & Deep Sea Programme
- PIPA World Heritage Programme
- PIPA Climate Change Programme

SPF 3. PIPA Zonation

SPF4. PIPA Regulations and Rules

SPF 5. PIPA Surveillance and Enforcement

SPF6. PIPA Monitoring and Evaluation

REFERENCES

APPENDICES

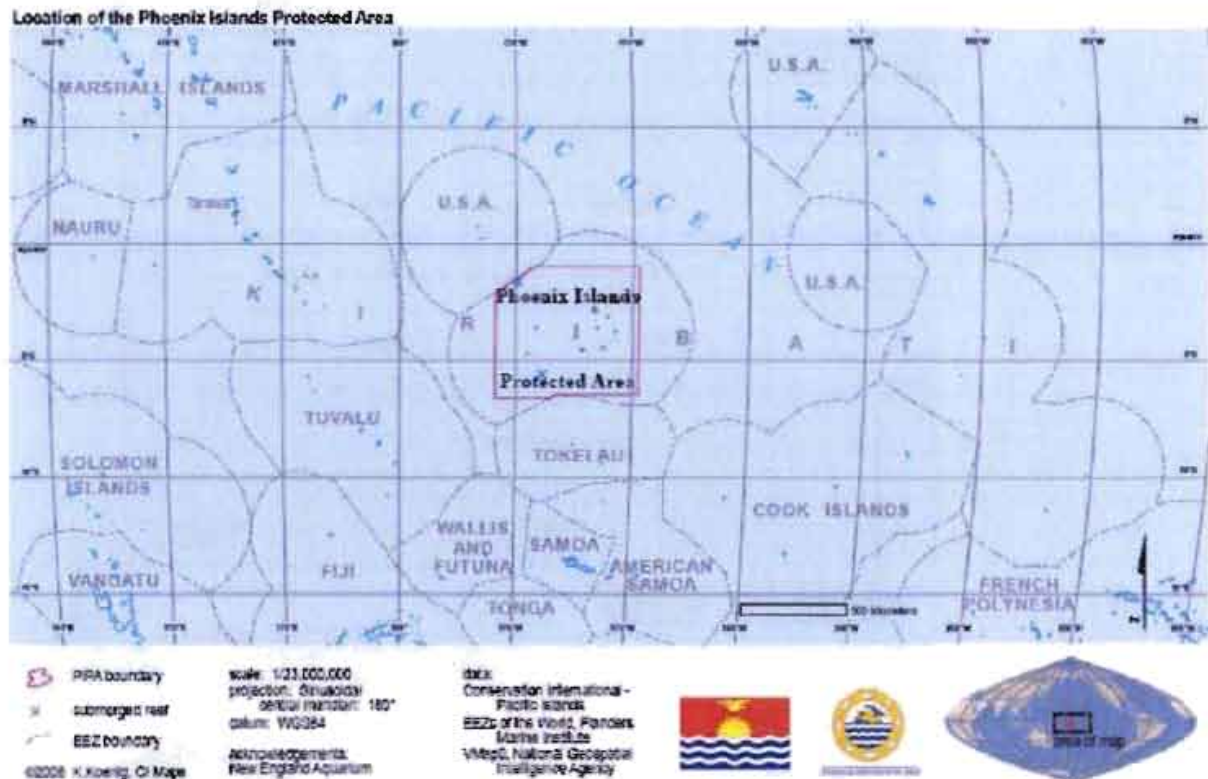
1. Glossary of Terms
2. PIPA Regulations (2008)
3. PIPA Geographic Coordinates
4. PIPA Summary of Resources
5. IUCN Red List – Kiribati/PIPA
6. CITES List – Kiribati/PIPA

CHAPTER 1. THE PHOENIX ISLANDS PROTECTED AREA (PIPA)

1.1 The Phoenix Islands Protected Area (PIPA)

The Phoenix Islands Protected Area (PIPA) is centered on a group of islands, the Phoenix Islands, in the geographic center of the Republic of Kiribati in the Central Pacific Ocean (Figure 1). These islands are also known as the Rawaki Islands (Government of Kiribati, 1979).

Figure 1. The Phoenix Islands, Kiribati, Central Pacific.

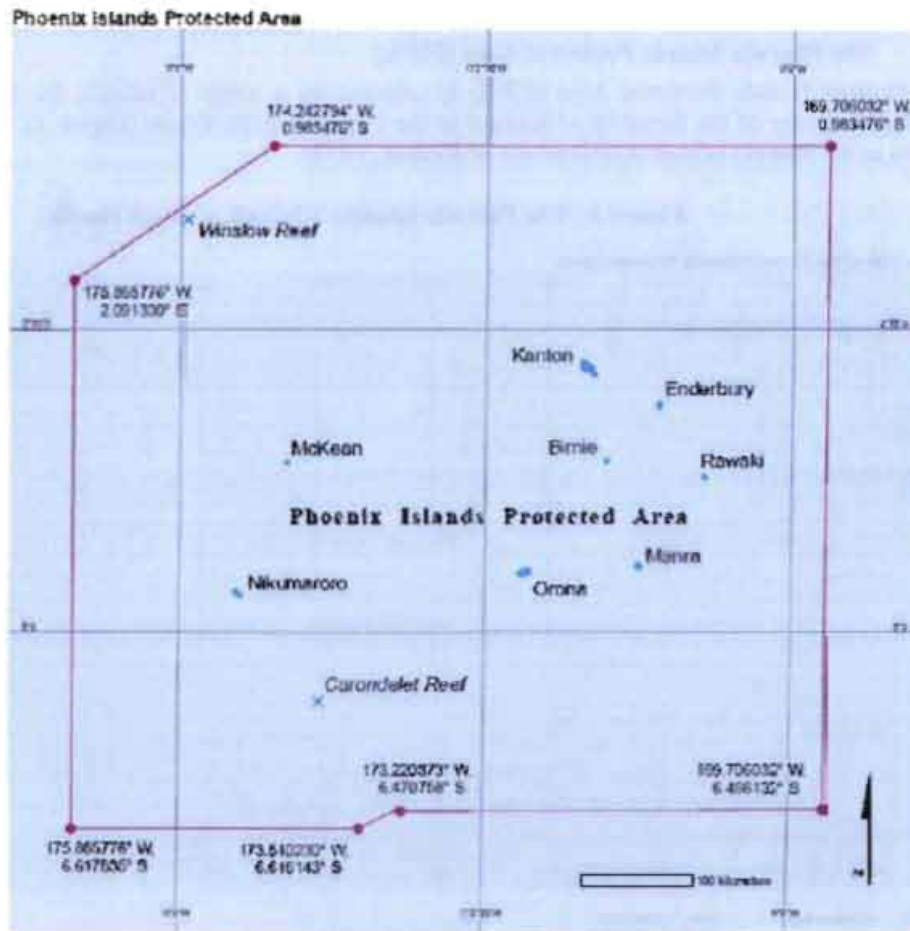






The Phoenix Island group is situated between the Gilbert Islands to the west and the Line Islands to the east, extending across the centre of Kiribati. Two of the Phoenix Islands, Howland and Baker, are low reef islands in the adjacent territory of the United States to the north of Kiribati.

The Phoenix Islands Protected Area (hereafter called PIPA) situated in the Phoenix Island group constitutes 11.34% of Kiribati's Exclusive Economic Zone (EEZ). PIPA's boundaries consists of a heptangular (7 corner points) shaped area that encompass some 408,250 sq km and includes 8 atoll/reef islands, two submerged reefs and at least 14 identified seamounts and their surrounding mainly deep water marine area. PIPA is the largest Marine Protected Area (MPA) in the world, first declared by the Government of Kiribati in 2006 and further extended in February 2008.

The Phoenix Islands within the boundary of PIPA are (see Figure 2). Kanton (Abariringa /Canton) Birnie, Enderbury, Manra (Sydney), McKean, Nikumaroro (Gardner), Orona (Hull), and Rawaki (Phoenix). Geographic coordinates for each island are given in Appendix 1. Two submerged reefs, Winslow and Carondelet, and at least 14 known seamounts together with open ocean and deep sea habitat are an integral part of PIPA (Figure 3).

Figure 2. Phoenix Islands Protected Area Boundary Map



-  PIPA boundary
-  PIPA coordinate
-  island
-  submerged reef



scale: 1:6,000,000
 projection: Sinusoidal
 central meridian: 160°
 datum: WGS84

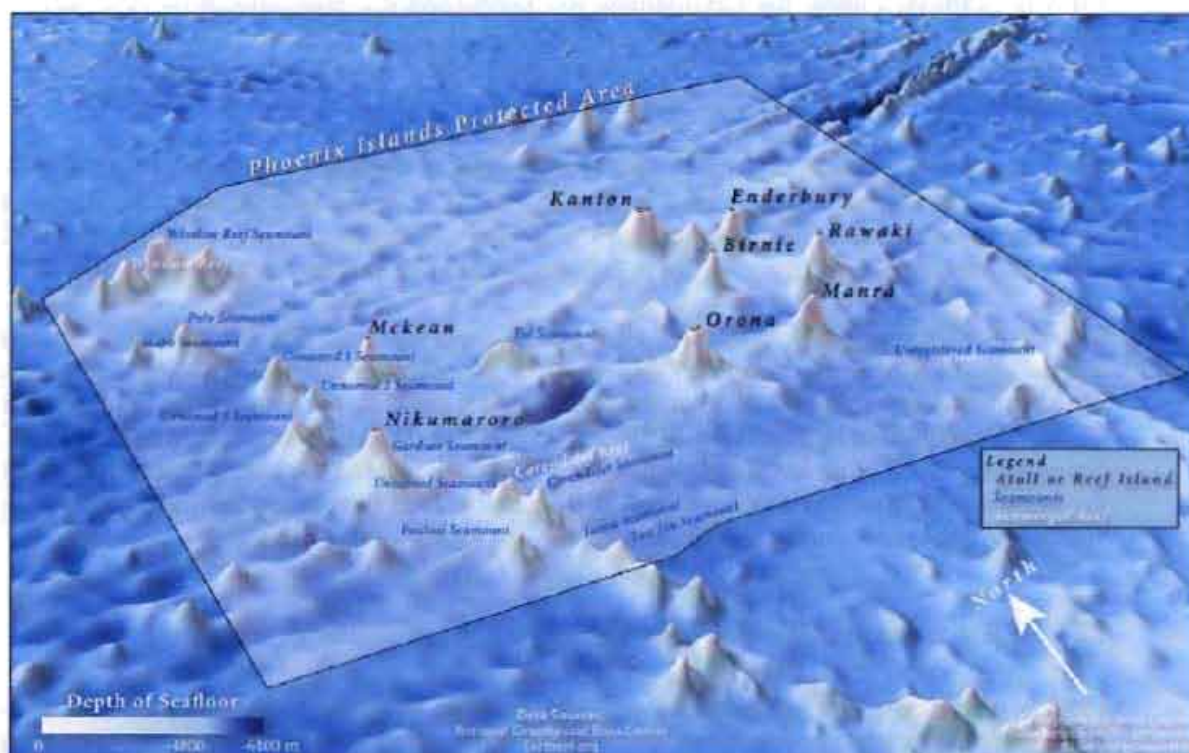
data:
 Conservation International - Pacific Islands
 VMap0, National Geospatial Intelligence Agency

acknowledgements:
 New England Aquarium

© 2008 K. Koenig, CI Maps



Figure 3. Phoenix Islands Protected Area in 3D



1.2 PIPA Area Description

Total marine area: c. 408, 224.49 km²

Total land area: c. 25.51 km²

Total nominated area: 408,250 km²

Island	Total area (ha)	Land area (ha)
Manra	-	c.500
Rawaki	73.24	58.14
Enderbury	596.6	500+
Birnie	50.95	48.2
Kanton	-	c.900
McKean	74.32	48.77
Orona	-	c.600
Nikumaroro	-	c.400

(According to Ray Pierce 2008)

Because the islands are small islands with large reef flat areas, they tend to change size depending on the weather and time, hence the approximate sizes. Areas of islands are still not formally surveyed and most recent calculations by Ray Pierce et al in 2008 suggest smaller than above calculations in the table, i.e. Rawaki calculated in 2008 to be 66 ha and McKean 32 ha incl. lagoons, the latter of which were 15.3 and 11.2 ha respectively. Birnie is probably also smaller than all the previous calculations suggest.

1.2 Legislative Authority and Purpose

PIPA is established under the Environment Act (1999) and its Environment (Amendment) Act 2007 by regulation. The Phoenix Islands Protected Area Regulations 2008 are given in Appendix 2. PIPA is established with a total area 408,250 sq km (Figure 2) and inclusive of all island and marine habitats therein.

The Phoenix Islands Protected Area is the Government of Kiribati's conservation and sustainable use strategy for the Phoenix Islands and surrounding marine environment. The PIPA Management Plan is developed in accordance with its proposed World Heritage Listing and to further Kiribati's obligations to the World Heritage Convention. PIPA is managed as a Wilderness Area (IUCN Category 1b).

Interim PIPA Management Measures have been agreed by the PIPA Management Committee and actions since PIPA declaration in 2006. The PIPA Regulations 2008 (Regulation 6 (6)) require that whilst this Management Plan was being finalised that " pending adoption of this management plan no activity takes place in or affects the PIPA or places at risk the ecological integrity of the PIPA shall be licensed, approved or undertaken by any public authority without the express written authorisation of the Minister." The only exception to this in Regulation 11 is the continuation of DWFN licences that shall remain valid until and unless otherwise decided by the GOK Cabinet.

1.3 PIPA's Outstanding Universal Values

PIPA is the world's first large, truly deep water, mid-ocean marine protected area. As a vast expanse of largely pristine mid-ocean environment, replete with a suite of largely intact uninhabited atolls, truly an oceanic wilderness, the PIPA, the largest marine protected area in the world (408,250 sq km), is globally exceptional and as such is a superlative natural phenomenon of global importance.

A feature of the marine environment of PIPA is an outstanding collection of large submerged volcanoes, presumed extinct, rising direct from the extensive deep seafloor with an average depth of more than 4,500 metres and a maximum depth of over 6,000 metres. Included in the collection of large volcanoes are no less than 14 recognised seamounts, submerged mountains that don't penetrate to the surface. The collection of atolls represent coral reef cappings on 8 other volcanic mountains that approach the surface.

These underwater mountains contribute a huge diversity of marine habitat types - atoll, low reef island, submerged reef, seamount and deep seabed as well as open ocean habitats. It can also be described as an underwater 'mountain-scape' with the highest peaks of the volcanic mountains, some rising more than 5,000 metres above the adjacent seabed, the highest reaching almost to the surface forming atolls, reef islands and, just below the surface, shallow submerged reefs.

The large bathymetric range of the submerged seamount landscape provides depth defined habitat types fully representative of the mid oceanic biota. The widely recognized local endemism and distinctive species assemblages associated with seamounts generally, specifically demonstrable in PIPA, is evidence of on-going in situ evolution of marine ecosystems and communities of plants and animals.

PIPA is of crucial scientific importance in identifying and monitoring the processes of sea level change, growth rates and age of reefs and reef builders, (both geologically and historically) and in evaluating effects from climate change. The reef systems are so remote and exhibit such near pristine conditions that PIPA can serve as a benchmark for understanding and potentially restoring other degraded hard coral ecosystems. The islands are acknowledged as critical sites for ongoing study of: global climate change and sea-level events in that they are located in a region less affected by other anthropogenic stresses; the

growth of reefs, evolution of reef systems, biological behavioural studies, recruitment processes in isolation, size classes and population dynamics of all marine organism groups and reef species diversity studies. As such, the oceanic Central Pacific islands are natural laboratories for understanding the natural history of the Pacific.

As a known breeding site for numerous nomadic, migratory and pelagic marine and terrestrial species, PIPA makes a significant contribution to on-going ecological and biological processes in the evolution and development of global marine ecosystems and communities of plants and animals.

Due to its great isolation, PIPA occupies a unique position in the biogeography of the Pacific as a critical stepping stone habitat for migratory and pelagic/planktonic species and for ocean currents in the region. PIPA embraces a range of associated marine environments that display high levels of marine abundance as well as the full spectrum of age and size cohorts, increasingly rare in the tropics, and especially in the case of apex predator fish, sea turtles, sea birds, corals, giant clams, and coconut crabs, most which have been depleted elsewhere. The overall marine trophic dynamics for these island communities across this archipelago are better functioning (relatively intact) compared with other island systems where human habitation and exploitation has significantly altered the environment.

PIPA provides important natural habitats for in-situ conservation of globally important oceanic biological diversity, both marine and terrestrial. It is the most important secure habitat of the local endemic and now endangered Phoenix petrel and serves as crucial breeding and resting area for a number of threatened migratory birds. PIPA collectively provides very important habitat for the continued existence of a number of globally endangered species (e.g. Napoleon wrasse, hawksbill turtle), vulnerable species (e.g. White-throated storm petrel, Bristle-thighed curlew, green turtle, giant clam, bumblehead parrotfish) and numerous others globally depleted species, both marine and terrestrial, including for example apex predators such as sharks.

The remoteness of the area and absence of permanent human settlement provides a unique opportunity for a high standard of habitat protection for species and ecosystems of global importance to science and conservation, from atoll to deep sea.

In summary PIPA has many outstanding universal heritage values, including those of international conservation significance. These attributes include:

- (1) Pristine coral reefs with natural populations of higher predators (sharks, large fish);
- (2) Highest regional diversity of corals and fishes;
- (3) Endemic species of corals and fish;
- (4) Spectacular lagoon coral and giant clam communities (Kanton and Orona);
- (5) Important marine turtle nesting beaches (Enderbury and Kanton) and breeding/feeding sites;
- (6) Significant coconut crab populations on Nikumaroro;
- (7) Traditional Kiribati medicinal plants now rare in the Gilbert Islands, still exist in the Phoenix Islands;

- (8) Globally important seabird rookeries (particularly on Rawaki and Enderbury) especially for greater/lesser frigate birds, terns and boobies;
- (9) The only secure population of vulnerable Phoenix petrel;
- (10) High isolation in the Central Pacific makes these islands unique and critical stepping-stone habitats for migratory and pelagic and planktonic species;
- (11) A large number of unexplored seamounts that form part of the Tokelau seamount chain which undoubtedly support unique marine communities.
- (12) Unique cultural history reflecting ancient Polynesian and Micronesian exploration and settlement of the Pacific, 19th century whaling, guano discovery and extraction, aviation history, resettlement, role in WWII, the cold war, and space exploration.

1.4 Initial Assessment of the Condition of the PIPA's Natural Values

In terms of the condition of the PIPA's natural values, the following is provided.

- (1) Pristine coral reefs with natural populations of higher predators (sharks, large fish) – Coral reefs are pristine. In the early 2000s, legal and illegal shark fishing occurred in many of the Phoenix Islands. After the PIPA declaration in 2006, all shark fishing has been terminated. In 2006, one illegal shark fishing vessel was identified and caught. There is no inshore fishery in the Phoenix Islands since the termination of the Kakai scheme in the early 2000s, except for some subsistence fishing by the government caretakers and their families on Kanton (maximum 50 inhabitants). Coral reefs were impacted by bleaching events in 2002 and 2004. These bleaching events did not appear to impact fish populations or diversity. Since human impacts are basically nil in the Phoenix Islands, coral recovery appeared to be much quicker than in more stressed environments that are heavily influenced by anthropogenic factors.
- (2) Highest regional diversity of corals and fishes – Corals and fishes species are highly diverse. Coral reefs were impacted by bleaching events in 2002 and 2004, but are recovering.
- (3) Endemic species of corals and fish – Endemic species of corals and fish exist in the Phoenix Islands.
- (4) Spectacular lagoon coral and giant clam communities (Kanton and Orona) – Lagoon corals were impacted by bleaching events in 2002 and 2004, but are recovering. Spectacular lagoon giant clam communities exist.
- (5) Important marine turtle nesting beaches (Enderbury and Kanton) and breeding/feeding sites – The Phoenix Islands is an important nesting area for marine turtles. It has been speculated that the recently noted decline in sea turtle populations may be attributable to the illegal shark fishing operations in the early 2000s. With the 2006 capture of an illegal shark fishing vessel, the termination of all inshore commercial fishing projects, and the declaration of PIPA, sea turtle populations should recover.

- (6) Significant coconut crab populations on Nikumaroro – Coconut crabs exist on several of the Phoenix Islands, but are most abundant on Nikumaroro. In the past, coconut crabs have been harvested, but with the declaration of PIPA, harvest has been banned. This has resulted in coconut crab populations once again flourishing on Nikumaroro.
- (7) Traditional Kiribati medicinal plants now rare in the Gilbert Islands, still exist in the Phoenix Islands – There are several species of plants that are used for traditional Kiribati medicines. With population increases, land clearing, and urbanization of the Gilbert Islands, especially Tarawa, these plants are quickly disappearing. Several of these plants still exist in the Phoenix Islands. As such PIPA can serve as the genetic depository for these important traditional medicinal plants.
- (8) Important seabird rookeries (particularly on Rawaki and Enderbury) especially for greater/lesser frigate birds, terns and boobies – An initial assessment of harmful exotic species was completed in 2006 (see Pierce et al 2006). Plans have been approved for a phased approach to removal of harmful exotic species in the Phoenix Islands. As harmful exotic species are removed, seabird rookeries should recover. In addition, on Abariringa, harmful POPs were removed in 2006. The removal of these POPs should also be beneficial to bird populations on Abariringa.
- (9) Population of vulnerable Phoenix petrel – (see item 8 above).
- (10) High isolation in the Central Pacific makes these islands unique and critical stepping-stone habitats for migratory and pelagic and planktonic species – There are no islands in close proximity to the Phoenix Islands. The oceanographic conditions are unique (see Uwate and Teroroko 2007a) and the area is rich in plankton. This was the foundation for the sperm whale populations that were hunted in the early 1800s. It is also the foundation for economically important pelagic tuna fishery.
- (11) The Phoenix Islands include a large number of unexplored seamounts that form part of the Tokelau seamount chain which undoubtedly support unique marine communities – Seamounts are known to have a high level of endemism and often contain high percentages of species that are new to science (see DOALOS 2007). Seamount ecosystems are of very special interest for conservation. Several seamounts have been identified in the Phoenix Islands area. However, they have yet to be explored. An initial exploration is planned for early 2008.
- (12) Unique cultural history reflecting ancient Polynesian and Micronesian exploration and settlement of the Pacific, 19th century whaling, guano discovery and extraction, aviation history, resettlement, role in WWII, the cold war, and space exploration – The history of the Phoenix Islands extremely diverse and spans centuries (see Uwate and Teroroko 2007a).

1.5 Summary of PIPA Management Planning

Phoenix Islands Management pre 2005

The only previous management plan for the Phoenix Islands was prepared by Garnett in 1983. It focused mainly on terrestrial resources and was never effectively implemented.

PIPA Management 2005-2007

In August 2005 the GoK and partners NEAq and CI agreed a MOU to design and establish PIPA. This was based on results of two scientific expeditions and extensive consultations amongst the partners. GoK formally declared PIPA in March 2006. From 2006 until February 2008 all activities in PIPA were overseen and decided upon the Phoenix Islands Steering Committee (PISC). Whilst the focus of this Committee's effort was on the design and full establishment of PIPA numerous management decisions and protective measures were also instigated during this time including:

- 2005 assessment of coral reef bleaching recovery and associated reef and atoll monitoring
- 2006 assessment of status of protected bird species
- 2006 assessment of impact of invasive species and feasibility of priority eradications, and
- 2006 prosecution of illegal shark finning

PIPA Management 2008- 2009

PIPA was established under the Environment (Amendment) Act 2007 and is covered by all legal processes under this law. The PIPA Regulations (2008) have given full legal establishment to PIPA. Under the Regulations the PISC is now formally established under law as the Phoenix Islands Protected Area Management Committee. Its membership is based on the earlier PISC and is inclusive of all government agencies (12) with a responsibility for the Phoenix Islands (refer to attached PIPA Regulations). The PIPA-MC is chaired by the Secretary of Ministry of Environment, Lands, and Agricultural Development (MELAD) and it meets regularly with meeting decisions and follow-up implementation well documented and reported by the PIPA Director.

Whilst this Management Plan was under development the PIPA Management Committee has agreed and successfully implemented, with various partners, a range of interim management actions which implement PIPA Regulations (2008) and are aimed at increasing protection of PIPA. These include:

- Successful 2008 Invasive Species Eradication Mission (NZODA, NZ-DOC, MELAD, Pacific Invasives Initiative, Pacific Expeditions)
- Visitor Permit system and associated Rules, Regulations and Fees
- Research Permit System and associated Rules, Regulations and Fees
- Tourism Operator Permit system and associated Rules, Regulations and Fees, and
- Completion of PIPA Resource Valuation, Endowment Strategy and draft Trust fund legislation

The PIPA Management Committee has developed and finalised this Management Plan with support from the PIPA Office and partners CI, NEAq and expertise provided by the Government of Australia.

CHAPTER 2 HUMAN USES OF PIPA – ISSUES AND CHALLENGES

2.1 History and Development

The Phoenix Islands were inhabited by Polynesian settlers between approximately AD 950 to 1500. They left stone building foundations that resembled marae from eastern Polynesia. In addition to building foundations, ancient stone weirs and fish traps were also discovered on some of the Phoenix Islands. It was speculated that the Phoenix Islands were abandoned because of droughts. Evidence was also found that suggested the Phoenix Islands were visited by Caroline Islanders (Micronesians). Most archaeological structures were found on Orona and Manra.

Western discovery of the Phoenix Islands began in earnest with the expansion of the American whale fleet into the Pacific in the early 1800s. Many of the Phoenix Islands were discovered by American or British whalers. There are varied accounts of who discovered which island and when they discovered it. It was not until the U.S. Exploring Expedition of 1838 to 1842, that the exact position of many of the Phoenix Islands was determined.

In the mid 1800s guano became an important agricultural input worldwide. The 1856 U.S. Guano Act allowed American citizens to claim previously unclaimed and uninhabited islands for guano extraction. Most of the Phoenix Islands were claimed and registered under this act. Guano was extracted from many of the Phoenix Islands. After major deposits had been depleted, leases were bought up by J.T. Arundel who was able to extract additional guano from some of the islands. After the guano era, J.T. Arundel focused on transforming the Phoenix Islands into coconut plantations. Coconut trees were planted, but many died due to drought conditions. The Phoenix Islands were transferred between various companies in the early 1900s. With the Kingford-Smith pioneering trans-Pacific flights in 1928 and 1934, the USA and UK began competing for a mid-Pacific refueling stop. Amelia Earhart was lost at sea in 1937 and may have landed on Nikumaroro. Later that year, a solar eclipse centered in the Phoenix Islands was studied by teams from the USA and NZ. In 1938, UK began resettlement of Manra, Nikumaroro, and Orona with people from over-populated Gilbert Islands. In 1939, Kanton and Enderbury were placed under joint administration by UK and the USA. This allowed PAA to begin construction of airport facilities on Kanton that same year.

The outbreak of WWII resulted in isolation for the settlements in the Phoenix Islands. Kanton became the center of military activities, with the U.S. military development of three land air strips, and one seaplane landing area within the lagoon. Kanton was a critical link to ferrying military equipment from the USA to NZ and Australia during WWII. In 1942, the *President Taylor* was wrecked on Kanton while carrying troops and supplies. Kanton was also shelled by the Japanese on three occasions.

After WWII, Kanton airport facilities were turned over the U.S. civilian control. Up to four different airline companies used this facility until the late 1950s, when jet aircraft began flying non-stop between Hawaii and Fiji. Droughts hit the Phoenix Islands causing abandonment of the Manra colony in the mid-1950s. Settlers from Orona and Nikumaroro were resettled in the Solomon Islands in the early 1960s. In the early 1960s, the USAF set up a space vehicle tracking station on Kanton. This was later converted to a satellite tracking station, then to a missile tracking station (SAMTEC). SAMTEC closed in 1976. In 1979, the Treaty of Friendship was signed between the USA and GOK. The USA gave up its claims to Kanton and Enderbury under this treaty.

After Kiribati independence in 1979, GOK declared a 200 nautical mile EEZ around the Phoenix Islands. Various schemes were attempted to resettle the Phoenix Islands. Kiribati passport sale for residence in the Phoenix Islands was probably the most controversial. TIGHAR began investigations

on Nikumaroro for evidence that Amelia Earhart landed there. In 2001, GOK initiated the Kakai scheme on Orona. Key economic activities such as copra, beche-de-mer, and sharkfin harvest were undertaken. However, the scheme was not successful and was closed in 2004. In the 2000s, NEAQ began periodic visits to the Phoenix Islands to document conditions on these islands. The result of NEAQ studies was the 2006 GOK declaration of PIPA. Less than 50 people now live on Kanton as caretakers on behalf of the GOK.

2.2 a Fisheries Development

Offshore Fisheries

Interest in offshore fisheries resources (tuna) around the Phoenix Islands began after WWII and was stimulated by Hawaiian fishing interests. At that time, baitfish was a key constrain to tuna fishing. Baitfish surveys indicated that live bait in the Phoenix Islands was limited. Another study showed that juvenile skipjack were available in the Phoenix Islands, indicating that this area was a skipjack spawning area. Yellowfin and skipjack feeding preferences were examined. Fishing trials were conducted in the 1970s. In the 1980s tuna tagging studies were initiated. These studies continued into the 1990s. Results indicated that these species migrate large distances during their lifetimes. Recent studies on tuna standing stocks indicate that yellowfin were nearly fully exploited. Bigeye were approaching overfishing. Skipjack landings could be increased.

The offshore fisheries (tuna) were active prior to Kiribati independence in 1979. However, GOK control over its waters was not established until 1979 when the 200 nautical mile EEZ was declared. This included waters around the Phoenix Islands. In 1987, the USA and certain Pacific Island states entered into a Multilateral Treaty on Fisheries. This allowed US purse seiners to operate in Kiribati waters (including the Phoenix Islands). Effort (days fishing) and landings data for longline, pole and line, and purse seine vessels for vessels fishing in the Kiribati EEZ (including the Phoenix Islands) has been published for each of the DWFN fleets. Data indicate that periodically during certain years the Kiribati EEZ around the Phoenix Islands is a significant source of tuna. Apparently during periods of El Niño, sea surface temperatures increase in the Phoenix Islands along with skipjack landings. SOI has been correlated with longline CPUE for yellowfin and bigeye caught fish. The lower the SOI, the higher the CPUE for these species.

There is increasing concern on the sustainability of tuna fisheries in the Pacific Islands region. The Government of Kiribati, as party to the Nauru Agreement has instituted measures to restrict effort eg restrictions on fisheries aggregation devices, purse seine exclusion zones. These measures apply to PIPA and are fully described in Chapter 5. PIPA is also seen as the first MPA globally to be used in part to conserve tuna. There is evidence of tuna spawning grounds in PIPA and the 'reverse fishing license' concept has been agreed to be phased in. In this funds from the PIPA endowment will be used to compensate Kiribati for lost DWFN license revenue. The current or baseline zonation of PIPA amounts to 3.87% of the marine area. In Phase 2, implementation within this first Management Plan, and additional 25% no take zone will be added as a measure to conserve tuna stocks in the area.

Inshore Fisheries

The inshore fisheries on the Phoenix Islands have been limited. After WWII and prior to the collapse of commercial airline connection on Kanton in the late 1950s, there were up to three fishing companies exporting fish to Hawaii. They made use of the commercial airline connections through Kanton. In 1988, household surveys were conducted on the five households on Kanton. Details on fishing activities were obtained. However, fishing was only for subsistence needs. In the early 1990s,

there were recreational fishing trials on Kanton for bonefish. This generated much interest in the development of Kanton as a recreational fishing destination. Plans were made, but nothing actually developed. In the early 2000s, shark fishing by a DWFN vessel on several Phoenix Islands and by Kakai scheme participants on Orona resulted in the massive depletion of sharks on several Phoenix Islands. There was speculation that these shark fishing efforts may have also reduced turtle populations there.

Surveys led by NEAQ have determined that coral reefs and inshore fisheries are extremely robust and constitute spectacular examples of these globally important habitats and species. In Phase 1 the Baseline or Current Zonation seven of the atolls have complete no take zones out to 12 nautical miles around each atoll. On Kanton subsistence fishing is permitted to meet the needs of the local caretaker population.

2.2 b Existing Uses

At this time, all of the Phoenix Islands are uninhabited except for Kanton. There are about 50 GOK employees and their families living on Kanton in a caretaker capacity.

The Phoenix Islands are periodically visited by ocean going yachts and by special boat charter for recreational divers and various researchers. Immigration clearance is by the customs officer on Kanton. In addition, inter-island boats that service Tarawa and Kiritimati periodically re-supply the residence of Kanton and the GOK patrol vessel visits the Phoenix Islands annually.

Wildlife sanctuaries have been previously established in Rawaki (Phoenix), McKean, and Birnie.

The Phoenix Islands Protected Area was declared in 2006, subsequently enlarged and legally gazetted by the GOK in early 2008. PIPA is the 'current use' of the Phoenix Islands and embodies Kiribati's conservation and sustainable resource use aspirations of this component of its territory. The PIPA Regulations 2008 provide the full mandate for GOK to manage all uses and interests across all sectors for these islands.

2.3 PIPA Issues and Challenges

Detailed descriptions and documentation on environmental issues related to the Phoenix Islands are provided in Uwate and Teroroko (2007a). Further information on PIPA resources and the context of these issues and challenges can be found in the PIPA Summary of Resources in the Appendices to this Plan. Environmental issues and challenges include the following.

- (1) **Natural Heritage and Biodiversity** - The Phoenix Islands was identified as a key biodiversity area within the Polynesia/Micronesia Biodiversity Hotspot Program under the CI's CEPF. This designation reflects the diversity, abundance and in some cases threatened species status of seabirds found in these islands. Coral reef and associated biota have now been well documented and contain populations of globally important and threatened species and are superb examples of coral reef ecosystems. Maintenance, and in some cases restoration, of biodiversity values are a key challenge for PIPA's management.
- (2) **Endangered and Threatened Species** - Endangered species listings that relate to the Phoenix Islands include (1) the IUCN Red List of Threatened Species that lists endangered species is for Kiribati, and (2) the CITES appendices (I - most endangered, II - may become threatened, and III - need cooperation to prevent unsustainable or

illegal exploitation) for Kiribati. IUCN Red list for Kiribati and CITES Appendices I, II, and III for Kiribati are provided in the Appendices. Many of the species listed by IUCN and by CITES for Kiribati are found in the Phoenix Islands. Of particular interest is sperm whales. In the early 19th century, American whaling fleet flourished in the Pacific and many thousands of sperm whales were taken from Phoenix Islands waters. During more recent expeditions to the Phoenix Islands no sperm whales have been observed.

- (3) Biosecurity and Invasive Species Management – A number of species have been accidentally or deliberately introduced to the Phoenix Islands. Many introductions did not survive, others have been benign, while some have caused environmental damage to the local flora and fauna. A significant ongoing challenge and investment for PIPA is in the eradications of problem invasive species and prevention of any new introductions. Feasibility assessment and prioritizations has been carried out for invasive species management in PIPA and the first two highest priority eradications (the rabbit, *Oryctolagus cuniculus*, from Rawaki, and the Asian rat, *Rattus tanezumi*, from McKean) were successfully carried out in 2008. Priority actions for exotic species in the Phoenix Islands (see Pierce et al 2006) include:
- Eradicate the Pacific rat, *Rattus exulans*, from Birnie.
 - Eradicate the Pacific rat, *Rattus exulans*, from Enderbury.
 - Eradicate cats (and rodents if present) on Orona.
- (4) Illegal and Overfishing - Inshore fisheries of the Phoenix Islands are vulnerable to over fishing. In the early 2000s, a shark fishing vessel operated in several of the Phoenix. After one illegal visit by one vessel, shark populations were fished in one atoll to near-zero levels. It was speculated that this one vessel also reduced turtle populations in the islands visited. Currently seven of the eight atoll/reef islands are no take zones and a sustainable resource use plan will be developed for the remaining atoll, Kanton. Surveillance and enforcement of these inshore areas together with offshore fishing is a significant ongoing challenge for PIPA.
- (5) Illegal and Overfishing – Off shore fisheries of the Phoenix Islands are focused on tuna. GOK as party to a range of fisheries agreements but has limited capacity for surveillance, enforcement and management. Despite this the recent agreements under the 3rd Arrangement to the Nauru Agreement has important fisheries management decisions including 3 month ban on FADs, 100% observer coverage. The recent signing of the Shipriders Agreement between USA and Kiribati also provides an additional mechanism for fisheries management. Surveillance and enforcement of offshore fishing by DWFN remains a significant challenge not only for PIPA but for GOK's entire EEZ.
- (6) Climate Change, Coral Bleaching, Sea Level Rise and Ocean Acidification - In July to September 2002, there was a hot-spot in the Phoenix Islands and was thought to be the cause of mass bleaching most notable in the lagoons of Kanton and Orona. A second bleaching event took place in November and December 2004. Long term monitoring pre and post bleaching indicates rapid recovery of PIPA's coral reefs, likely due to the fact that there are no other stressors present eg over fishing, pollution etc. All PIPA's atolls and reef islands are low lying and vulnerable to sea level rise. There is also concern at the impacts of increasing ocean acidification on coral reefs and other species

in PIPA. Due to the absence of other anthropogenic stressors PIPA has a potentially important role to play in researching and understanding impacts of coral bleaching, climate change and resilience of tropical reef systems.

- (7) Cultural Heritage - archeological investigations have confirmed that Polynesians and Micronesians variously used the Phoenix Islands. However all attempts appear to have been unsuccessful in the long term likely due to limited freshwater resources and frequent droughts. Conservation of marae, fishing structures and sites from more recent human history with PIPA are planned for. PIPA examples the limit of pacific peoples migrations and attempted colonization.
- (8) Ocean Dumping - An explosives dumping area was established southwestward of Kanton at the end of WWII. Coordinates for the dumping area were 3^o09'S to 3^o28' S, and 171^o53'W and 172^o13'W. Other areas of Kiribati eg Tarawa have been cleared of military waste due to the threat it poses to local fisherman in particular.
- (9) Toxic Wastes - Various toxic materials were left by the US military on Kanton after WWII. Some of these materials had leaked from their containers and had spilled onto the concrete floor. Asbestos strips were common at former military sites on Kanton. Polychlorinated Biphenyls (PCB's) was found in transformers and probably also was present in switches and other electronic equipment. Toxic wastes were inventoried in 2002. Most were removed in 2006 under a joint Kiribati and Australian programme.
- (10) Unregulated Visitors - There may be a number of visitors to the Phoenix Islands. These were primarily private yachts. They may anchor and stay on one of the Phoenix Islands for extended periods. Some probably don't clear Customs and Immigration on Kanton first. There are environmental concerns with unregulated visitors. These include: disposal of sewage and wastes, illegal collection and harvest of terrestrial and marine resources, potential introduction of invasive species and disturbance of bird populations.
- (11) Vessel Groundings and Oil Spills - The Phoenix Islands have had numerous vessel groundings over the years. One of the earliest recorded groundings was the whaleship *Canton* on Abariringa (Canton) in 1854. Undoubtedly, there have been other groundings that were not permanent, did not result in vessel loss, or were not reported. Ships caused coral damage during grounding and break-up. More recently a Korean trawler grounded on McKean Island and is believed to have been the source of the Asian rat introduction.
- (12) Tourism - With the declaration and publicity surrounding PIPA interest in tourism, particularly dive tourism, is increasing. Tourism is seen as a potential source of sustainable income for GOK and PIPA and strategy to develop tourism in a safe, sensible and sustainable manner is a key action area within this management plan.
- (13) Deep Sea - a significant component of PIPA is deep sea and open ocean habitat. Little is known about the submerged reefs or 14 or more seamounts within PIPA's boundaries. Research into these areas is planned as resources and opportunities allow.
- (14) Transboundary Issues - The range of several species present in the Phoenix Islands extend beyond the limited of the Phoenix Islands (see Uwate and Teroroko 2007a).

Many species of birds, fish, and turtles migrate to and from the Phoenix Islands. In order to protect these migrating species, habitat and conditions in other parts of a species range need to be considered.

- (15) Overall Management, Surveillance, Enforcement, Human Capacity and Resources - there remains limited capacity and resources within Kiribati to provide effective management for PIPA. Isolation can no longer be relied upon to protect the values of PIPA. This is a key action area under development and resourcing in this plan and is reflected in the partnerships GOK has fostered to implement PIPA.

Critical cross cutting issues related to the above primary issues and challenges list are:

- Lack of information (data gaps) - There have been many resource surveys on birds, plants, insects, mammals, corals, and fish of the Phoenix Islands (see Uwate and Teroroko 2007a). Most have focused on Kanton. For other Phoenix Islands, few surveys have ever been completed or the information available may be several decades old. Also, no resource surveys have been reported for either Winslow or Carondelet reefs, nor on the unnamed reef just northwest of Carondelet. Major data gaps are noted for turtles, reptiles, marine mammals, coconut crabs, and deepwater habitat and associated species.
- Lack of accessibility to available information - During this planning effort, perhaps 90 percent of the research reports found relating to the Phoenix Islands were not previously available in Kiribati. In many cases, despite local research permit requirements, no report was submitted to GOK, or the report was misplaced or lost. Without access to documentation on previous activities and research, planning for an activity or research is difficult.
- Non-standardized data collection and analyses - There have been many resource surveys in the Phoenix Islands (see Uwate and Teroroko 2007a). However, survey methodology varied almost as much as the number of researchers. Results from using different survey methodologies are difficult, if not impossible, to compare. In some cases, the methodology is not quantitative and resultant data can't be compared. Survey results need to be quantifiable and comparable.
- Limited local, global, and visitor awareness - The local population of Kiribati needs to be kept informed about the special features of the Phoenix Islands, and about progress in managing this resource. Local support for PIPA is essential for its success. In addition, the global community is most interested in PIPA developments and its many unique features. Many know of the declaration of PIPA, but many more need to be made aware of the unique resources and features of the Phoenix Islands. Finally, visitors to the Phoenix Islands need to be informed about PIPA. They can also be enlisted to assist in monitoring activities on the islands.
- Limited surveillance and enforcement of existing wildlife sanctuaries - Over the last several decades, there has been basically no surveillance and enforcement of the declared wildlife sanctuaries on some of the Phoenix Islands - their sheer isolation was their saving grace. This situation needs to be addressed in the formulation of PIPA. Some activities can quickly reduce pristine populations to almost zero, as in the case of recent shark finning activities and the recent harvests of coconut crabs on Nikumaroro. Without surveillance and enforcement, the resources of the Phoenix Islands can quickly be exploited to the point of stock collapse.

- Sustainable economic development – There are limited economic opportunities in Kiribati. With the development of PIPA, opportunities for tourism and fisheries development and employment may develop. Opportunities may include ecotourism and catch and release fishing by visiting tourists. Other potential opportunities for revenue generation for GOK need to be investigated. GOK also wishes to keep the option of ocean mining operations open. Any development activities should be sustainable and executed in an environmentally friendly manner.

Critical issues that relate to support for management and logistics include:

- Lack of portable water – There is no freshwater on many of the Phoenix Islands (see Uwate and Teroroko 2007a). Some of the islands do have freshwater, but not enough to support large populations. Major considerations are needed for all activities involving placement of people on the Phoenix Islands, whether this is for short term (such as for research surveys) or long term (for management purposes).
- Transportation limitations – There were several major problems that were encountered with anyone planning to use Kanton. These included the isolation, the lack of regular transportation to and from the island. During the KAKAI Scheme, the costs of servicing the island were too high for the volume of cargo shipped. The diversion of an inter-island vessel was over AUD 5,000 per trip. For any visit to the Phoenix Islands, transport costs can be very high. According to B. Onorio (CPP Manager, personal communication 2006), the cost for chartering their mother ship to visit the Phoenix Islands was in the order of AUD 50,000 for a 10 day trip.
- High operating costs of activity in the Phoenix Islands – There are extremely limited resources available on the Phoenix Islands. All supplies and construction materials must be brought in. In addition, all equipment, and most food stuff also need to be brought in. This makes establishing and operating any facility on the Phoenix Islands extremely expensive.
- Remoteness of each Phoenix Island relative to others – There are eight Phoenix Islands. Some of these islands are 200 nm away from others. This distance cannot be covered safely in a small vessel with an outboard motor. It is costly and difficult to visit all of the islands of the Phoenix, even if based on Kanton. A sea-worthy vessel with at least 500 nm range would be required. Also, adequate fuel supplies for refuelling the vessel would be needed on Kanton.
- Costly communication and lack of internet - At this time, there is no telephone system in the Phoenix Islands. Communication is limited to radio. In addition, there are no internet services available on any of the Phoenix Islands. The only telephone services that would work on any of the Phoenix Islands are satellite phones. These are costly to purchase and to operate. Internet is available to marine vessels. A similar system could be installed on the Phoenix Islands.
- Lack of safe anchorage and landing facilities – For most of the Phoenix Islands, except Kanton, landing facilities are non-existent. Changing weather and currents coupled with the limited size of suitable anchorage areas makes safe anchoring very difficult. During the guano period in the late 1800s, special permanent anchors and cables had to be set up for guano ships (see Uwate and Teroroko 2007a). Consideration is needed regarding permanent anchoring stations so that vessels can anchor safely and the fragile coral reef habitat is preserved.

CHAPTER 3. PIPA MANAGEMENT PLAN 2009 – 2014 VISION, GUIDING PRINCIPLES AND KEY OBJECTIVES

3.1 PIPA's Vision:

"to conserve and manage the natural and cultural heritage of the Phoenix Islands Protected Area for the sustained benefit of the peoples of the Republic of Kiribati and the world."

3.2 Guiding Principles

The following guiding principles form the foundation of this plan.

- **"Intergenerational equity** - Future generations are entitled to inherit marine resources and biodiversity in a state that is as good as, or better than, their current state" (DOALOS 2007).
- **"Ecological sustainability** - Ecological sustainability is the foundation of both social and economic development. Key elements of management and planning for ecological sustainability include ecosystem-based management, conservation of ecological processes, protection of critical habitats, use not to exceed maximum sustainable yield or carrying capacity, conservation of biodiversity in general and conservation of rare and endangered species in particular" (DOALOS 2007).
- **"The precautionary principle** - The absence of scientific certainty should not be a reason for postponing management of MPAs. If an activity is assessed as having a low risk of causing serious or irreversible damage or if there is insufficient information with which to assess fully and with certainty the magnitude and nature of impacts, decision making should proceed in a conservative and cautious manner" (DOALOS 2007).
- **"Integrated planning and management** - Many of the activities that can potentially threaten MPAs occur outside their borders, including terrestrial areas, and often come under the jurisdiction of other management agencies. Management of MPAs should consider all potential sources of threats and develop a management protocol that addresses these threats. In order to achieve this, management of the MPA will need to be integrated with management responsibilities of the other relevant agencies" (DOALOS 2007).
- **"Stakeholder consultation and participation** – MPAs are used by a range of stakeholders, many of whom derive their livelihoods from the MPA and have no alternative sources of livelihood. They are likely to be affected by management of the MPA and have the right to be consulted and to play an active part in the decision-making process. Many stakeholders also possess much knowledge and experience that can assist in planning and management" (DOALOS 2007).
- **"Capacity-building and technology transfer** - A key element to the successful implementation of MPA management is skilled and knowledgeable staff. Where skills and knowledge are limited, capacity building of staff is a critical element in the success of MPAs. Considerable technology is available that facilitates decision-making and the evaluation of management actions. A modern and appropriate technology base is a central component of MPA management. This includes computing and communication facilities, information resources, and geographic information systems. A sustainable long-term financing strategy is also important for the success of the MPA" (DOALOS 2007).

- **Adaptive management** - Management of MPAs needs to be viewed as an adaptive process or experiment that is varied in response to changes in the character and intensity of threats, increased knowledge, and changes in the composition of the local community. Adaptive management requires the establishment of performance measures at the outset of management. The results of systematic monitoring of key indicators are evaluated against the agreed performance measures, and management adjusted (if necessary) to ensure that objectives and goals are being achieved" (DOALOS 2007; see Figure 3 below).
- **Ecosystem Approach** - A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (IUCN 2006). The application of the ecosystem approach will help to reach a balance of the three objectives of the CBD: conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.
- **Resilience** - "The ability to absorb or recover from disturbance and change, while maintaining ecosystem functions and services. Resilience relates to the concepts such as representation, replication, refugia, connectivity, and management" (DOALOS 2007).
- **Transparency of decision making** - Decisions regarding the management of the protected area need to be made transparent to the public. Information on decision makers, their decisions, and the basis for their decisions should be readily available to the public.

3.3 PIPA Regulations (2008) - Management Objectives

The PIPA Regulations 2008 set the long term management objectives for this PIPA Management Plan:

1. To conserve and manage substantial examples of marine and terrestrial systems to ensure their long-term viability and to maintain genetic diversity;
2. To conserve depleted, threatened, rare or endangered species and populations and, in particular, to preserve habitats considered critical for the survival of such species;
3. To conserve and manage areas of significance to the lifecycles of economically important species such as tuna;
4. To prevent human activities from detrimentally affecting the PIPA;
5. To preserve, protect, and manage historical and cultural sites and natural aesthetic values;
6. To facilitate the interpretation of marine and terrestrial systems for the purposes of conservation, education, and tourism;
7. To accommodate within appropriate management regimes a broad spectrum of multi-use human activities compatible with the primary goal of marine and terrestrial conservation and sustainable use, including appropriate fishing, ecologically-sound tourism, and sustainable economic development;
8. To provide for research and training, and for monitoring the environmental effects of human activities, including the direct and indirect effects of development activities; and

9. To ensure consistency between all activities taking place in the PIPA and any third-party conservation contracts into which the Minister may choose to enter with the advice and approval of the Cabinet for the conservation and long-term sustainable use of the PIPA.

To implement the long term PIPA Management Objectives the following Strategic Programme Framework(SPF) for 2009-2014 has been developed.

3.4 Summary PIPA Strategic Programme Framework 2009 -2014

SPF 1. PIPA Decision making, Administration, Management and Resourcing

- GOK MELAD Minister and Cabinet
- PIPA Management Committee
- PIPA Director and Office
- PIPA Partnerships
- PIPA Sustainable Financing

SPF 2. PIPA 'Issues to Actions' Programmes

- PIPA Atoll & Reef Islands Restoration & Biosecurity Programme
- PIPA Coral Reefs and Coastal Management Programme
- PIPA Offshore Fisheries Programme
- PIPA Endangered and Threatened Species Programme
- PIPA Seamount & Deep Sea Programme
- PIPA World Heritage Programme
- PIPA Climate Change Programme

SPF 3. PIPA Zonation

SPF4. PIPA Regulations and Rules

SPF 5. PIPA Surveillance and Enforcement

SPF6. PIPA Monitoring and Evaluation



**CHAPTER 4. PIPA STRATEGIC PROGRAMME FRAMEWORK & TARGETS
2009-2014**

SPF 1. PIPA Decision making, Administration, Management and Resourcing

- GOK MELAD Minister and Cabinet
- PIPA Management Committee
- PIPA Director and Office
- PIPA Partnerships
- PIPA Sustainable Financing

SPF 2. PIPA Zonation

SPF 3. PIPA 'Issues to Actions' Programmes

- PIPA Atoll & Reef Islands Restoration Programme & Biosecurity
- PIPA Coral Reefs and Coastal Management Programme
- PIPA Offshore Fisheries Programme
- PIPA Endangered and Threatened Species Programme
- PIPA Seamount & Deep Sea Programme
- PIPA World Heritage Programme
- PIPA Climate Change Programme

SPF4. PIPA Regulations and Rules

SPF 5. PIPA Surveillance and Enforcement

SPF6. PIPA Monitoring and Evaluation

REFERENCES CITED

- Allain, V. 2006. Seamounts and pelagic fisheries interactions under study. SPC fisheries newsletter #116 – January/March 2006. Pp. 33-35.
- Division of Ocean Affairs and the Law of the Sea Office of Legal Affairs (DOALOS). 2007. Development, implementation and management of marine protected areas training manual (draft). Train-Sea-Coast Workshop, Honiara, Solomon Islands. 15-20 January 2007. United Nations, New York.
- Chapman, L. 2004. Nearshore domestic fisheries development in Pacific island countries and territories. 4th SPC Heads of Fisheries Meeting, 30 August-3 September 2004, Noumea, New Caledonia. Information Paper 8.
- Conservation International. 2006. Technologies for tracking & combating illegal fishing. Power point presentation prepared by the Regional Analysis Program, Center for Applied Biodiversity Science, Conservation International. 20 slides.
- Garnett, M.C. 1983a. A management plan for nature conservation in the Line and Phoenix Islands. Part 1. Description. Unpublished report prepared for the Ministry of Line and Phoenix Islands, Kiritimati Island, Kiribati. 318 pp.
- Garnett, M.C. 1983b. A management plan for nature conservation in the Line and Phoenix Islands. Part 2. Policy. Unpublished report prepared for the Ministry of Line and Phoenix Islands, Kiritimati Island, Kiribati.
- Garnett, M.C. 1983c. Part 3. Recommendations. Unpublished report prepared for the Ministry of Line and Phoenix Islands, Kiritimati Island, Kiribati. 125 pp.
- Hampton, J., T. Lawson, P. Williams, and J. Sibert. 1995. Interaction between small-scale fisheries in Kiribati and the industrial purse seine fishery in the western and central Pacific Ocean. In: R.S. Shomura, J. Majkowski, and R. Harman (eds). Proceedings of the Second FAO Expert Consultation on Interactions of Pacific Tuna Fisheries. Shimizu, Japan. 23 to 31 January 1995. FAO Fisheries Technical Paper T365.
- IUCN. 1994. Guidelines for protected area management categories. IUCN Commission on National Parks and Protected Areas with assistance of WCMC. IUCN, Gland, Switzerland and Cambridge, UK.
- IUCN. 2006. The ecosystem approach: demystifying the concept and its application in the Marine Environment. 7th meeting of the United Nations. Open-ended Informal Consultative Process on Oceans and the Law of the Sea, New York, New York, June 12-16, 2006.
- IUCN Protected Areas Programme. Draft. Management planning for World Heritage properties, a resource manual for practitioners. World Commission on Protected Areas, World Heritage, and UNESCO. [draft report 2007].
- Langley, A. 2003. Kiribati national tuna fishery status report no. 2. Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Kelleher, G. (ed.). 1999. Guidelines for marine protected areas. World Commission on Protected Areas of IUCN. Best Practice Protected Area Guidelines Series No. 3. IUCN – The World Conservation Union.

New England Aquarium. 2006. Pacific islands paradise protected. News release, Newswide, March 28, 2006.

Pierce, R.J., T. Etei, V. Kerr, E. Saul, A. Teatata, M. Thorsen, and G. Wragg. 2006. Phoenix Islands conservation survey and assessment of restoration feasibility: Kiribati. Report prepared for: Conservation International, Samoa and Pacific Islands Initiative, Auckland University, Auckland.

Pollution Control Unit. 2006. Report on Kanton chemical cleanup mission (19/5/06 - /05/06). Environment and Conservation Division.

Salafsky, N., R. Margoluis, and K. Redford. Undated. Adaptive management: a tool for conservation practitioners. Washington, D.C.: Biodiversity Support Program.

Uwate, K.R. and T. Teroroko. 2007a. Compilation of reports related to the Phoenix Islands. Phoenix Islands Protected Area, Ministry of Environment, Lands and Agricultural Development, Government of Kiribati, Bikenibeu, Tarawa, Republic of Kiribati. PIPA Technical Report No. 1.

Uwate, K.R. and T. Teroroko. 2007b. Phoenix Islands Protected Area – Stakeholder opinions. Phoenix Islands Protected Area, Ministry of Environment, Lands and Agricultural Development, Government of Kiribati, Bikenibeu, Tarawa, Republic of Kiribati. PIPA Technical Report No. 2.

Uwate, K.R., W. FitzGerald, and T. Teroroko. 2007. Valuation of Phoenix Islands marine and fisheries resources. Phoenix Islands Protected Area, Ministry of Environment, Lands and Agricultural Development, Government of Kiribati, Bikenibeu, Tarawa, Republic of Kiribati. PIPA Technical Report No. 3.

World Heritage Centre (WHC). 2005. Operational Guidelines for the implementation of the World Heritage Convention. United Nations Educational, Scientific and Cultural Organisation, Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage. WHC 05/2, 2 February 2005.

APPENDICES

APPENDIX 1. Glossary of Terms

Access fee - Fee paid by DWFN for fishing access to the waters of another country.

Artisanal fishing - Small scale fishing operations that provide fish for domestic use and for the cash economy. Sales of fish are allowed.

Benthic community - The assemblage of organisms, substrate, and structural formations found at or near the bottom that is periodically or permanently covered by water.

Biodiversity - The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD).

Biosecurity - Safeguard endemic flora and fauna from the introduction of harmful exotic species.

Closed - All entry or use is prohibited.

Commercial fishing - Any activity that results in the sale or trade for intended profit of fish, shellfish, algae, or corals.

Cultural heritage - The sum total of living built by a group of human beings and passed from generation to generation.

Cultural resource - Any historical or cultural feature, including archaeological site, historic structure, shipwreck, and artifact.

Distant water fishing nation (DWFN) - A nation who's fishing fleet fishes in the waters of another country.

Ecosystem - An interacting system of living and non-living parts such as sunlight, air, water, minerals and nutrients. Ecosystems can be small and short-lived, such as waterfilled tree holes or rotting logs on a forest floor, or large and long-lived, such as forests or lakes.

Endemic - Organisms whose distribution is restricted to a particular locality.

Exotic species - Non-native species. A species of plant, invertebrate, fish, amphibian, reptile or mammal whose natural zoogeographic range would not have included the waters of the central Pacific Ocean without passive or active introduction to such area through anthropogenic means.

Fishing - Fishing means: (1) the catching, taking, or harvesting of fish; (2) the attempted catching, taking, or harvesting of fish; (3) any other activity which can reasonably be expected to result in the catching, taking, or harvesting of fish; or (4) any operation at sea in support of, or in preparation for, any activity described in subparagraphs (1) through (3). Such term does not include any scientific research activity which is conducted by a scientific research vessel.

Genetic diversity - The variability in the genetic make up among individuals within a single species. In more technical terms, it is the genetic differences among populations of a single species and those among individuals within a population.

Habitat - The place or type of area in which an organism naturally occurs.

Harvest - The catching or taking of a marine organism by any means whatsoever, followed by a reduction of such organism to possession. Marine organisms that are caught but immediately returned to the water free, alive, and unharmed are not harvested. In addition, temporary possession of a marine animal for the purpose of measuring it to determine

compliance with the minimum or maximum size requirements of this chapter shall not constitute harvesting such animal, provided that it is measured immediately after taking, and immediately returned to the water free, alive, and unharmed if undersize or oversize.

Innocent passage – A vessel cannot do anything that is prejudicial to the peace, good order or security of the coastal state. Activities such as fishing, research, pollution or other activities not having a direct bearing on passage are deemed to not be innocent.

Injure - To change adversely, either in the short or long term, a chemical, biological or physical attribute of, or the viability of. This includes, but is not limited to, to cause the loss of or destroy.

Mineral – Clay, stone, sand, gravel, metalliferous ore, nonmetalliferous ore, or any other solid material or other matter of commercial value.

Mining operations – The term covers a broad range of activities including exploration for minerals and extraction of minerals.

MPA - A protected marine intertidal or subtidal area, within territorial waters, exclusive economic zones or in the high seas, set aside by law or other effective means, together with its overlying water and associated flora, fauna, historical and cultural features. It provides degrees of preservation and protection for important marine biodiversity and resources; a particular habitat (e.g. a mangrove or a reef) or species, or sub-population (e.g. spawners or juveniles) depending on the degree of use permitted. The use of MPAs (for scientific, educational, recreational, extractive and other purposes, including fishing) is strictly regulated and could be prohibited.

Natural heritage - Physical and biological resources available to a group of human beings that are passed from generation to generation.

Pelagic fish - Fish that are not closely associated with the ocean floor and are normally caught near the sea surface or in the water column.

Protected area - An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

Species diversity - The variety of species, whether wild or domesticated, within a particular geographical area. A species is a group of organisms, which have evolved distinct inheritable features and occupy a unique geographic area. Species are usually unable to interbreed naturally with other species due to such factors as genetic divergence, different behaviour and biological needs, and separate geographic location.

Subsistence fishing - Fishing for home consumption. No fish sales are allowed.

Sustained benefit - Positive contributions to the welfare of people that are continuous over time.

Tourist - A person traveling to and staying in places outside his or her usual environment for not more than one consecutive year for leisure, business, and other purposes.

Tourism - The activities of persons traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business, and other purposes.

Vessel - Watercraft of any description, including, but not limited to, motorized and nonmotorized watercraft, personal watercraft, airboats, and float planes while maneuvering on the water, capable of being used as a means of transportation in/on the waters of the Sanctuary. For purposes of this part, the terms "vessel," "watercraft," and "boat" have the same meaning.

APPNEDEX 2. PIPA REGULATIONS 2008

Insert signed PIPA Regs 2008 and Ammendment

APPENDIX 3. PIPA ISLAND GEOGRAPHIC COORDINATES

Coordinates for each island within PIPA:

Kanton: 2°46.2'S to 2°52.2'S;
171°37.4'W to 171°43.4'W

Enderbury: 3°6.3'S to 3°8.9'S;
171°4.7'W to 171°5.7'W

Rawaki: 3°43.0'S to 3°43.6'S
170°42.5'W to 170°43.0'W

Manra: 4°26.2'S to 4°28.0'S;
171°13.6'W to 171°15.9'W

Orona: 4°29.0'S to 4°32.3'S;
172°8.1'W to 172°13.1'W

Birnie: 3°34.8'S to 3°35.4'S;
171°30.7'W to 171°31.2'W

McKean: 3°35.5'S to 3°36.1'S;
174°7.2'W to 174°7.6'W

Nikumaroro: 4°39.2'S to 4°41.8'S;
174°29.8'W to 174°32.8'W

APPENDIX 4. PIPA SUMMARY OF RESOURCES

The Phoenix Islands are remote (see Figure 1). They are about 3,100 km southwest of Hawaii and about 4,500 km northeast of Australia.

Seven of the eight Phoenix Islands are uninhabited. There are about 50 government employees and their families living on Kanton. They are periodically serviced by inter-island ships that stop there a few times a year and are visited occasionally by yachts and fishing boats. There is an aircraft runway on Kanton that was constructed during WWII. However, there has not been regular air service since the 1960s.

4.1 Resource Description

4.1.1 Physical

The Phoenix Island group is situated between the Gilbert Islands to the west and the Line Islands to the east, extending across the centre of Kiribati. Two of the Phoenix Islands, Howland and Baker, are low reef islands in adjacent territory of the United States to the north of Kiribati.

Located directly north of the Tonga-Kermadec ocean trench, the Phoenix Islands region shows no evidence of a northward extension of the trench; rather it is located on the Tokelau Ridge, incorporating some of the many Tokelau volcanoes aligned along the ridge (See map on Bathymetry and Seamounts section). Beyond the Tokelau seamounts there is a well defined cluster of volcanoes to the east, including Kanton, Enderbury, Rawaki, Birnie, Manra and Orona atolls and low reef islands, all within PIPA. Beyond the volcanoes, the sea floor is typical flat terrain mid-ocean sea floor. With an average water depth of 4,500 m and maximum depth of 6,147 m, the highest peaks of the underwater volcanoes reach to the surface where they are capped by coral atolls and reefs.

As many as ten of these massive volcanoes have a surface or near surface manifestation; four are capped with coral atolls (Orona, Manra, Kanton and Nikumaroro), six occurring as low reef islands (Birnie, Rawaki, McKean and Enderbury in Kiribati, Baker and Howland in US territory) and two as submerged reefs (Carondelet and Winslow).

PIPA includes all eight atoll and low reef islands of the Kiribati section of the Phoenix group: Rawaki, Enderbury, Nikumaroro, McKean, Manra, Birnie, Kanton and Orona. Their tops are all isolated peaks rising from the deep ocean floor (3,000 m or greater) with several other presumed old volcanoes rising to near the surface, and many more known only from bathymetric study that do not reach to near the surface. Two known submerged reefs, Carondelet Reef, located 125 km southeast from Nikumaroro, and Winslow Reef located 240 km northwest from the McKean Island, are shallow platform reefs with Carondelet Reef being as little as 3-4 m underwater at low tide.

The 8 atolls and low reef islands and the two submerged reefs of PIPA represent only the highest of numerous large and long-extinct volcanoes. An even larger number of large volcanoes do not reach to within 200 metres of the surface and are therefore technically classified as seamounts. A few of PIPA's seamount volcanoes have been studied bathymetrically and formally named and entered into the Seamount Catalogue, including the Carondelet and Winslow seamounts near their namesake submerged reefs. The catalogued seamounts also include Fautasi, Siapo, Polo, Tai, Tanoa, Tau Tau, Gardner, and four unnamed seamounts. Another large unnamed seamount is located in the south east of PIPA (170° 15' W, 5° 36' S).

These atolls and low reef islands are surrounded by some of the most pristine coral reefs in the world. The waters are teeming with fish in quantities rarely seen elsewhere and tens of thousands of seabirds find refuge on the atolls.

The substrate is almost entirely limestone with accumulated organic matter. Guano is present and was collected and exported from the Phoenix Islands in the late 1800s. The total area of all eight islands is 30 square km. (insert table with island areas/statistics) Abariringa, Orona and Nikumaroro have lagoons that open to the sea. The lagoons in other islands are closed.

A map documenting substrate types has been completed for Enderbury. Changes to island shapes, shoreline or lagoon openings have been documented for Abariringa and Nikumaroro.

Meteorology

PIPA is located in the Pacific equatorial dry zone that experiences droughts and periods of heavy rainfall. During El Niño periods, the Phoenix Islands may experience high rainfall. Historic Kanton rainfall data indicates that precipitation between 1940 and 1965 was much lower than that between 1986 and 2001. Overall, the rainfall in the Phoenix Islands is among the lowest in the Central Pacific. Most of the Phoenix Islands receive less than 1,000 millimetres (mm) of rain annually with a dry period from March through June. The northern most islands in the Phoenix are the driest, i.e. Kanton and Enderbury. Birnie, Rawaki, Nikumaroro and McKean are wetter. Orona and Manra are the wettest.

Air temperature ranges from 21.7° to 36.7°C with an average 28.9°C. Relative humidity ranges from 57 to 85 percent.

Nunn (1994) noted that the intertropical convergence zone remains relatively stationary during the year over the central Pacific Ocean. However, the South Pacific convergence zone moves north from January to July. The Phoenix Islands are between the two zones throughout the year. Between 5°N to 5°S particularly in the central Pacific Ocean (where the Phoenix Islands are located), there is persistent high pressure preventing the development of tropical cyclones (hurricanes).

The meteorological conditions have a big influence on fish stocks in the region. Lehodey et al (1997) examined the El Niño - Southern Oscillation (ENSO) in relationship to the western equatorial Pacific warm pool. During ENSO events this warm water pool shifts to the east and skipjack tuna populations also shift to the east extending significant catches to the Phoenix Islands. The Phoenix Islands region appears to be the centre of El Niño activities in the Pacific so may be ideal for studying the El Niño phenomenon and more generally in relation to climate change.

Geology

There has been little study of geology of the atolls and seamounts in PIPA but based on what is known from Howland and Baker, the US islands within the Phoenix Group, some extrapolations can be made for the origins and geological history of PIPA. Joyce Miller in Maragos et al provide the following information (Chapter 15, Coral Reefs of the USA, 2008):

The Line and Tokelau (PIPA is located across the Tokelau ridge) ridges lie within the Darwin Rise, on magnetically "quiet" seafloor formed during the Cretaceous Normal Superchron (120–83 Ma) (Atwater et al. 1993). The seafloor underlying the northern part of the Tokelau ridge is dated between 120.4 and 131.9 Ma (Early Cretaceous) (Muller et al. 1997; Clouard and Bonneville 2005).

Recent research by Koppers and Staudigel (2005) along the Tokelau ridge and Gilbert Island chain establishes seamount ages from dredge samples in these areas, particularly focusing on dating the bends that occur in the two chains. These seamount ages are combined with predicted hotspot traces from extinct hotspots (Wessel et al. 2003; Kroenke et al. 2004) to compare the age of Tokelau (57 Ma) and Gilbert (67 Ma) bends with the 47 Ma age of the Hawaiian-Emperor Bend (Dalrymple and Clague 1976), which has recently been revised to 50 Ma (Sharp and Clague 2006). Koppers and Staudigel (2005) argue that because the ages of the three bends are asynchronous, these data do not support a stationary hot spot paradigm, but may point to either hot spot motion or magmatism caused by short-term local lithospheric extension as the origin of the Tokelau ridge.

The geological processes that formed the Kiribati Phoenix Islands and associated seamounts are likely the same as for Howland and Baker. Atoll and reef island development began when the volcanic foundations were still emergent islands in the Cretaceous to Eocene periods, followed by subsidence being offset by upward reef growth maintaining proximity to the sea surface over long time periods.

The summits of Baker and Howland Islands are the smallest of the Pacific remote islands of the USA, and the highest point on any of these lies just 8 m above sea level. Their tops are all isolated peaks rising from the deep ocean (3,000 m or greater) with no surrounding ridges or other connected features. Although the flanks of these islands are very steep with slopes between 30° and 40° down to a depth of about 1,000 m, both also have small shallow terraces that probably reflect previous sea level stands. The terraces marked by the areas of low slope, are present between -7 and 17 m and between -90 and 130 m around the islands. Additional terraces are present at multiple depths off Howland Island. According to bathymetric information available (see also chapter on bathymetry), it is probable that the PIPA islands and seamounts, are similarly isolated volcanic peaks extending from deep sea. Seafloor age adjacent at Baker and Howland is estimated to be 123-124 (Ma).

Larson and Chase (1972) correlated the magnetic anomaly sets near the Phoenix Islands, east of Japan, and west of Hawaii as part of their analyses of patterns and evolution of sea-floor spreading in the Cretaceous and Cenozoic periods. This was based on the Phoenix lineation set of magnetic anomaly data. A magnetic reversal model was derived and applied. This shows that the Phoenix Islands, Japan, and Hawaii were formed during the Cretaceous and Cenozoic period.

Magnetic anomaly data around the Phoenix Islands was used to analyze sea-floor spreading in the Cretaceous and Cenozoic periods. In the 1970s, Pacific Islands Applied Geoscience Commission (SOPAC) conducted manganese nodule surveys around the Phoenix Islands. The eastern side of the Phoenix Islands portion of the Kiribati EEZ appeared to have higher amounts of manganese nodules than the western side. Phoenix Islands manganese nodules had an average of 1.35 percent Ni content. These nodules (and nodules from all of Kiribati's EEZs) were of low grade and appear to have no economic value for commercial harvest in the foreseeable future.

Several bathymetric surveys have been completed in the Phoenix Islands. Seabed surface composition was primarily calcareous ooze, siliceous-calcareous clay, and brown clay. Most of the seamounts on the eastern side of the Phoenix Islands portion of the Kiribati EEZ were surveyed by the Japanese in the late 1980s.

The substrate of the Phoenix Islands is almost entirely limestone with accumulated organic matter (Fosberg and Sachet c1976). Garnett (1983a) noted that the soils on Kanton were composed of coral sand and larger fragments of dead corals and other biogenic materials. Little or no humic material was in the soil. Soil samples at most sites around Kanton were primarily sand (GoK 1995).

Darwin has been reported to have used some of the Phoenix Islands as a basis for development of his theory of coral reef and atoll development.

To summarize, PIPA illustrates evolutionary stages of volcanic subsidence and corresponding reef growth culminating in the formation of large biogenic structures. The Phoenix Islands are among the most ancient atoll archipelagos in the world. All were formed as coralline limestone accumulated atop subsiding volcanoes over a period of millions of years. Subsequent development of lagoons and dunes has continued during sea level changes in the Holocene. Fringing coral reefs continue to develop around the islands.

The Phoenix Islands reflect a geological sequence of globally significant mid-oceanic archipelagos, capturing a diversity of forms and developmental stages of ancient atolls, low reef islands, submerged reefs and seamounts, recording in their rock strata the formation of the world's largest biogenic structures (atolls and reef islands) over the past 10 to 80 million years. These formations collectively contain one of the world's largest pristine atoll archipelagos, which in turn contribute essential habitat for coral communities, benthic algae communities, giant clam beds, intact atoll forests and intact atoll dry scrubs. It is a unique opportunity to have nominated as World Heritage, an entire suite of atolls, low reef islands, submerged reefs and seamounts set on a deep mid-ocean sea floor and that have had minimal anthropogenic impact.

Bathymetry and Seamounts

PIPA has a huge bathymetric range with waters reaching to maximum of 6,147 meters depth but the main seafloor averages around 4,500 metres below the ocean surface. Additional to the ancient volcanoes that reach or approach the surface, bathymetry reveals a series of topographic features which are interpreted to also be volcanoes which technically qualify as 'seamounts' – 'submerged mountains with a height of more than 1,000 metres above the sea floor but whose peak lies below the photic zone'.

Based on bathymetry alone, it is estimated that there may be more than 30 seamounts to be found within the PIPA nomination. Globally the Pacific Ocean contains the highest density of seamounts followed by the Atlantic and Indian Oceans. There is noticeably higher densities of seamounts in the Central Pacific, including Kiribati.

Research to study the seamounts and other volcanoes of PIPA is on-going. To date, some 14 seamounts have been identified within PIPA, thirteen of which have been formally registered but only nine of those have yet been named viz Tai, Polo, Siapo, Gardner, Tanoa, Fautasi, Tau Tau, Carondelet and Winslow Reef, which are the larger seamounts. The Government of Kiribati will likely recommend re-naming of some of the seamounts, proposing culturally appropriate Kiribati names.

A further exploratory cruise will be conducted in the Phoenix Islands in 2009 led by the New England Aquarium. The primary objective of this cruise will be to obtain further information on seamounts in the Phoenix Islands area utilising remotely operated submarine equipment.

Topographic Features of Phoenix Islands Protected Area (PIPA):

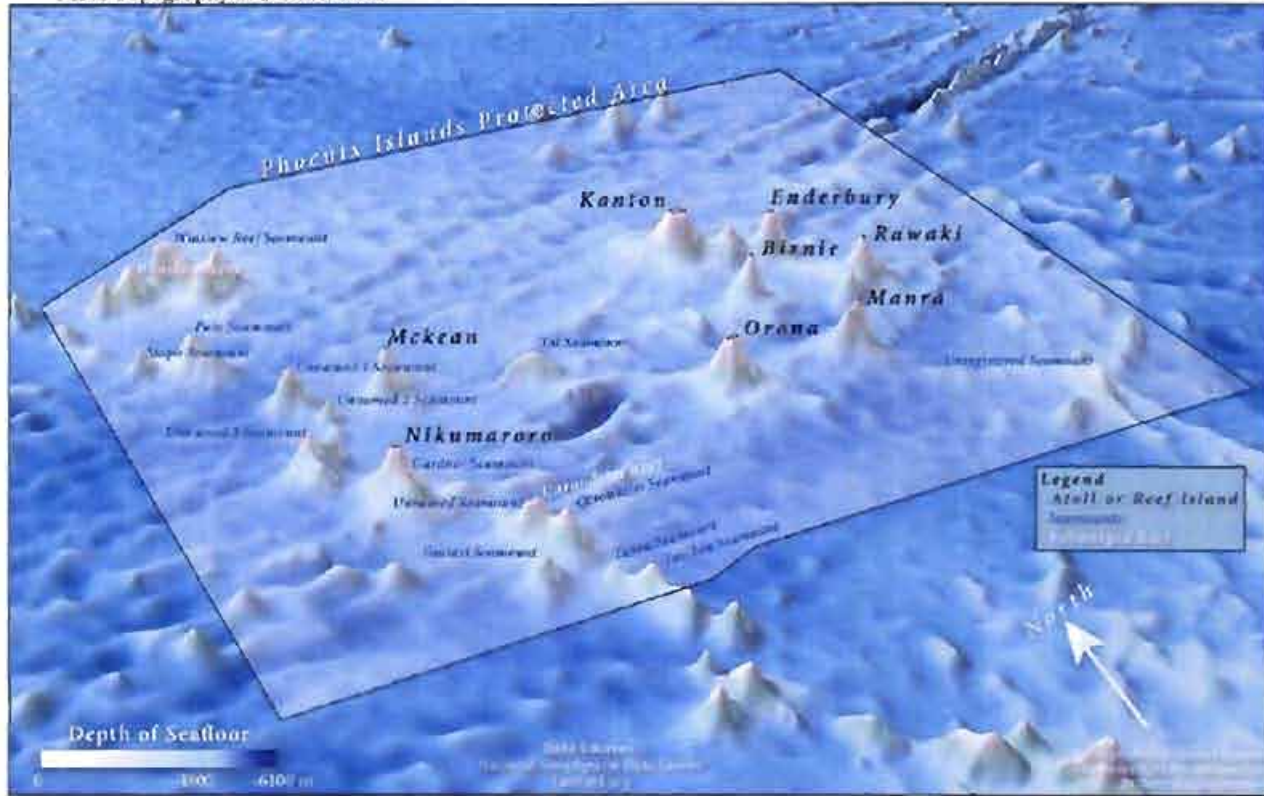


Map base is a Merged Bathymetric Map courtesy of <http://www.earthref.org/SBN/>. Labelling and placement using Google Earth is indicative only.

Atolls and Reef Islands are shown with flag icons, submerged reefs with concentric circles and seamounts with triangles. Most of the confirmed seamounts are part of the Tokelau Seamounts array extending north-south. Also located on the Tokelau ridge are two atolls – Mckean and Nikumaroro – as well, two submerged reefs – Winslow and Carondelet - both of which are associated with adjacent large seamounts.

Six of the Phoenix Islands, in the east of PIPA, occur as a cluster on a lateral ridge extending eastward from the Tokelau Ridge.

Seamounts within PIPA
PIPA Topography in 3 Dimensions



The above three dimensional map shows the underwater topography of PIPA. The atolls (4), reef (4) islands, submerged reefs (2) and 9 of the 14 confirmed seamounts have been named. Average depth of the seafloor is about 4,500 metres, with a maximum of 6,147 m. Details on each of the topographic features are provided elsewhere in the nomination document.

No previous resource surveys have been identified for Carondelet or Winslow reefs, or for the unnamed reefs in the Phoenix Islands. A survey was attempted at Winslow in August 2008 but the reef could not be located (Jim Maragos, US Fish and Wildlife Service, oral information). These remote untouched reefs undoubtedly have high species diversity and populations of endangered species.

Oceanography

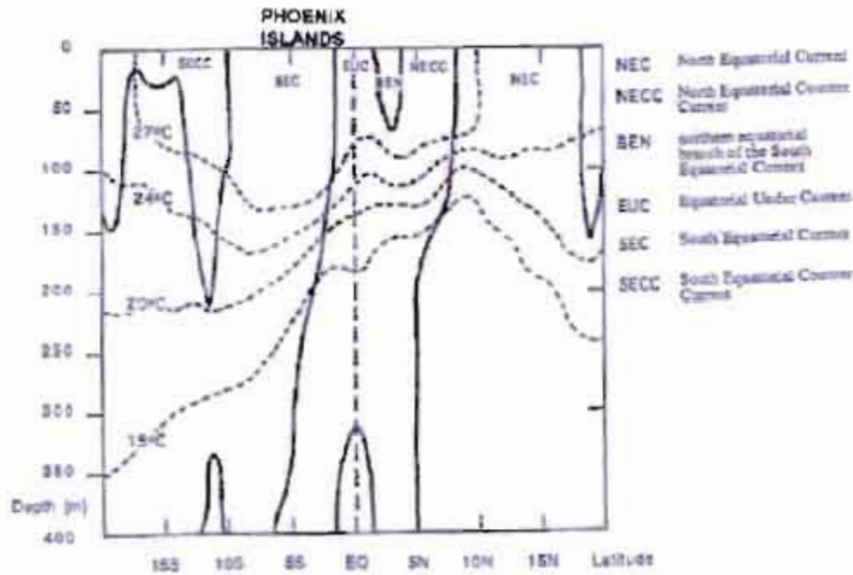
Sea surface temperatures within PIPA are normally between 28-30°C. There is no significant thermocline down to 50 m depth. Sea level observations on Kanton show regular four-day oscillations related to equatorial waves. Oceanographic studies reveal that silicate and phosphate levels in the waters around the Phoenix Islands are elevated compared adjacent waters. This may be a result of upwelling and have high importance for the pelagic food chain in the region. For example in 2000, McKean water temperature was slightly cooler than that of Nikumaroro. This suggested up-welling and mixing of deeper water on McKean. The minimum water temperature recorded was 26.7°C at Nikumaroro (Obura and Stone 2003).

The Phoenix Islands are adjacent to the equator and are predominantly influenced by the westward-flowing Equatorial Current (northern equatorial branch of the South Equatorial Current (BEN) and south equatorial branch of the South Equatorial Current (BES) (TBAP 1993). Offshore currents are generally westward. The strength of the currents varies with the wind. Usual current speed is 1.9 km per hour (1 knot), with a maximum of 3.7 km per hour (2 knots).

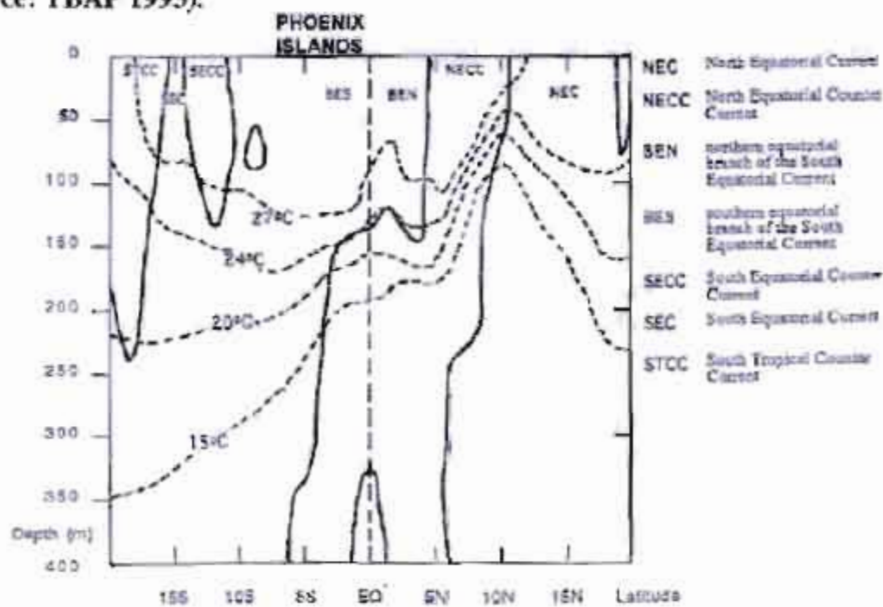
The Phoenix Islands are subject to the ENSO that occurs every two to seven years and lasts for 18 to 24 months. During ENSO events, the westward trade winds are reduced and the main water currents experience variations and even reversal. This deepens the eastern Pacific thermocline. More specifically, the Phoenix Islands are located within the region of the Central Pacific in which warm pool of surface waters develops at the onset of El Niño phases, and can experience persistent hotspots lasting 1 year or more, as occurred in 2002-3. This unique environment of high exposure to warm water pools may exert unusual selective pressures on marine organisms relevant to climate change adaptation, discussed further in later sections.

The Tuna and Billfish Assessment Programme (TBAP 1993) provided diagrams (some shown below) of the seasonal changes in major equatorial surface currents around the Phoenix Islands.

Vertical sections of the central Pacific, including the Phoenix Islands, showing mean temperature, and current profiles for JUNE between the surface and 400 m (source: TBAP 1993).



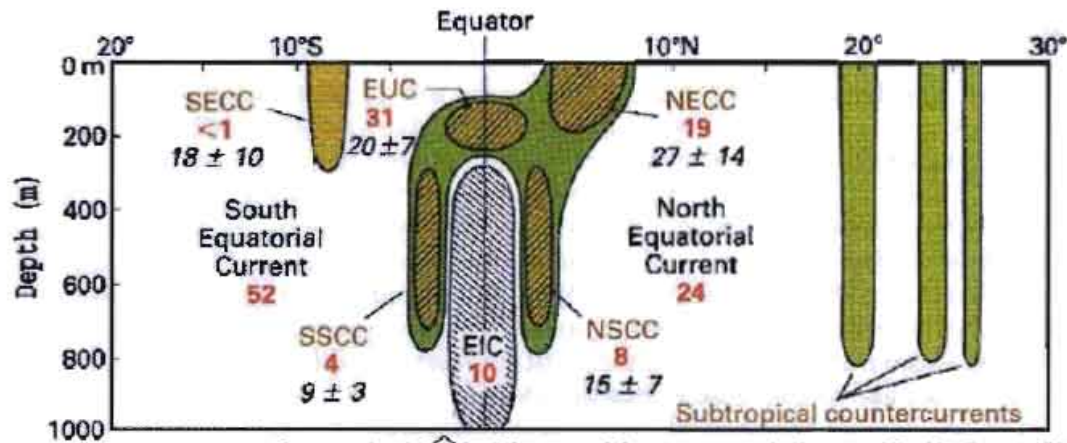
Vertical sections of the central Pacific, including the Phoenix Islands, showing mean temperature, and current profiles for **DECEMBER** between the surface and 400 m (source: TBAP 1993).



Jamie Gove in Maragos et al (2008) provided a sketch of the equatorial current system in the central Pacific shown in the figure below. The Phoenix Islands were in an area of unique.

subsurface water currents. This may have great significance for dispersing larvae originating from the Phoenix Islands.

Sketch of equatorial current system in the central Pacific Ocean (170°W) including the Equatorial Intermediate Current (EIC), the North and South Subsurface Countercurrents (NSCC and SECC). (source: Maragos et al Coral Reefs of the USA, 2008).



Cross-sectional sketch of the equatorial current system in the central Pacific Ocean (170° W). Shown in crosshatch are the North and South Equatorial Countercurrent (NECC and SECC), subsurface Equatorial Intermediate Current (EIC), North and South Subsurface Countercurrents (NSCC and SSCC), and Equatorial Undercurrent (EUC). Eastward flow is colored green or brown, and all westward flow is white, including the North Equatorial Current (NEC) north of 5° N and the South Equatorial current (SEC) south of 5° N and outside the EIC. Black numbers in italics were observations from January 1984 to June 1986 (latitude 165° E), and bold red numbers were observations from April 1979 to March 1980 (latitude 155° W), with both representing transports in Sverdrups (Sv = 10⁶ m³/s) (Modified from Tomczak and Godfrey (2003))

4.1.2 Marine Ecosystems

The marine environment of the PIPA is extremely diverse. It varies from the spectacular turquoise lagoons with huge coral heads and clams to pristine and colourful coral reefs that form and surround the atoll, low reef islands and submerged reefs down the slopes of the massive volcanoes to the ocean floor to over 6,000 meters deep. The marine environment of the PIPA is known to support a number of globally endangered and endemic species and hosts interesting and unique species assemblages not found elsewhere in the world.

From a marine science perspective the PIPA is extremely important because of the minimal human impacts and hence it's near pristine state. In addition PIPA is biogeographically uniquely situated in the center of the equatorial Pacific. PIPA plays a significant role in movements and dispersal of marine animals and larvae. Little is still known about the full effect of these islands on the surrounding pelagic marine species and systems, which in turn support internationally important seabird populations and numerous migratory birds.

Signs (prolific algae growth) of unusually high nutrient levels for oceanic atolls have been observed in the Phoenix Islands. This effect could be caused by a combination of lagoon enrichment, leaching of guano deposits or oceanic upwelling caused by deep currents striking the massive seamounts underlying each of the Phoenix Islands. Pierce et al (2006) suggested

that the Phoenix Islands are affecting and supporting the pelagic marine life/seabird ecology by increasing nutrient status, which has a food chain effect reaching outwards for a very long distance off shore.

The Phoenix Islands are considered spawning grounds for skipjack tuna. Hence their protection should also contribute to increase in tuna stocks. Tuna is the most important income earner for Pacific island countries including Kiribati.

Coral reefs

The Phoenix Islands of Kiribati consist of three atolls with lagoons encircled by perimeter coral reefs (Orona, Nikumaroro, Kanton) and five (Manra, Rawaki, Birnie, McKean and Enderbury) low reef islands surrounded by fringing coral reefs. Two additional outlying low reef islands (Baker and Howland) to the northwest are territories of the United States and protected as National Wildlife Refuges. Collectively they are among the least disturbed coral reefs in the world. The reef system is so remote and largely pristine (except for Kanton which was modified as a military base between WWII and the mid 1970s) that it can serve as a benchmark for understanding and potentially restoring other degraded hard coral ecosystems. The Phoenix Island reefs provide a model of what atoll and low reef islands in this part of the Pacific Ocean are like with minimal human disturbance.

The Phoenix Islands reefs show classic features of small remote atoll islands, including:

- extreme exposure to surf and storms on three quarters of the island perimeters;
- endemicity of marine fauna and unusual species assemblages of reef organisms (algae, corals and fishes); and
- relatively moderate species diversity but high abundances of normally rare species;

Researchers have identified a total of over 200 coral species in the Phoenix Islands. Preliminary assessments of the coral fauna indicate range extensions of 2 species from the Eastern Pacific (*Pavona eplanulata* and *Pavona chiriquensis*) and little-known species also only recorded from other remote Pacific islands without protection status such as in the Line Islands. Coral reefs of the Phoenix Islands were notable for the moderate coral cover (20-40%) and evidence of high physical breakage by wave energy on the southern, eastern and northern shores of the islands.

Typical reef structure comprised 4 zones, from deep to shallow, with 2 additional zones on atolls with both islands and lagoons:

- **Reef slope** – between 60-85° slope, surveyed from 20 to 50m deep, and extending beyond the range of visibility to > 100 meters depth. Upper slopes tend to have high cover of rubble and *Halimeda*, some with up to 60-70% coral cover. Soft corals are common, dominated by leathery forms.
- **Reef edge** – transition between the steep slope and the near-horizontal shallow platform, about 12-20m deep.
- **Shallow platform** – from 12-20m at its deep edge, to the shallow surge zone at 5-6m. Depending on wave exposure, it can be covered with hard and soft coral growth with close to 100% cover in patches, or dominated by rubble and coralline algae on wave exposed slopes.
- **Surge zone** – extends from 4-6m to the surface, and typically cut into buttresses and surge channels with up to 3m vertical relief.

On Nikumaroro, Orona and Kanton Islands two additional zones have been recorded:

- **Passes and dredged Channel** – shallow passes for Orona and Nikumaroro (<1m), and a deep channel (10m) in Kanton. However, Kanton's deep channel was dredged by the military, causing lagoon water levels to submerge reef crests and to emerge several feet (Jokiel and Maragos, pers.comun. 1973).
- **Lagoons** – characterized by soft silty bottoms with raised rocky features on which grow corals, algae and encrusting invertebrates. Maximum depths recorded were 4m (Nikumaroro), 12m (Orona) and 26m (Kanton). Extensive relict pillars and ancient reef structures are common in Orona and Kanton lagoons, while Kanton lagoon has some 'line reef' structures that run approximately north-south, topped by sand and rubble.

In general, the greater the distance between islands, the fewer species are found on the more remote islands. This is because reef animals with short larval life spans or specialized habitat requirements do not make it across the gaps of open ocean. The atolls, especially Kanton which has been more thoroughly studied, appear to support higher species numbers because of larger size and additional habitats (protected lagoons, pinnacles, patch reefs, passes, and dredged channel).

Coral cover varied considerably around Kanton depending on the site visited (Stone et al 2001). In some sites, coral cover was more than 50 percent. Coral communities were more highly developed on Kanton than on other islands in the Phoenix Islands. The lagoon coral gardens on Kanton were among the most highly developed *Acropora* communities ever observed by investigators. Dominant coral species on the outer reefs of the Phoenix Islands includes *Acropora* spp., *Pocillopora* spp., *Favia stelligera*, *Pterogyra sinuosa*, *Lobophyllia hemprichii*, *Porites* spp. and others. Within the lagoons, apart from the branching and tabulate *Acropora* stands, common corals include *Pavona* spp., *Montipora* spp., *Goniastrea pectinata*, and *Favia* spp., and in some locations beds of the rare coral *Anacropora forbesi*. Regional endemics include *Montipora capitata* and *M. dilatata*, the latter currently only known elsewhere from two small locations outside the Phoenix Islands.

In July 2002 and into 2003, there was a seawater hot-spot over the Phoenix Islands. This caused mass bleaching and mortality of corals most notably in the lagoon and sheltered western reefs of Kanton. This was the first time that coral bleaching was reported from Kiribati.

Bleaching in the most highly developed *Acropora* stands in Kanton lagoon and the *Acropora*/mixed communities on the western shores was near 100 percent. The bleaching may have been exacerbated by the residual effects of previous WWII military dredging and filling at Kanton. Farther from these zones, coral mortality decreased to between 60 and 30 percent on Kanton, and on the other islands of the group. By the time of surveys in 2004 (Planetary Coral Reef Foundation) and 2005 (NEAq), many coral recruits and juveniles up to 10 cm diameter were observed. This indicated that significant recruitment had taken place after the mass mortality event. Also deep water corals stayed in good condition, with mortality ending at about 15-20 m on the east-facing sides and 30-35 m on the west-facing sides. These are a sign of resilience of the Phoenix reefs, with rapid recruitment from refuge populations in deep waters, and resistant corals in shallow reefs.

Also in 2006, Kerr and Wragg conducted coral health rapid assessment surveys on Manra, Rawaki, Enderbury, Birnie, McKean, Orona, and Nikumaroro. All surveys were completed on the lee sides of these islands. They reported no evidence of the recent coral bleaching

events and they did not observe any significant coral diseases, also reaffirming recovery of reefs post the bleaching event.

Even though coral reefs of the Phoenix Islands are not isolated from the effects of global warming (such as bleaching) their ability to regenerate appears much better than reefs in more populated areas in part because of lack of other threats and stresses to the reefs. This provides an important and likely unsurpassed opportunity to research and understand climate change impacts on coral reef systems in the virtual absence of other anthropogenic factors.

Fish

Documented fish fauna of the Phoenix Islands consists mainly of shallow water species associated with coral reefs. The most abundant families in terms of number of species are wrasses (Labridae), groupers (Serranidae), gobies (Gobiidae), damselfishes (Pomacentridae), surgeonfishes (Acanthuridae), moray eels (Muraenidae), butterflyfishes (Chaetodontidae), blennies (Blenniidae), squirrelfishes (Holocentridae), and cardinalfishes (Apogonidae). These 10 families collectively account for 62 percent of the total reef fish fauna. Deep sea and open ocean species have not been surveyed, except for tuna resources.

The total known shallow reef-fish fauna of the Phoenix Islands now stands at 518 species, consisting of the following: 192 species originally recorded by Schultz (1943), 100 species recorded by the year 2000 expedition (Stone *et al.* 2001), 9 species recorded in various generic revisions, and 217 new species from the 2002 New England Aquarium expedition. A formula for predicting the total reef fish fauna based on the number of species in six key indicator families (Allen, unpublished data) indicates that at least 576 species, over 50 more than currently listed, can be expected to occur at the Phoenix Islands. A new species of damselfish, *Chrysiptera albata*, was collected in 42-50m depth at Nikumaroro Island (Allen and Bailey 2003). Other potential undescribed species were found in the genera *Myripristis* (Holocentridae), *Eviota* (Gobiidae), and *Trimma* (Gobiidae).

Certain species are particularly common on Phoenix Islands reefs, occurring in much higher densities and full age/size cohorts than at most localities in the Indo-Pacific region. These include various surgeonfishes (Holocentridae), *Eviota* (Gobiidae), and *Trimma* (Gobiidae) (*Acanthurus guttatus*, *A. nigricans*, *A. triostegus*, *A. xanthopterus*, *Naso literatus*, and *Zebbrasoma veliferum*) and parrotfishes (*Hipposcarus longiceps* and *Scarus ghobban*). All of these species can be frequently sighted in extraordinarily large aggregations in the Phoenix Islands.

The composition of local reef fish communities in the Indo-Pacific region is largely dependent on habitat variability and consequent availability of food and shelter. The relatively limited faunal diversity of the Phoenix Islands compared to areas further to the west is primarily due to two factors: 1) the distance from the "coral triangle", which is generally acknowledged as the center of Indo-Pacific coral reef fish diversity, and 2) the relatively homogenous nature of the reef environment. Phoenix Island reefs, typical of atolls, are generally characterised by limited habitat diversity, and are consequently inhabited mainly by fishes typical of atoll seaward reefs, with the exception of the 26 lagoon species. The few islands that contain substantial lagoons (Nikumaroro, Kanton and Orona) possess relatively impoverished lagoon faunas due to poor circulation, extensive shallows, lack of reef structure, or combination of these factors. However, what they may lack in species number or

diversity is made up for in the sheer robustness and abundance of reef fish species, especially apex predators, seldom observed in these quantities in other reef systems.

Perhaps the most interesting segment of the Phoenix fauna is the group of species that are largely restricted to the central Pacific. Springer (1982) provided ample evidence for a discrete Pacific Plate province characterized by a high degree of endemism, particularly for shore fishes. Allen (in press) estimated that approximately 19 percent of the overall Pacific Plate fauna is endemic, based on an analysis of 17 common reef fish families.

The endemicity of reef fish is largely unknown. The recently described damselfish (*Chrysiptera albata*) and goby (*Trimma squamicanta*) are currently known only from the Phoenix Islands. However, they can be expected at other areas in the central Pacific such as the Line Islands.

Phoenix Islands fishes with apparent restricted distributions:

Species	General Distribution
<i>Myripristis earlei</i> (Holocentridae)	Marquesas and Phoenix Islands
<i>Paracirrhinus nesus</i> (Cirrhitidae)	Tuamotus and Phoenix Islands
<i>Kuhlia petiti</i> (Kuhliidae)	Marquesas and Phoenix Islands
<i>Chaetodon declivis</i> (Chaetodontidae)	Marquesas, Line Is., and Phoenix Is.
<i>Apolemichthys xanthopunctatus</i> (Pomacanthidae)	Gilbert, Phoenix, and Line Islands
<i>Chrysiptera albata</i> (Pomacentridae)	Nikumaroro Atoll
<i>Bodianus prognathus</i> (Labridae)	Line and Phoenix Islands
<i>Coris centralis</i> (Labridae)	Line and Phoenix Islands
<i>Parapercis lata</i> (Pinguipedidae)	Line and Phoenix Islands
<i>Ctenogobius</i> sp. (Gobiidae)	Line and Phoenix Islands
<i>Priolepis ailina</i> (Gobiidae)	Society and Phoenix Islands
<i>Trimma squamicanta</i> (Gobiidae)	Phoenix Islands

4.2.3 Terrestrial Resources

- Vegetation

Vegetation, plants and fungi have been surveyed and reported on periodically since the 1950s. About 20 to 30 species of plants were considered native. The primary factor influencing vegetation was the extreme fluctuations in rainfall from year to year. There are years during which no rain falls. During and after WWII and during the resettlement program starting in the late 1930s, large numbers of plants were introduced. Of the 129 species introduced to Abariringa in the early 1950s, only 14 persisted until 1973. There have been several attempts to establish coconut plantations on key Phoenix Islands. Most attempts have failed due to the period droughts experienced there.

- Terrestrial Invertebrates

Insects in the Phoenix Islands have been the subject of several studies. This was necessitated by the development of air transportation through Abariringa just prior to WWII to the late 1950s. The Hawaiian Sugar Planters established a plant quarantine station there to intercept insects that might be introduced to Hawaii and damage local agriculture there. Ant species were recently documented for the Phoenix Islands (except Manra which was not surveyed).

None of these species were considered invasive species. This belongs in history and development section—prob OK here

Other terrestrial invertebrates include primarily arachnids and land crabs. Species of other invertebrates have been surveyed on Abariringa. Land crab species were recently documented for the Phoenix Islands (except Manra). Nikumaroro had been known as being overrun by coconut crabs. However, in the late 1990s, coconut crabs were almost extinct there (presumably over-harvested by visiting vessel(s)). By the mid-2000s, coconut crab populations showed signs of recovery.

- Reptiles and Amphibians

No amphibians have been reported for Abariringa. No reports have been located regarding their presence on other Phoenix Islands.

Reptiles on the Phoenix Islands include species of geckos and skinks. These were found on all Phoenix Islands except Birnie. Marine turtles also visit the Phoenix Islands to lay eggs.

- Birds

Bird species and populations have been documented on the Phoenix Islands starting in 1891. Birds were the source of the guano that was extracted from many of the Phoenix Islands in the late 1800s. Millions of seabirds have been reported for the Phoenix Islands which are well known as a key breeding site for many species of birds. Bird colonies on key Phoenix Islands have been mapped. Extensive bird tagging studies were conducted in the early 1960s. Tag returns indicated that Phoenix Island birds migrate to other Pacific islands and as far as Asia. In 2006, Birdlife International identified the Phoenix Islands as an important bird area.

- Mammals

Terrestrial mammals were primarily introduced and are considered destructive to native species of vegetation and birds. There were at least two species of rats and perhaps one species of mouse on various Phoenix Islands. It was speculated that the Polynesian rat was introduced by early Polynesian visitors. The Asian or black rat may have been introduced recently from a Korean fishing vessel that grounded. The mouse species was identified on Abariringa and could have been introduced during WWII. Ironically, the one island with rabbits (introduced by guano collectors in the 1860s) did not have any rats. Settlers have also introduced cats, dogs, and pigs with varying levels of success.

Invasive Species Summary – need to insert

4.4.1 National Laws and Regulations

The following national laws and regulations apply to PIPA.

- (1) Closed District Act - The Closed District Act 1990 was a re-enactment of a 1936 ordinance and followed the Constitutional (Laws Adaptation) Order

1980. Under this law, Abariringa (Canton), as well as Kiritimati, Tabuaeran, and Teraina were declared closed areas. Access was limited to permit holders. This was rescinded during President Tito's administration (in the mid 1990s).

- (2) Environment Act - Environmental Act of 1999 and Environment (Amendment Act 2007. Specific requirements for protected areas are provided in the Environment (Amendment) Act 2007, Sections 42 to 48 (see Appendix 5).
- (3) The Fisheries (Pacific Island States' Treaty with the USA) Act - The Fisheries Act gave effect to the Treaty on Fisheries between the Governments of certain Pacific Island States and the Government of the USA. The Treaty allowed tuna purse seine vessels from the USA to fish in Kiribati waters (including the Kiribati EEZ around the Phoenix Islands). The MLFT is due for renewal or end in 2013.
- (4) The Fisheries Ordinances of 1977, and amendments, and the Fisheries Act of 1984 - These regulations and laws relate to marine tenure and resource use. The Fisheries Act provided the regulatory framework for the operation of the fishery in Kiribati. However, the Fisheries Act provided no guidance on fisheries conservation or sustainable development. Other key points of the Fisheries Act included: vessels over 7 m require a license; foreign vessels must have a permit prior to entry into the fishery; and Fishing permits were issued annually with fees subject to negotiation. Vessels involved in transshipping must also be registered and licensed and must pay transshipment fees. According to the Fisheries Act, the Minister has the power to make regulations on closed seasons, closed areas, size limits, gear limitations, and other measures as appropriate. Various fisheries regulations have been promulgated to manage the fishery including regulations for processing and export of fishery products and for vessel licensing.
- (5) Foreshore and Land Reclamation Ordinance - The Foreshore and Land Reclamation Ordinance included the general provision that the State owns the seabed from the high tide mark. However, the public has the right of navigation, fishing and passing over the foreshore.
- (6) Importation of Animals Ordinance - The Importation of Animals Ordinance regulated the importation of animals.
- (7) Land Planning Ordinance - The Land Planning Ordinance provided for control of development and use of land.
- (8) Local Government Act - The Local Government Act gave the local island councils wide-ranging functions, include regulation of local fisheries.
- (9) Marine Zone (Declaration) Act - The marine Zone (Declaration) Act related to the internal waters, archipelagic waters, territorial sea, the EEZ, and the contiguous zone of Kiribati.

- (10) Merchant Shipping (oil pollution) Order - The Merchant Shipping (oil pollution) Order was the application of the UK Merchant Shipping (oil pollution) Act of 1971.
- (11) Native Lands Ordinance of 1956 – The Native Lands Ordinance relates to land tenure.
- (12) Plant Ordinance - The Plant Ordinance provided for the protection of endangered or culturally important plant species.
- (13) Prohibited Areas Ordinance 1957 – The Prohibited Areas Ordinance had a provision for setting aside areas for nature conservation purposes. Unauthorized persons were not allowed into prohibited areas. Under this ordinance, Birnie, Abariringa (Canton), Enderbury and Orona (Hull) were declared protected areas.
- (14) Quarantine Ordinance - The Quarantine Ordinance regulated importation of agricultural and other products that may harbour dangerous pathogens.
- (15) Wildlife Conservation Ordinance of 1975, amended in 1979 – The Wildlife Conservation Ordinance covered the conservation of wildlife.

4.4.3 Land Ownership

During the 1938 Phoenix Islands Settlement Scheme, each Manra settler received a portion of land. All titles were freehold. A land book was used to register land ownership. In early 1941, work began on Nikumaroro to demarcate and plot land holdings on the southwest side of the island. Gallagher had just begun to divide land plots prior to his passing so much of the land there still belonged to the government. In the 1960s, it was reported that settlers to the Phoenix Islands had full land ownership. At that time, all settlers were moved to the Solomon Islands. In the 1980s, it was reported that all of the Phoenix Islands were owned by GOK. More detailed accounts of land ownership in the Phoenix Islands are provided in Uwate and Teroroko (2007a).

According to the Environment (Amendment) Act 2007, Section 43(4)(c), before prescribing an area as a protected area, reasonable enquiries to identify persons having proprietary interest or right to the area need to be made. In addition, attempts to make an agreement in writing with those persons relating to the protected area need to be made.

Inquires were made with the Lands and Management Division, MELAD. No records were available regarding land ownership in the Phoenix Islands. In addition, a preliminary search of the Kiribati National Archives did not yield any government (GEIC) documents related to land ownership in the Phoenix Islands.

Therefore, "reasonable enquiries" have been made to identify persons having proprietary interest or rights in the area. Further investigation is possible, but beyond the scope of this planning effort. This may include searching any archives in Fiji or London for GEIC documents relating to land ownership in the Phoenix Islands during the Phoenix Islands Settlement Scheme.

4.4.5 International Agreements

GOK is party to the following international agreements and conventions that can be applied to the Phoenix Islands. International agreements are as follows:

- (1) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Conservation);
- (2) Convention on Biological Diversity;
- (3) Convention on Climate Change;
- (4) World Heritage Convention;
- (5) Nuclear Non-Proliferation Treaty;
- (6) International Maritime Organization Convention;
- (7) Maritime Pollution Convention (MARPOL).

Regional agreement that GOK is party to include the following:

- (1) Convention on Conservation of Nature in the South Pacific (Apia Convention);
- (2) South Pacific Forum Fisheries Agency Convention;
- (3) Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (SPREP Convention);
- (4) South Pacific Nuclear Free Zone Treaty (Rarotonga Treaty);
- (5) Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the USA;
- (6) Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific (Tarawa Declaration);
- (7) Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific Region (Niue Treaty).

APPENDIX 6. IUCN List of Endangered Species for Kiribati

Appendix Table 6-1. IUCN Red List of Endangered Species for Kiribati.
(source: <http://www.iucnredlist.org/>, cited February 24, 2007)

Species	Common Name	Status
<i>Eretmochelys imbricata</i>	Hawksbill turtle	Critically endangered
<i>Birgus latro</i>	Coconut crab	Data deficient
<i>Feresa attenuata</i>	Pygmy killer whale	Data deficient
<i>Lagenodelphis hosei</i>	Fraser's dolphin	Data deficient
<i>Mesoplodon densirostris</i>	Blainville's beaked whale	Data deficient
<i>Mesoplodon ginkgodens</i>	Ginkgo-toothed beaked whale	Data deficient
<i>Steno bredanensis</i>	Rough-toothed dolphin	Data deficient
<i>Thunnus alalunga</i>	Albacore tuna	Data deficient

<u>Xiphias gladius</u>	Swordfish	Data deficient
<u>Alopias vulpinus</u>	Thresher shark	Data deficient
<u>Echinorhinus brucus</u>	Bramble shark	Data deficient
<u>Chelonia mydas</u>	Green turtle	Endangered
<u>Cheilinus undulatus</u>	Giant wrasse	Endangered
<u>Pterodroma alba</u>	Phoenix petrel	Endangered
<u>Prosobonia cancellata</u>	Tuamotu sandpiper	Endangered
<u>Vini kuhlii</u>	Kuhl's lorikeet	Endangered
<u>Pterodroma cookii</u>	Cook's petrel	Endangered
<u>Acrocephalus aequinoctialis</u>	Bokikokiko	Least Concern
<u>Actitis hypoleucos</u>	Common sandpiper	Least Concern
<u>Anas acuta</u>	Northern pintail	Least Concern
<u>Anas clypeata</u>	Northern shoveler	Least Concern
<u>Anas platyrhynchos</u>	Mallard	Least Concern
<u>Anas strepera</u>	Gadwall	Least Concern
<u>Anous minutus</u>	Black noddy	Least Concern
<u>Anous stolidus</u>	Brown noddy	Least Concern
<u>Arenaria interpres</u>	Ruddy turnstone	Least Concern
<u>Branta canadensis</u>	Canada goose	Least Concern
<u>Bulweria bulwerii</u>	Bulwer's petrel	Least Concern
<u>Calidris acuminata</u>	Sharp-tailed sandpiper	Least Concern
<u>Calidris alba</u>	Sanderling	Least Concern
<u>Calidris melanotos</u>	Pectoral sandpiper	Least Concern
<u>Ducula pacifica</u>	Pacific imperial-pigeon	Least Concern
<u>Eudynamis taitensis</u>	Long-tailed koel	Least Concern
<u>Fregata ariel</u>	Lesser frigatebird	Least Concern

Appendix Table 6-1 (continued). IUCN Red List of
Endangered Species for Kiribati.
(source: <http://www.iucnredlist.org/>, cited February 24, 2007)

Species	Common Name	Status
<u>Gygis alba</u>	Common white-tern	Least Concern
<u>Gygis microrhyncha</u>	Little white-tern	Least Concern
<u>Heteroscelus incanus</u>	Wandering tattler	Least Concern
<u>Larus atricilla</u>	Laughing gull	Least Concern
<u>Larus delawarensis</u>	Ring-billed gull	Least Concern
<u>Larus pipixcan</u>	Franklin's gull	Least Concern
<u>Limosa lapponica</u>	Bar-tailed godwit	Least Concern
<u>Numenius phaeopus</u>	Whimbrel	Least Concern
<u>Oceanites oceanicus</u>	Wilson's storm-petrel	Least Concern
<u>Oceanodroma castro</u>	Band-rumped storm-petrel	Least Concern
<u>Oceanodroma leucorhoa</u>	Leach's storm-petrel	Least Concern
<u>Pelagodroma marina</u>	White-faced storm-petrel	Least Concern
<u>Phalaropus fulicarius</u>	Grey phalarope	Least Concern
<u>Pluvialis fulva</u>	Pacific golden-plover	Least Concern
<u>Procelsterna cerulea</u>	Blue noddy	Least Concern
<u>Puffinus nativitatis</u>	Christmas Island shearwater	Least Concern
<u>Stercorarius pomarinus</u>	Pomarine jaeger	Least Concern
<u>Sterna albifrons</u>	Little tern	Least Concern
<u>Sterna bergii</u>	Great crested-tern	Least Concern
<u>Sterna fuscata</u>	Sooty tern	Least Concern
<u>Sterna lunata</u>	Grey-backed tern	Least Concern
<u>Sula dactylatra</u>	Masked booby	Least Concern
<u>Sula leucogaster</u>	Brown booby	Least Concern
<u>Hippopus hippopus</u>	Bear paw clam	Lower risk, conservation dependent
<u>Stenella longirostris</u>	Long-beaked dolphin	Lower risk, conservation dependent
<u>Tridacna maxima</u>	Small giant clam	Lower risk, conservation dependent
<u>Tridacna squamosa</u>	Fluted clam	Lower risk, conservation dependent
<u>Carcharhinus falciformis</u>	Silky shark	Low risk, least concern
<u>Kogia sima</u>	Dwarf sperm whale	Low risk, least concern
<u>Thunnus albacares</u>	Yellowfin tuna	Low risk, least concern
<u>Carcharhinus amblyrhynchos</u>	Gray reef shark	Low risk, near threatened
<u>Carcharhinus melanopterus</u>	Blacktip reef shark	Low risk, near threatened
<u>Galeocerdo cuvier</u>	Tiger shark	Low risk, near threatened

Appendix Table 6-1 (continued). IUCN Red List of
Endangered Species for Kiribati.
(source: <http://www.iucnredlist.org/>, cited February 24, 2007)

Species	Common Name	Status
<u>Isurus oxyrinchus</u>	Shortfin mako	Low risk, near threatened
<u>Prionace glauca</u>	Blue shark	Low risk, near threatened
<u>Pseudocarcharias kamoharai</u>	Crocodile shark	Low risk, near threatened
<u>Sphyrna lewini</u>	Scalloped hammerhead	Low risk, near threatened
<u>Triaenodon obesus</u>	Whitetip reef shark	Low risk, near threatened
<u>Ducula oceanica</u>	Micronesian imperial-pigeon	Near Threatened
<u>Epinephelus fuscoguttatus</u>	Brown-marbled grouper	Near Threatened
<u>Epinephelus polyphekadion</u>	Camouflage grouper	Near Threatened
<u>Thunnus obesus</u>	Bigeye tuna	Vulnerable
<u>Rhincodon typus</u>	Whale shark	Vulnerable
<u>Nesofregata fuliginosa</u>	Polynesian storm-petrel	Vulnerable
<u>Tridacna gigas</u>	Giant clam	Vulnerable
<u>Epinephelus lanceolatus</u>	Brindle bass	Vulnerable
<u>Numenius tahitiensis</u>	Bristle-thighed curlew	Vulnerable

APPENDIX 7. CITES List of Endangered Species for Kiribati

CITES has three different lists of Kiribati species (see <http://www.cites.org/eng/resources/species.html>). Appendix I listed species that were most endangered. Appendix II listed species that were not necessarily now threatened with extinction but that may become so unless trade was closely controlled. Appendix III listed species at the request of a party that already regulates trade in the species and needed the cooperation of other countries to prevent unsustainable or illegal exploitation.

CITES Appendices I, II, and III for Kiribati are provided below (see Appendix Tables 7-1 to 7-5 below). Many of the species listed in these appendices were found in the Phoenix Islands.

Appendix Table 7-1. CITES Appendix I Most Endangered Species for Kiribati
(source: <http://www.cites.org/eng/resources/species.html>, cited September 6, 2007)

APPENDIX 1	
Aves (bird)	<i>Branta canadensis</i>
Reptilia (turtle)	<i>Chelonia mydas</i> <i>Eretmochelys imbricata</i>

Appendix Table 7-2. CITES Appendix II May Become Threatened Species for Kiribati
(source: <http://www.cites.org/eng/resources/species.html>, cited September 6, 2007)

APPENDIX 2		
Mammalia (dolphin)	<i>Lagenodelphus hosei</i>	
Aves (bird)	<i>Vini kuhlii</i>	
Reptilia (turtle)	<i>Chelonia mydas</i>	
Actinopterygii (bony fishes)	<i>Chelinus undulatus</i>	
Elasmobranchii (sharks and rays)	<i>Rhincodon typus</i>	
Mollusc (shellfish)	<i>Hippopus hippopus</i> <i>Tridacna gigas</i>	<i>Tridacna maxima</i> <i>Tridacna squamosa</i>
Anthozoa (corals)	<i>Tubipora musica</i> <i>Heliopora coerulea</i> <i>Pocillopora damicornis</i> <i>Pocillopora elegans</i> <i>Pocillopora eydouxi</i> <i>Pocillopora meandrina</i> <i>Pocillopora molokensis</i> <i>Pocillopora verrucosa</i> <i>Seriatopora hystrix</i> <i>Stylophora mordax</i> <i>Stylophora pistillata</i> <i>Acropora abrotanoides</i> <i>Acropora acuminata</i> <i>Acropora anthocercis</i>	<i>Gardineroseris planulata</i> <i>Leptoseris hawaiiensis</i> <i>Leptoseris incrustans</i> <i>Leptoseris mycetoseroides</i> <i>Leptoseris scabra</i> <i>Pachyseris speciosa</i> <i>Pavona cactus</i> <i>Pavona clavus</i> <i>Pavona divaricata</i> <i>Pavona explanulata</i> <i>Pavona gigantea</i> <i>Pavona maldivensis</i> <i>Pavona minuta</i> <i>Pavona varians</i>

Appendix Table 7-2 (continued). CITES Appendix II May Become
Threatened Species for Kiribati

(source: <http://www.cites.org/eng/resources/species.html>, cited September 6, 2007)

APPENDIX 2		
Anthozoa (corals)	<i>Acropora cerealis</i>	<i>Pavona venosa</i>
	<i>Acropora clathrata</i>	<i>Fungia concinna</i>
	<i>Acropora cytherea</i>	<i>Fungia costulata</i>
	<i>Acropora digitifera</i>	<i>Fungia fralinae</i>
	<i>Acropora divaricata</i>	<i>Fungia fungites</i>
	<i>Acropora echinata</i>	<i>Fungia granulosa</i>
	<i>Acropora formosa</i>	<i>Fungia horrida</i>
	<i>Acropora gemmifera</i>	<i>Fungia paumotensis</i>
	<i>Acropora grandis</i>	<i>Fungia repanda</i>
	<i>Acropora horrida</i>	<i>Fungia scruposa</i>
	<i>Acropora humilis</i>	<i>Fungia scutaria</i>
	<i>Acropora hyacinthus</i>	<i>Halomitra pileus</i>
	<i>Acropora intermedia</i>	<i>Herpolitha limax</i>
	<i>Acropora latistella</i>	<i>Podabacia crustacea</i>
	<i>Acropora longicyathus</i>	<i>Sandalolitha dentata</i>
	<i>Acropora lovelli</i>	<i>Sandalolitha robusta</i>
	<i>Acropora lutkeni</i>	<i>Culicia stellata</i>
	<i>Acropora microphthalma</i>	<i>Echinophyllia aspera</i>
	<i>Acropora nana</i>	<i>Echinophyllia echinata</i>
	<i>Acropora nasuta</i>	<i>Mycedium elephantotus</i>
	<i>Acropora palifera</i>	<i>Oxypora lacera</i>
	<i>Acropora paniculata</i>	<i>Acanthastrea echinata</i>
	<i>Acropora polystoma</i>	<i>Lobophyllia corymbosa</i>
	<i>Acropora robusta</i>	<i>Lobophyllia costata</i>
	<i>Acropora secale</i>	<i>Lobophyllia hemprichii</i>
	<i>Acropora selago</i>	<i>Symphyllia radians</i>
	<i>Acropora spicifera</i>	<i>Hydnophora exesa</i>
	<i>Acropora striata</i>	<i>Hydnophora microconos</i>
	<i>Acropora subulata</i>	<i>Hydnophora rigida</i>
	<i>Acropora tenuis</i>	<i>Merulina ampliata</i>
	<i>Acropora tortuosa</i>	<i>Cyphastrea microphthalma</i>
	<i>Acropora valida</i>	<i>Cyphastrea serailia</i>
	<i>Acropora vaughani</i>	<i>Echinopora horrida</i>
	<i>Acropora verweyi</i>	<i>Echinopora lamellosa</i>
	<i>Acropora yongei</i>	<i>Favia fava</i>
	<i>Astreopora gracilis</i>	<i>Favia matthaii</i>
	<i>Astreopora listeri</i>	<i>Favia pallida</i>
	<i>Astreopora myriophthalma</i>	<i>Favia rotumana</i>
	<i>Astreopora ocellata</i>	<i>Favia speciosa</i>
	<i>Astreopora randalli</i>	<i>Favia stelligera</i>
	<i>Astreopora scabra</i>	<i>Favites abdita</i>
	<i>Montipora aequituberculata</i>	<i>Favites chinensis</i>
	<i>Montipora efflorescens</i>	<i>Favites flexuosa</i>
	<i>Montipora foveolata</i>	<i>Favites halicora</i>
	<i>Montipora grisea</i>	<i>Favites pentagona</i>

Appendix Table 7-2 (continued). CITES Appendix II May Become

Threatened Species for Kiribati

(source: <http://www.cites.org/eng/resources/species.html>, cited September 6, 2007)

APPENDIX 2		
Anthozoa (corals)	<i>Montipora hispida</i> <i>Montipora hoffmeisteri</i> <i>Montipora informis</i> <i>Montipora monasteriata</i> <i>Montipora peliiformis</i> <i>Montipora tuberculosa</i> <i>Montipora venosa</i> <i>Montipora verrilli</i> <i>Montipora verrucosa</i> <i>Alveopora verrilliana</i> <i>Goniopora stutchburyi</i> <i>Porites arnaudi</i> <i>Porites australiensis</i> <i>Porites cylindrica</i> <i>Porites lichen</i> <i>Porites lobatu</i> <i>Porites lutea</i> <i>Porites pukoensis</i> <i>Porites rus</i> <i>Porites solida</i> <i>Porites vaughani</i> <i>Coscinastrea columna</i> <i>Coscinastrea monile</i> <i>Psammocora contigua</i> <i>Psammocora haimiana</i> <i>Psammocora nierstraszi</i> <i>Psammocora profundacella</i> <i>Psammocora stellata</i> <i>Psammocora verrilli</i>	<i>Favites russelli</i> <i>Goniastrea aspera</i> <i>Goniastrea edwardsi</i> <i>Goniastrea favulus</i> <i>Goniastrea pectinata</i> <i>Goniastrea reiformis</i> <i>Leptastrea bewickensis</i> <i>Leptastrea pruinosa</i> <i>Leptastrea purpurea</i> <i>Leptastrea transversa</i> <i>Leptoria phrygia</i> <i>Montastraea curta</i> <i>Montastraea magnistellata</i> <i>Oulophyllia crispa</i> <i>Platygyra daedalea</i> <i>Platygyra lamellina</i> <i>Platygyra sinensis</i> <i>Plesiastrea versipora</i> <i>Plerogyra simplex</i> <i>Plerogyra sinuosa</i> <i>Javania insignis</i> <i>Tabastraea coccinea</i> <i>Tabastraea diaphana</i> <i>Tabastraea micranthus</i> <i>Turbinaria frondens</i> <i>Turbinaria irregularis</i> <i>Turbinaria mesenterina</i> <i>Turbinaria reniformis</i> <i>Turbinaria stellulata</i>
Hydrozoa	<i>Millepora platyphylla</i> <i>Distichopora coccinea</i> <i>Distichopora nitida</i>	<i>Distichopora violacea</i> <i>Stylaster bocki</i> <i>Stylaster sanguineus</i>

Appendix Table 7-3. CITES Appendix III Species that need Management Cooperation for Kiribati

(source: <http://www.cites.org/eng/resources/species.html>, cited September 6, 2007)

CITES APPENDIX 3	
Aves (birds)	<i>Anas acuta</i> <i>Anas clypeata</i>

Appendix Table 7-4. CITES Reservations to Appendices I, II, and III for Kiribati
(source: <http://www.cites.org/eng/resources/species.html>, cited September 6, 2007)

CITES Appendix 1 -Reservations	
Reptilia (turtle)	<i>Chelonia mydas</i> <i>Eretmochelys imbricata</i>
CITES Appendix 2 – Reservations	
Aves (birds)	<i>Vini kuhlii</i>
Reptilia (turtle)	<i>Chelonia mydas</i>
Elasmobranchii (sharks and rays)	<i>Rhincodon typus</i>
Molluscs (shellfish)	<i>Hippopus hippopus</i> <i>Tridacna gigas</i> <i>Tridacna maxima</i> <i>Tridacna squamosa</i>
CITES Appendix 3 – Reservations	
Aves (birds)	<i>Anas acuta</i> <i>Anas clypeata</i>

Appendix Table 7-5. CITES Withdrawals to Appendices I, II, and III for Kiribati
(source: <http://www.cites.org/eng/resources/species.html>, cited September 6, 2007)

CITES Appendix 1 – Withdrawals	
Reptilia (turtle)	<i>Chelonia mydas</i> <i>Eretmochelys imbricate</i>
CITES Appendix 2 – Withdrawals	
Aves (birds)	<i>Vini kuhlii</i>
Reptilia (turtle)	<i>Chelonia mydas</i>
Molluscs (shellfish)	<i>Tridacna gigas</i>
CITES Appendix 3 – Reservations	
Aves (birds)	<i>Anas acuta</i> <i>Anas clypeata</i>



**PHOENIX ISLANDS
PROTECTED AREA
KIRIBATI**

**Nomination for a
World Heritage site 2009**

Annex 2

**Phoenix Islands Protected Area Regulations 2008,
Republic of Kiribati, Environment Act 1999**



REPUBLIC OF KIRIBATI

ENVIRONMENT ACT 1999

PHOENIX ISLANDS PROTECTED AREA REGULATIONS 2008

REPUBLIC OF KIRIBATI

ENVIRONMENT ACT 1999

PHOENIX ISLANDS PROTECTED AREA REGULATIONS 2008

In exercise of the powers conferred by sections 43(1) and 86(1) of the *Environment Act 1999*, and acting in accordance with the advice of the Cabinet, I hereby make the following Regulations—

1. Title

These regulations are called the *Phoenix Islands Protected Area Regulations 2008*.

2. Objective

- (1) The objective of these Regulations is to prescribe a protected area for the terrestrial and marine resources of the Phoenix Islands, subject to such conditions as are included herein.
- (2) The further objective of these Regulations is to prescribe particular licences and permits for regulating certain activities in the Phoenix Islands Protected Area and to establish a schedule of penalties for all activities affecting the Phoenix Islands Protected Area.
- (3) The further objective of these Regulations is to implement the Cabinet decision of 20 March 2006, approving the nomination of the Phoenix Islands Protected Area to the World Heritage Committee established under the World Heritage Convention, for inclusion on the World Heritage list.

3. Commencement

These regulations come into operation on the day they are published at the Office of the Beretitenti.

4. Definitions

In these Regulations—

“Act” means the *Environment Act 1999*;

“IUCN” means the World Conservation Union;

“management plan” means a set of principles, practices, and procedures applicable to the terrestrial and marine resources of the Phoenix Islands, duly established pursuant to the terms of sections 45 and 47 of the Act;

“management committee” means that committee duly established by the Minister pursuant to the terms of section 46 of the Act;

“Minister” means the Minister for the time being responsible for the environment;

“Ministry” means the Ministry for the time being responsible for the environment;

“PIPA” means the Phoenix Islands Protected Area;

“protected area” within the context of the PIPA means a large, zoned, multi-use land and marine area managed for conservation and sustainable use under IUCN Category Ib - Wilderness Area;

“public authority” has the same meaning as in the Act.

5. Protected Area Prescription and World Heritage Nomination

- (1) The Minister hereby prescribes the following area as an area protected for conservation and sustainable use purposes pursuant to section 43 of the Act—

Birnie Island
 Enderbury Island
 Kanton (otherwise known as Abariranga or Canton) Island
 Manra (otherwise known as Sydney Island)
 McKean Island
 Nikumaroro (otherwise known as Gardner) Island
 Orona (otherwise known as Hull) Island and
 Rawaki (otherwise known as Phoenix) Island.

the lagoons and internal waters (if any) of each island, and those parts of the adjacent Kiribati territorial sea and exclusive economic zone within the area bounded by straight lines connecting the following points in the order stated.

PIPA Boundaries

LONGITUDE	LATITUDE
174.242794°W	0.983476°S
169.706032°W	0.983476°S
169.706032°W	6.466132°S
173.220373°W	6.470758°S
173.510230°W	6.616143°S
175.865776°W	6.617835°S
175.865776°W	2.091330°S



- (2) This protected area shall be known as the "Phoenix Islands Protected Area."

- (3) This protected area shall also be nominated to the World Heritage Committee established under the World Heritage Convention, for inclusion on the World Heritage list.
- (4) The Phoenix Islands Protected Area shall be recognised and managed as a Category Ib Wilderness Area according to the definitions, objectives for management, and guidance provided by the IUCN's 1994 *Guidelines for Protected Area Management Categories*. The relevant extract of the *Guidelines* is attached as appendix 1.
- 6. PIPA Management Committee and Management Plan**
- (1) The Minister shall establish a PIPA Management Committee, which shall be chaired by the Secretary of the Ministry, and shall comprise representatives of—
- (a) the Principal Environment Officer;
 - (b) the Environment and Conservation Division of the Ministry;
 - (c) the Ministry's PIPA Office;
 - (d) the Ministries for the time being responsible for—
 - (i) fisheries;
 - (ii) the Phoenix Islands;
 - (iii) finance;
 - (iv) tourism;
 - (v) foreign affairs; and
 - (vi) commerce;
 - (e) the Office of the Attorney-General;
 - (f) the Kiribati Police Service; and
 - (g) the Atoll Research Centre of the University of the South Pacific.
- (2) The PIPA Management Committee shall—
- (a) prepare a draft management plan for the PIPA;
 - (b) resolve inter-agency differences and make recommendations to the Minister relating to actions associated with the management of the PIPA;
 - (c) provide such advice as the Minister may seek related to activities in the PIPA, including proposed development activities; and
 - (d) monitor the management of the PIPA and make such reports as the Minister might require to ensure compliance with the terms of the Act, these regulations, the PIPA management plan, and any international treaty agreements or third party contractual agreements entered into for the purposes sustaining the conservation and sustainable use of the PIPA.
- (3) Within 12 months of the entry into force of these Regulations, the PIPA Management Committee shall develop and the Minister, acting in accordance with the advice of the Cabinet, shall adopt a PIPA management plan that is consistent with the Act, these Regulations, and any international treaty agreements or third party contractual agreements entered into for the purpose of sustaining the conservation and sustainable use of the PIPA.

- (4) The PIPA management plan shall identify such management zones and associated allowable activities as are appropriate for implementing the purposes of this regulation and the Act.
- (5) Except as provided in regulation 11 below, pending adoption of the management plan, no activity that takes place in or affects the PIPA or places at risk the ecological integrity of the PIPA shall be licensed, approved or undertaken by any public authority without the express written authorisation of the Minister.
- (6) As part of the management plan, and subject to available funding, the Minister shall develop and implement a monitoring program designed to ensure that the objectives of the Act, these Regulations, and the PIPA management plan are being accomplished.
7. **Marine conservation, management and development**

In addition to such other requirements as may be established by these regulations or the management plan, all provisions of Parts III, IV, V, VI, and VII of the Act shall fully apply within the PIPA at all times.

8. **PIPA Management Plan**

- (1) The objectives of the PIPA are specified in a management plan developed by the PIPA Management Committee and the Principal Environment Officer, in accordance with the provisions of Part V of the Act.
- (2) In addition to the management principles set out in section 45(1) of the Act, the PIPA management plan shall ensure that all activities that take place in the PIPA are designed for the benefit of present and future generations. To that end, the PIPA management plan shall implement such measures as are necessary for the following objectives—
- (a) to conserve and manage substantial examples of marine and terrestrial systems to ensure their long-term viability and to maintain genetic diversity;
 - (b) to conserve depleted, threatened, rare or endangered species and populations and, in particular, to preserve habitats considered critical for the survival of such species;
 - (c) to conserve and manage areas of significance in the PIPA to the life cycles of economically important species such as tuna;
 - (d) to prevent human activities from detrimentally affecting the PIPA;
 - (e) to preserve, protect, and manage historical, cultural and archeological sites and natural aesthetic values;
 - (f) to facilitate the interpretation of marine and terrestrial systems for the purposes of conservation, education, and tourism;
 - (g) to accommodate within appropriate management regimes a broad spectrum of multi-use human activities compatible with the primary goal of marine and terrestrial conservation and sustainable use, including appropriate fishing, ecologically-sound tourism, and sustainable economic development;
 - (h) to provide for research and training and for monitoring the environmental effects of human activities, including the direct and indirect effects of development activities; and

- (i) to ensure consistency between all activities taking place in the PIPA and any third-party conservation contracts into which the Minister may choose to enter with the advice and approval of the Cabinet for the conservation and long-term sustainable use of the PIPA.

9. Conservation and management measures

- (1) All persons and corporations engaged in conduct in the PIPA must comply with all conservation and management measures as specified in the Act, these Regulations and the PIPA Management Plan.
- (2) All public authorities are obliged to conduct all activities within the PIPA, or that are likely to have effects on the PIPA, consistently with the Act, these Regulations and the PIPA Management Plan.
- (3) The PIPA Management Plan shall be consistent with any international obligations or agreements relating to the environment entered into by Kiribati.
- (4) Additional conservation and management measures may be specified by the Minister or in the PIPA Management Plan as required.

10. PIPA permit, licence and penalty provisions

- (1) With respect to any activity having an effect or the potential for an effect on the PIPA, all licences, permits, or other approvals issued by the Minister, as well as any other licence, permit, or approval issued by any other public authority, shall be consistent with the provisions of the PIPA management plan, these Regulations and the Act.
- (2) In addition to any other licence, permit or approval required by the Act, and subject to further specification in the PIPA management plan, the following permit and licence requirements shall be in force in the PIPA and implemented as part of the management activities in the PIPA—
 - (a) scientific, cultural, or educational studies – special permission is required from the Principal Environment Officer for conducting any scientific or educational study within the PIPA;
 - (b) collection of specimens – special permission is required from the Principal Environment Officer for the collection of any scientific specimens or samples from the PIPA;
 - (c) special permits – any special permission must be obtained from the Principal Environment Officer prior to the start of any activity. Special conditions may be attached to the permit including reporting requirements. The Principal Environment Officer shall promptly notify the PIPA Management Committee of all special permits in force for the PIPA protected area;
 - (d) the PIPA management plan shall further specify permits, the conditions of permits and the process for obtaining permits for visitors to the PIPA for the purposes of diving, visiting the atolls in the PIPA, and recreational fishing; and
 - (e) the PIPA management plan shall further specify fees schedules for any processing or use fees associated with PIPA permits and licences.

- (3) In addition to the offences set out in Part III of the Act, the PIPA management plan shall establish such additional offences punishable by fines not to exceed \$100,000 or terms of imprisonment not to exceed five years, or both, that are considered necessary to enforce the practices and procedures established in the PIPA management plan. Any violation of those practices or procedures shall constitute a violation of these regulations and the Act.
- (4) The Principal Environment Officer shall have primary responsibility and authority to commence civil, criminal, injunctive, or other action against any person or corporation reasonably believed to be in violation of the Act, these regulations, or the PIPA management plan.
- (5) The Principal Environment Officer shall have the primary responsibility and authority to amend, suspend, revoke or withhold any licence or other authorisation issued to a person or corporation reasonably believed to be in violation of the terms of their licence or authorisation, the terms of the PIPA management plan, these Regulations or the Act.

11. Savings and transitional

Distant water fishing nation tuna fishing access licences and agreements shall remain valid in the PIPA, and tuna fishing activities carried out pursuant to those licences and agreements shall continue in the PIPA according to their terms, until and unless otherwise decided by the Cabinet.

12. Miscellaneous

- (1) The Minister, in consultation with the PIPA Management Committee and the Principal Environment Officer, shall issue a report on the state of the PIPA every five years. The report shall include the following environmental and management indicators—
- (a) bird population trends;
 - (b) bird nesting pairs population trends;
 - (c) live coral cover trends;
 - (d) selected reef fish population trends;
 - (e) reef shark population trends;
 - (f) turtle population trends;
 - (g) pelagic conditions within the PIPA, including fisheries landings trends;
 - (h) annual visitor number trends; and
 - (i) such other matters as the PIPA Management Committee shall choose to report.
- (2) The Minister may require, by written notice, a licensee or permittee, public authority, or other person to present information relevant to the report. Such person or entity shall comply with a request of the Minister within one month of receiving it.

Appendix I

Extract - *Guidelines for Protected Area Management Categories* (IUCN, 1994)

Category I - Strict Nature Reserve/Wilderness Area: protected area managed mainly for science or wilderness protection

Category Ib - Wilderness Area: protected area managed mainly for wilderness protection

Definition: Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.

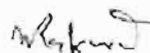
Objectives of Management

- to ensure that future generations have the opportunity to experience understanding and enjoyment of areas that have been largely undisturbed by human action over a long period of time;
- to maintain the essential natural attributes and qualities of the environment over the long term;
- to provide for public access at levels and of a type which will serve best the physical and spiritual well-being of visitors and maintain the wilderness qualities of the area for present and future generations; and
- to enable indigenous human communities living at low density and in balance with the available resources to maintain their lifestyle.

Guidance for Selection:

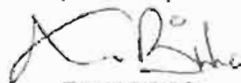
- The area should possess high natural quality, be governed primarily by the forces of nature, with human disturbance substantially absent, and be likely to continue to display those attributes if managed as proposed.
- The area should contain significant ecological, geological, physiogeographic, or other features of scientific, educational, scenic or historic value.
- The area should offer outstanding opportunities for solitude, enjoyed once the area has been reached, by simple, quiet, non-polluting and non-intrusive means of travel (i.e. non-motorised).
- The area should be of sufficient size to make practical such preservation and use.

Dated this 7th day of February, 2008.



HON. TETABO NAKARA
Minister for Environment, Lands
and Agricultural Development

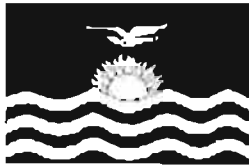
Published by exhibition at the Office of the Beretitenti this 14th day of February, 2008.



TAAM BIRIBO
Ag. Secretary to the Cabinet



**PHOENIX ISLANDS
PROTECTED AREA
KIRIBATI**



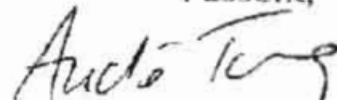
**Nomination for a
World Heritage site 2009**

Annex 3

Environment (Amendment) Act 2007

REPUBLIC OF KIRIBATI
(No 1 of 2007)

I assent,



Beretitenti

04/09 2007

AN ACT TO AMEND THE *ENVIRONMENT ACT* 1999

Commencement:

2007

MADE by the Maneaba ni Maungatabu and assented to by the Beretitenti

1. Short title

This Act may be cited as the *Environment (Amendment) Act* 2007.

2. Meaning of 'principal Act'

In this Act 'principal Act' means the *Environment Act* 1999.

3. Amendment of section 2

Section 2 of the principal Act is amended—

- (a) by inserting after the definition of 'approval' the following definition—
"conduct' includes an act or omission;"
- (b) by inserting after the definition of 'conservation' the following definitions—
"construction work' includes—
 - (a) excavation; and
 - (b) erection, alteration or repair of a building or structure;
'conveyance' means a vessel, vehicle or aircraft;"
- (c) by repealing the definition of 'discharge' and substituting the following definition—
"discharge' includes dumping, spilling, leaking, pumping, throwing, placing, dropping, abandonment, depositing, discarding, rejecting, emitting and other similar activities;"

- (d) by inserting after the definition of 'Division' the following definition—
 “‘energy’ includes vibrations, noise, heat and electromagnetic radiation;”
- (e) by inserting after the definition of 'environment' the following definitions—
 “‘environment inspector’ means a person appointed under section 5(4), and includes the Principal Environment Officer;
 ‘environment licence’ means a licence granted under section 32 or section 37;”
- (f) by repealing the definition of ‘environmental impact assessment (EIA)’;
- (g) in the definition of ‘Environment impact statement (EIS)’, by repealing the word “Environment” (where it first appears) and substituting the word “environmental”;
- (h) by repealing the definition of ‘Environmental inspector’ and substituting the following definitions—
 “‘evidentiary material’ means an item that is suspected on reasonable grounds of—
 (a) being involved in a contravention of this Act;
 (b) affording evidence as to a contravention of this Act; or
 (c) being used, or intended to be used, for the purpose of contravening this Act;
 ‘harm’ means an adverse effect other than an insignificant adverse effect, and, in the case of an organism, includes gathering, plucking, cutting, pulling up, moving, destroying, taking, digging up, removing, injuring, hunting, shooting, poisoning, netting, snaring, spearing, pursuing, capturing, trapping or killing the organism;
 ‘heritage’ includes a place, feature, structure or object that has aesthetic, archaeological, historic, cultural, natural, scientific or social significance or other special value for the present community and for future generations;”
- (i) by inserting after the definition of ‘licence’ the following definitions—
 “‘litter’ includes waste, refuse, debris and rubbish, but does not include vegetation;
 ‘management plan’ means a management plan for a protected area or an area on the World Heritage list;”
- (j) by inserting after the definition of ‘offensive noise’ the following definitions—
 “‘open place’ means any place not inside a building or conveyance;

'organism' includes—

- (a) an organism that is alive or dead;
- (b) part of an organism;
- (c) egg, embryo, ova, semen, seed and any organic animal tissue from which the organism can be produced;
- (d) any matter or secretion that the organism produces; and
- (e) any product that is derived from or includes the organism;”;

(k) by inserting after the definition of 'pollution' the following definition—

“‘precautionary principle’ means the principle whereby a lack of scientific certainty should not be used as a reason for not acting to anticipate, prevent or minimise environmental harm;”;

(l) in the definition of 'premises', by inserting after “includes” the words “a building or structure, and any land or a place (whether enclosed or built on or not), and a”;

(m) by inserting after the definition of 'prescribed development' the following definitions—

“‘Principal Environment Officer’ means the person appointed under section 5(2);

‘private premises’ means any premises which is not a public place;

‘protected area’ means an area, subject to any conditions (if any), prescribed under section 43;

‘protected species’ means a species, subject to any condition (if any), prescribed under section 41;”;

(n) by inserting after the definition of 'public authority' the following definitions—

“‘species’ includes any defined sub-species and taxon below a sub-species and any recognisable variant of a sub-species or taxon;

‘substance’ means any solid, liquid or gas, including odour;”;

(o) in the definition of 'sustainable development', by repealing paragraph (f) and substituting the following paragraphs—

“(f) preserving protected species and areas of environmental, cultural and historic significance; and

(g) avoiding, minimising, mitigating and remedying adverse effects on natural, social and cultural systems;”;

- (p) by inserting after the definition of 'waste' the following definitions—
- “World Heritage Convention’ means the *Convention for the Protection of the World Cultural and Natural Heritage* done at Paris on 16 November 1972;
- ‘World Heritage list’ means the list established by Article 11(2) of the World Heritage Convention.”.

4. Amendment of section 3

Section 3 of the principal Act is amended—

- (a) by repealing sub-paragraph (iv) of paragraph (c); and
- (b) after paragraph (d), by inserting the following paragraphs—
- “(e) to comply with and give effect to regional and international conventions and obligations relating to the environment;
- (f) to provide for the protection, conservation and use of the environment;
- (g) to promote sustainable development;
- (h) to control, manage and regulate hazardous substances;
- (i) to promote the conservation and sustainable use of biological diversity; and
- (j) to protect, conserve and promote heritage.”.

5. New sections 4A and 4B

After section 4 of the principal Act, the following sections are inserted—

“4A. Extent of Act

- (1) This Act applies, in addition to the circumstances described in Part III of the *Penal Code*—
- (a) throughout Kiribati and Kiribati waters; and
- (b) throughout the exclusive economic zone of Kiribati.
- (2) This Act shall not apply to any island or part of an island which the Minister, acting in accordance of the advice of the Cabinet may from time to time by order in writing declare to be so exempt.
- (3) If expressly stated, a provision of this Act may apply in other places.

4B. Requirements of decision making

In any decision made under this Act, the decision-maker must—

- (a) have due respect for the culture and traditions of the people of Kiribati;

- (b) endeavour to minimise, where appropriate, any adverse effects upon those persons who engage in a subsistence lifestyle;
- (c) consider, where appropriate, the retention and use of the traditional knowledge, innovations and practices of the people of Kiribati relevant to the conservation and sustainable use of the biological diversity of Kiribati;
- (d) be mindful of the technical capacity constraints prevailing in Kiribati;
- (e) not act inconsistently with the precautionary principle; and
- (f) not act to substantially increase the risk of extinction of any species in Kiribati.”.

6. Amendment of section 5

Section 5 of the principal Act is amended by repealing subsection (2) and substituting the following subsections—

- “(2) Subject to section 99 of the *Constitution*, the Minister shall, by instrument in writing published in the *Gazette*, appoint a Principal Environment Officer.
- (3) The Minister may give the Principal Environment Officer directions as to the exercise of any powers or functions or the performance of any duties under this Act.
- (4) Subject to section 99 of the *Constitution*, and subject to subsection (5), the Minister may, by instrument in writing, appoint a person (including a class of persons) as an environment inspector.
- (5) If a person or class of persons to be appointed as an environment inspector is employed otherwise than in the Ministry of the Minister, the Minister must consult with the employer of the person or class of persons.”.

7. Amendment of section 6

Section 6 of the principal Act is amended as follows—

- (a) by repealing subsection (1)(a); and
- (b) by renumbering the existing sub subsections (b) to (k) of subsection (1) as (a) to (j).

8. Amendment of section 7

Section 7 of the principal Act is amended by repealing the whole section.

9. Amendment of section 9

Section 9 of the principal Act is amended by repealing the whole section.

10. Repeal and replacement of Parts III, IV and V

Parts III, IV and V of the principal Act are repealed and the following Parts are substituted—

"PART III—OBLIGATIONS

Division 1—Pollution

12. Littering

- (1) Litter must be placed—
- (a) in a contained manner;
 - (b) separate from vegetation material; and
 - (c) in a place where it will be collected for disposal.
- (2) Any person who discharges litter in any open place or public place contrary to subsection (1), other than in accordance with an environment licence, commits an offence.

Maximum penalty: fine of \$500, imprisonment for one month

- (3) Subsections (1) and (2) only apply to—
- (a) South Tarawa;
 - (b) Kiribati waters;
 - (c) the exclusive economic zone of Kiribati; and
 - (d) any other area that may be prescribed by regulation.

13. Pig premises to be kept clean

The occupier of premises who allows a place where a pig is kept to be in an unclean condition commits an offence.

Maximum penalty: fine of \$500, imprisonment for one month

14. Excessive emissions from vehicles

- (1) A person who drives, or allows a person to drive, a vehicle if the vehicle emits excessive emissions commits an offence.

Maximum penalty: fine of \$500, imprisonment for one month

- (2) For the purpose of subsection (1)—

'excessive emissions' means—

- (a) for a diesel-fuelled vehicle, when operated normally—
 - (i) visible smoke continuously for more than five seconds; or
 - (ii) a cloud of visible smoke which is larger than one metre in diameter at any point; and

(b) for a petrol-fuelled vehicle, when operated normally, any visible smoke.

(3) The definition of 'excessive emissions' may be amended by regulation.

15. Pollution of waters

(1) A person who causes or allows the discharge of any substance or energy into water that—

- (a) results in a change in the physical, chemical or biological condition of the water;
- (b) causes a visible change to the water or the surface of the water;
- (c) makes, or is likely to make, the water unclean, noxious or poisonous;
- (d) makes, or is likely to make, the water detrimental to the health or safety of persons, property, animals or plants; or
- (e) interferes with, or is likely to interfere with, the exercise or enjoyment of any person's right in relation to the water,

other than in accordance with an environment licence commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

(2) In this section—

'discharge' includes, in addition to the definition in section 2, placing any substance in a position where it falls, descends, is washed, is blown or percolates into any water, or is likely to do so;

'water' includes the whole or any part of any lagoon, swamp, wetland, lake, unconfined surface water, natural or artificial watercourse, dam, tidal waters (including the sea), underground waters, or water in artificial works, water mains, water pipes or waterchannels.

16. Dumping in sea or lagoon

(1) A person who causes or allows the dumping of waste or other matter in the sea or lagoon other than in accordance with an environment licence commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

(2) Subsection (1) does not apply to:

- (a) the disposal of waste or other matter incidental to or derived from the normal operations of vessels, aircraft, platforms or other man-made structures; or
- (b) the placement or abandonment of waste or other matter other than for disposal.

(3) In this section—

'dumping' includes any abandonment or toppling of platforms or other man-made structures;

'waste or other matter' means materials and substances of any kind, form or description, and includes vessels, aircraft, platforms or other man-made structures, cables, pipelines and marine research devices.

17. Pollution from private premises

A person who causes or allows the discharge of any substance or energy from private premises that unreasonably interferes, or is likely to unreasonably interfere with, the health or comfort of any person outside that premises commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

18. Pollution in a public place or public conveyance

A person who causes or allows the discharge of any substance or energy in any public place, or conveyance used by the public, that unreasonably interferes with, or is likely to unreasonably interfere with, the health or comfort of any person commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

19. Pollution that harms the environment

A person who causes or allows the discharge of a substance or energy which harms the environment other than in accordance with an environment licence commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

20. Duty to clean-up environment

(1) A person who causes or allows the discharge of any waste or other substance in contravention of this Act must take any appropriate actions to remove the waste or other substance and remedy, mitigate and contain any harm to the environment.

(2) A person who fails to comply with subsection (1) commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

Division 2—Environmentally-Significant Activities

21. Environmentally-significant activities

(1) Environmentally-significant activities are activities listed in the Schedule.

(2) The Minister, acting in accordance with the advice of Cabinet, may, by notice published in the *Gazette*, amend the Schedule.

22. Carrying out environmentally-significant activities

- (1) An—
- (a) environmentally-significant activity; and
 - (b) any construction work designed to enable an environmentally-significant activity,
- must be carried out in accordance with an environment licence.
- (2) A person who—
- (a) carries out; or
 - (b) is responsible for, directs, causes or allows the carrying out of, an environmentally-significant activity, or construction work, contrary to subsection (1) commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

Division 3—Conservation

23. Harming coral reefs, mangroves and sea grass beds

- (1) A person who causes or allows harm (other than insignificant harm) to a—
- (a) coral reef;
 - (b) mangrove; or
 - (c) sea grass bed,
- other than in accordance with an environment licence commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

- (2) Subsection (1) does not apply to conduct that is a traditional practice in Kiribati.

24. Harming a protected species or its nest or dwelling place

- (1) A person who causes or allows harm to—
- (a) an organism that is a protected species; or
 - (b) the nest or dwelling place of a living organism that is a protected species,

other than in accordance with an environment licence commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

- (2) In any proceedings for a contravention of paragraph (1)(a), it is a defence if the person against whom the proceedings have been brought establishes—
- (a) that the harm to the organism was incidental to the lawful taking of a marine species; and
 - (b) if the organism was taken or captured, that upon becoming aware of the taking or capturing, immediate steps were taken to return the organism to its natural environment.

25. Trading, possessing, etc. protected species

- (1) A person who buys, sells, offers for sale, possesses, has under control, imports or exports an organism that is a protected species other than in accordance with an environment licence commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

- (2) In any proceedings for a contravention of subsection (1), it is a defence if the person against whom the proceedings have been brought establishes that the organism was taken from the wild, or cultivated, without contravening this Act.
- (3) A person does not contravene subsection (1) if the organism is a plant naturally occurring on land that the person owns or occupies.

26. Actions affecting protected areas

A person who engages in conduct which results in—

- (a) harm an organism in a protected area;
- (b) harm to a natural feature in a protected area;
- (c) harm to heritage in a protected area;
- (d) the carrying out of construction work in a protected area;
- (e) any activity for commercial purposes in a protected area;
- (f) harm to any fence, sign, or building in a protected area; or
- (g) harm to the environment in a protected area,

other than in accordance with an environment licence or management plan for the area, commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

27. Possessing certain items in a protected area

A person who possesses any of the following items in a protected area—

- (a) an explosive;
- (b) a device or instrument used to hunt or capture an animal; or

- (c) a device for detecting minerals or metal,

other than in a stowed position which is not accessible for use, or in accordance with an environment licence, commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

28. World Heritage of a World Heritage area

A person who causes or allows harm to the cultural heritage or natural heritage (as defined by the World Heritage Convention) of an area included on the World Heritage list, other than in accordance with an environment licence, commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

Division 4—Miscellaneous

29. Contravention of conditions of an environment licence

If—

- (a) a person is the holder of an environment licence; and
- (b) a condition of that licence is contravened,

the person commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

30. Providing false or misleading information

If—

- (a) a person provides information in response to a requirement, direction or request under this Act or in the process of obtaining a licence, authorisation or accreditation (however described) under this Act; and
- (b) the person knows or is reckless as to whether the information is false or misleading in a material particular,

the person commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

PART IV—ENVIRONMENT LICENCES

31. Application for an environment licence

A person may apply to the Principal Environment Officer for an environment licence in relation to a proposed activity by—

- (a) using the form approved by the Principal Environment Officer from time to time, and attaching any information required by that form; and
- (b) paying such fee as may be prescribed by regulation.

32. Consideration of application

- (1) After receiving an application for an environment licence, the Principal Environment Officer may, in writing to the applicant—
 - (a) grant an environment licence, subject to any reasonable conditions;
 - (b) require the applicant to submit an environmental impact assessment report to the Principal Environment Officer; or
 - (c) refuse to grant an environment licence.
- (2) The Principal Environment Officer may only grant an environment licence under subsection (1) if—
 - (a) the possible environmental impacts of the proposed activity are well known, are not significant, will not harm area of natural, cultural or historic significance, and are not likely to be controversial; or
 - (b) the activity is an unforeseen activity requiring immediate action in the public interest, and the need for such action outweighs the need for an environmental assessment.
- (3) In making a decision under subsection (1), the Principal Environment Officer must—
 - (a) be guided by the principles of sustainable development;
 - (b) not act inconsistently with any international obligation or agreement relating to the environment entered into by Kiribati; and
 - (c) act in accordance with any other requirements that may be prescribed.

33. Requirements of environmental impact assessment report

- (1) An environmental impact assessment report must include—
 - (a) a description of the impacts of the proposed activity;
 - (b) the possible alternatives to the proposed activity, including the alternative of not undertaking the proposed activity;
 - (c) mitigation measures that can be applied to minimise or prevent harm to the environment; and
 - (d) any details that may be prescribed.
- (2) The Principal Environment Officer may, by notice in writing to an applicant, exempt the applicant from including information required by subsection (1) if the Principal Environment Officer considers the information is not necessary or appropriate for the purposes of evaluating the proposed activity.

- (3) In preparing an environmental impact assessment report, the applicant must attempt to consult with—
 - (a) any nearby or adjacent landowners; and
 - (b) any other person who would have an immediate interest in the activity.
- (4) The costs of preparing an environmental impact assessment report must be borne by the applicant for the environment licence.

34. Requesting additional information and seeking advice and information

- (1) At any point after an application for an environment licence has been made, and before determining the application, the Principal Environment Officer may, in writing—
 - (a) request additional information from the applicant; or
 - (b) seek advice or information from any person or committee, to gain a better understanding of the proposed activity.
- (2) If the Principal Environment Officer has made a request under subsection (1)(a), the Principal Environment Officer is not required to make any further decisions in relation to the application for the environment licence until the information is provided.

35. Suggesting amendments to proposed activities

- (1) The Principal Environment Officer may, by notice in writing to an applicant, suggest amendments to a proposed activity.
- (2) The applicant, in response to a suggestion made under subsection (1), may by notice in writing to the Principal Environment Officer, modify the proposed activity.

36. Publication of environmental impact assessment report

- (1) If the Principal Environment Officer is satisfied that an environmental impact assessment report meets the requirements of this Act, the Principal Environment Officer must give notice in writing to the applicant setting out a procedure for publication adequate to bring the report to the attention of interested persons.
- (2) Without limiting the generality of subsection (1) the Principal Environment Officer may require—
 - (a) publication of notices in newspapers and radio;
 - (b) the holding of public hearings; and
 - (c) submission of copies to public authorities or specified persons that may be interested in the proposed activity.

- (3) The Principal Environment Officer may require that comments be submitted to the Principal Environment Officer by a particular date.
- (4) The Principal Environment Officer may exclude information from publication to—
 - (a) protect the environment; or
 - (b) protect commercially sensitive information.
- (5) The Principal Environment Officer must allow the applicant to inspect and copy any comments received by the Principal Environment Officer under this section.
- (6) The Principal Environment Officer may require that the costs of publication in relation to this section be borne by the applicant.
- (7) The Principal Environment Officer is not required to make any further decisions in relation to an application unless the applicant has published the environmental impact assessment report as required by subsection (1).

37. Consideration of environmental impact assessment report and comments

- (1) At the conclusion of any period allowed for comment under section 36 the Principal Environment Officer may, in writing to the applicant—
 - (a) grant an environment licence for the proposed activity, subject to any reasonable conditions; or
 - (b) refuse to grant an environment licence.
- (2) In making a decision under subsection (1), the Principal Environment Officer must—
 - (a) be guided by the principles of sustainable development;
 - (b) not act inconsistently with any international obligation or agreement relating to the environment entered into by Kiribati; and
 - (c) act in accordance with any requirements that may be prescribed.

38. Conditions on environment licences

An environment licence may be subject to reasonable conditions, including conditions—

- (a) specifying the duration of the licence;
- (b) specifying the location of any particular activities;
- (c) specifying the method of undertaking any activities;
- (d) modifying the proposed activity;

Division 2—Protected Areas

42. Purpose of Division

This Division establishes a list of areas to be protected for conservation purposes.

43. Prescribing protected areas

- (1) Protected areas may be prescribed by regulation.
- (2) A protected area may be categorised according to international or national standards.
- (3) A protected area may be subject to any conditions, including that—
 - (a) it is a protected area only at certain times; or
 - (b) that particular provisions of Part III do not apply to the protected area.
- (4) Before prescribing an area under subsection (1) the Minister must—
 - (a) undertake any consultations that may be required by Cabinet;
 - (b) follow any procedures that may be prescribed by regulation; and
 - (c) make reasonable enquiries to identify persons having a proprietary interest or right in the area, and if such persons are identified, attempt to make an agreement in writing with those persons relating to the protected area.
- (5) Any agreement made under subsection (4)(c)—
 - (a) if the proprietary interest or right is over land, attaches to the interest in the land and binds any person to whom the interest is transferred;
 - (b) may provide for arrangements for the management of the protected area;
 - (c) may provide for compensation; and
 - (d) may provide for activities that are allowed without contravening this Act.
- (6) If an area (or part of an area) is proposed to be revoked from being a protected area, or the protection of the area is reduced, the revocation must be in accordance with a specific resolution of the Maneaba ni Maungatabu.

44. Proprietary interest or rights over a protected area

- (1) If a proprietary interest or right over a protected area—
 - (a) is held by a person other than the Republic or a person with whom an agreement has been made under section 43(4)(c), and

(b) is held prior to the area becoming a protected area, sections 26 and 27, and any management plan for the protected area, do not apply to the exercise of that proprietary interest or right.

(2) This section applies to a right arising out of a proprietary interest or right in the same way as it applies to that interest or right.

45. Management of protected areas

(1) The Principal Environment Officer is responsible for managing protected areas—

(a) to the extent practicable, to provide for broad and meaningful participation by the community, public authorities and private interests;

(b) according to the principle that the integrity of an area is best conserved by protecting it from disturbance and threatening processes;

(c) so that use of the protected area does not diminish the potential of the protected area to meet the needs and aspirations of future generations;

(d) to promote public appreciation and understanding of the values of the protected area;

(e) so that use and enjoyment of the area does not compromise the values of the protected area;

(f) to promote appropriate research and monitoring; and

(g) in any way that may be prescribed by regulation.

(2) Any management plan for a protected area must not be inconsistent with the management principles for the protected area set out in subsection (1).

46. Management committees

(1) The Minister may establish committees under section 81 to assist in the management of protected areas.

(2) Without limiting the generality of subsection (1), a committee established to assist in the management of a protected area or areas may be given functions to—

(a) prepare a draft management plan for a protected area;

(b) make decisions relating to the management of the protected area that are consistent with the management plan in operation for the area;

(c) monitor the management of the protected area; and

(d) advise the Minister on the future development of the protected area.

47. Management plans

- (1) The Minister, acting in accordance with the advice of Cabinet, may make a management plan for a protected area by notice in the *Gazette*.
- (2) A management plan sets out the principles, practices and procedures necessary to manage the protected area, and may—
 - (a) state the activities that are allowed, prohibited or regulated in the area, and the means of allowing, prohibiting or regulating them;
 - (b) require the payment of fees and charges;
 - (c) include offences punishable by fines not exceeding \$100,000 or terms of imprisonment not exceeding five years, or both; and
 - (d) specify any limitation or prohibition on the exercise of a power or performance of a function under any Act in, or in relation to, the area.
- (3) Before making a management plan under subsection (1) the Minister must undertake any consultations that may be—
 - (a) required by Cabinet; and
 - (b) prescribed by regulation.
- (4) If a management plan limits or prohibits the exercise of a specified power, or the performance of a specified function, under an Act, the power or function is limited or prohibited in, or in relation to, the protected area while the plan is in operation.
- (5) The Minister must use his or her powers and functions to give effect to a management plan.
- (6) A public authority must not act inconsistently with a management plan.

48. World Heritage

- (1) The Minister, acting in accordance with the advice from Cabinet, may nominate areas to the World Heritage Committee established under the World Heritage Convention, for inclusion on the World Heritage list.
- (2) Before making a nomination under subsection (1), the Minister must—
 - (a) undertake any consultations that may be required by Cabinet;
 - (b) undertake any consultations that may be prescribed by regulation; and

- (c) use his or her best endeavours to reach agreement with any person who has a proprietary interest in the area proposed to be nominated on—
 - (i) whether the area should be nominated; and
 - (ii) the management arrangements for the area.
- (3) The Principal Environment Officer must publish a notice in the *Gazette*—
 - (a) if an area of Kiribati has been included in the World Heritage list; and
 - (b) if an area of Kiribati has been altered or withdrawn from the World Heritage list.
- (4) All World Heritage areas must be managed—
 - (a) in accordance with the obligations of the Republic under the World Heritage Convention to identify, protect, conserve, present and transmit to future generations the World Heritage and the outstanding universal value of the area;
 - (b) to give the World Heritage and the outstanding universal value of the area a function in the life of the community;
 - (c) to integrate the protection of the World Heritage and the outstanding universal value of the area into comprehensive planning programmes;
 - (d) to develop scientific and technical studies, and research and to establish methods to counteract threats to the World Heritage and the outstanding universal value of the area;
 - (e) to promote public appreciation and understanding of the World Heritage and the outstanding universal value of the area;
 - (f) to make special provision, if appropriate, for the involvement in managing the area of people who—
 - (i) have a particular interest in the area; and
 - (ii) may be affected by the management of the area.
- (5) The Principal Environment Officer must ensure that a management plan is in place for each area of Kiribati included on the World Heritage list.
- (6) Section 47 applies to the making and effect of a management plan for an area included on the World Heritage list as if the area were a protected area for the purposes of that section.
- (7) Any management plan for an area included on the World Heritage list must not be inconsistent with the management principles contained in subsection (4).

PART VI—ENFORCEMENT

Division 1—Enforcement Powers

49. General provisions relating to environment inspectors

(1) An environment inspector may only exercise his or her powers under this Act for the purpose of administering this Act.

(2) Before or during the exercise of any power under this Act, an environment inspector must, if asked, provide his or her name and identification.

(3) A person who falsely represents himself or herself to be an environment inspector commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

(4) A person who obstructs, intimidates, threatens, resists or hinders an environment inspector exercising or performing his or her powers, duties or functions under this Act commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

(5) An environment inspector may acquire assistance in the exercise of any power, duty or function under this Act.

(6) No proceeding shall lie against an environment inspector, or any person assisting an environment inspector, for any act done in good faith and without gross negligence, in exercising or performing his or her powers, duties or functions under this Act.

(7) An environment inspector may give reasonable directions and ask reasonable questions to any person to assist in the lawful exercise of any powers, functions or duties under this Act.

(8) An environment inspector may use no more force than is necessary in exercising any powers, functions or duties under this Act.

(9) The Principal Environment Officer may give environment inspectors directions as to the exercise or performance of any powers, duties or functions under this Act.

50. Powers in relation to conveyances

(1) For the purposes of testing a conveyance, an environment inspector may—

(a) direct the person in charge of the conveyance to stop or move the conveyance;

(b) enter and operate the conveyance;

(c) take photographs, video or other recordings of the conveyance; and

- (d) inspect or test the conveyance.
- (2) An environment inspector may exercise any of the following powers in relation to a conveyance for the purpose of detecting or preventing a contravention of this Act—
 - (a) any power contained in subsection (1);
 - (b) inspect and test any substance being carried by the conveyance;
 - (c) inspect and take samples, extracts or copies of any evidentiary material; and
 - (d) seize any evidentiary material.

51. Powers in relation to items involved in international travel

If an environment inspector reasonably believes that an item will be, is, or has been on a conveyance that travels between a place in Kiribati and a place outside Kiribati, he or she may—

- (a) examine the item;
- (b) open and search the item;
- (c) if the items are in a container, open and search the container; and
- (d) seize any evidentiary material.

52. Powers in relation to premises

- (1) An environment inspector may only enter residential premises if the environment inspector has—
 - (a) the consent of the occupier of the premises; or
 - (b) a search warrant allowing such activities.
- (2) An environment inspector may enter any premises, except for residential premises, for the purpose of detecting or preventing a contravention of this Act.
- (3) If an environment inspector lawfully enters premises, the inspector may—
 - (a) examine and search the premises and any equipment, structures, conveyances or other items on the premises;
 - (b) make examinations, inquiries and tests of any substance or thing;
 - (c) take photographs, films, audio, video and other recordings;
 - (d) require records to be produced for inspection;
 - (e) use any electronic equipment;
 - (f) inspect, and take samples, extracts or copies of any records or evidentiary material;

- (g) seize any evidentiary material; and
 - (h) take other action authorised by a search warrant.
- (4) A magistrate may issue a search warrant in relation to premises if the magistrate believes, based on information provided on oath, that—
- (a) a contravention of this Act has occurred, is occurring, or is likely to occur on premises; or
 - (b) there is evidentiary material on the premises.

53. Power to ask for information and records

- (1) The Principal Environment Officer may, by notice in writing, request a person to—
- (a) answer a question; or
 - (b) provide information or records in written or other form,
- for the purpose of any matter connected with this Act.
- (2) Any answer given, or information or record provided in response to a request under subsection (1) can not be used in any proceedings against that person.
- (3) A notice issued under subsection (1) must state that—
- (a) failure to comply with the request without reasonable excuse is an offence; and
 - (b) any answer given, or information or record provided in response to such request will not be used in any criminal proceedings against that person.
- (4) A person is not excused from complying with a request under this section on the ground that the answer, record or information might incriminate the person.

54. Arrest

- (1) An environment inspector may, without warrant, arrest any person, if the environment inspector reasonably suspects that the person—
- (a) is committing or has committed an offence against this Act and proceedings by summons against the person would not be effective;
 - (b) is committing, has committed, or is attempting to commit, an offence against this Act in the presence of the environment inspector.
- (2) An environment inspector must bring any person arrested under subsection (1) to the officer-in-charge of the nearest police station to be dealt with in accordance with the *Criminal Procedure Code*.

55. Removal of litter

If an environment inspector reasonably believes that a person has contravened section 12 (relating to littering), the environment inspector may require the person to remove the litter.

56. Contravening a direction or request of environment inspector

(1) A person who does not comply with a reasonable direction or request of an environment inspector in exercise of a power under this Act, commits an offence.

Maximum penalty: fine of \$500, imprisonment for one month

(2) In any proceedings for a contravention of subsection (1), it is a defence if the person against whom the proceedings have been brought establishes that he or she had a reasonable excuse for not complying with the direction or request.

Division 2—Compliance Notices and Clean-up Notices

57. Compliance notices

(1) A compliance notice is a notice requiring a person to—

- (a) carry out specified actions by a particular time; or
- (b) cease taking specified actions by a particular time.

(2) An environment inspector may issue a compliance notice to a person who the inspector reasonably believes is contravening, has contravened, or is likely to contravene this Act if the inspector reasonably believes that the conduct required by the notice will prevent a contravention of this Act from occurring.

(3) Without limiting the generality of subsections (1) or (2) a compliance notice may require—

- (a) the installation, repair, alteration, replacement, maintenance or operation of any equipment;
- (b) modifying, or carrying out any work on equipment, structures or vehicles;
- (c) ceasing to use equipment or vehicles or altering the way equipment or vehicles are used;
- (d) ceasing to carry on or not commencing to carry on an activity;
- (e) carrying on an activity in a particular manner or during particular times;
- (f) monitoring, sampling or analysing any discharge of a substance or energy or otherwise ascertaining the nature, extent, or risk of such a discharge;

- (g) taking action with respect to the transportation, collection, reception, treatment, re-use, reprocessing, storage and disposal of any waste;
- (h) preparing and carrying out a plan of action to control, prevent or minimise waste; and
- (i) the reporting to the Principal Environment Officer on any result or progress of any activity.

58. Clean-up notices

- (1) An environment inspector may issue a clean-up notice to any person who the environment inspector reasonably believes has caused or allowed the discharge of a substance or energy if the environment inspector reasonably believes the notice will minimise or prevent the adverse effect of the discharge on the environment.
- (2) The clean-up notice must specify the actions that are required to be taken by the person to whom the notice is issued and the time by which they are to be taken.
- (3) Without limiting the generality of subsections (1) or (2), a clean-up notice may require—
 - (a) the taking of action to prevent, minimise, remove, disperse, destroy or mitigate the adverse effect of any discharge;
 - (b) the taking of action to restore the environment to a state that it was before the discharge;
 - (c) ascertaining the nature and extent of the discharge and of the actual or likely effects of the discharge;
 - (d) preparing and carrying out a remedial plan of action; and
 - (e) the taking of action to remove or store waste or litter.

59. Failing to comply with notices

- (1) A person who—
 - (a) has been issued a notice under this Division; and
 - (b) does not comply with the notice,
 commits an offence.

Maximum penalty: fine of \$100,000, imprisonment for five years

- (2) If the Principal Environment Officer reasonably believes that a person has committed an offence under subsection (1), the Principal Environment Officer must obtain authority from the Minister to take any action, either by directing environment inspectors, agents, contractors, or otherwise, to ensure that the actions or omissions required by the notice are carried out.

- (3) Any costs incurred by the Republic as a result of the taking of action under subsection (2) may be recovered from the person to whom the notice was issued as a debt due to the Republic.
- (4) Any person who has been directed by the Principal Environment Officer under subsection (2) may enter any premises at any reasonable time to give effect to the direction.
- (5) A person who obstructs a person directed by the Principal Environment Officer under subsection (2) while they are carrying out such direction, commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

Division 3—Infringement Notices

60. Infringement notices

- (1) If an environment inspector reasonably believes that a person has contravened this Act, the environment inspector may issue, in writing, an infringement notice to that person.
- (2) An infringement notice must set out the following information—
 - (a) the name and address of the person who has been issued with the notice;
 - (b) the date of the issue of the notice;
 - (c) the conduct resulting in the alleged contravention of the Act including—
 - (i) the day, and time (if appropriate); and
 - (ii) the place;
 - (d) the amount of money that can be paid to satisfy the infringement notice;
 - (e) a statement that if the person does not pay the amount of money to satisfy the infringement notice within 28 days, the person may be prosecuted for an offence;
 - (f) details of how, and where payment under paragraph (d) may be made;
 - (g) a statement that, if the amount of money is paid to satisfy the infringement notice in time—
 - (i) proceedings under this Act cannot be taken against the person for the contravention; and
 - (ii) the person is not taken to have been convicted of an offence; and
 - (h) the name of the environment inspector who issued the notice.

- (3) The maximum amount of money that can be required to be paid to satisfy an infringement notice is one-tenth the maximum fine that a court may impose upon conviction for the offence to which the infringement notice relates.
- (4) If a person pays the amount of money specified in the infringement notice in accordance with the procedure set out in the infringement notice, the person must be issued with a receipt stating that the infringement notice has been satisfied.

61. Community service to satisfy an infringement notice

- (1) An infringement notice may include information that, as an alternative to paying money, the infringement notice may be satisfied by undertaking a specified number of hours of community service.
- (2) The maximum number of hours of community service that can be required to satisfy an infringement notice is one hour for each \$20 of the maximum fine that a court may impose upon conviction for the offence to which the infringement notice relates.
- (3) If an infringement notice states that the notice may be satisfied by undertaking community service, the notice must set out the following information—
 - (a) how and where the person may notify an intention to undertake community service;
 - (b) that if the community service is not undertaken or not undertaken in a satisfactory manner, the person may be prosecuted for an offence.
- (4) If a person notifies an intention to undertake community service to satisfy an infringement notice the person must be given a written statement specifying where and when to report for community service.
- (5) If the person completes the required number of hours of community service to the reasonable satisfaction of the supervising officer, the officer must issue a receipt to the person stating that the infringement notice has been satisfied.

62. Effect of satisfying an infringement notice

If a person served with an infringement notice receives a receipt stating that the infringement notice has been satisfied—

- (a) proceedings cannot be taken against the person in respect the conduct specified in the infringement notice; and
- (b) the person is not convicted of an offence.

Division 4—Improvement Plans

63. Improvement plans

- (1) An improvement plan is a plan to improve an activity so that it complies with environmental standards required by this Act.
- (2) The Principal Environment Officer may agree in writing with any person on an improvement plan for an activity carried on by that person.
- (3) An improvement plan must set out—
 - (a) the actions that are required to be taken by the person;
 - (b) the time by when the actions must be taken; and
 - (c) the period the improvement plan is in force.
- (4) An improvement plan may—
 - (a) exempt the person from having to comply with particular sections of this Act in relation to the activity while the person is acting in accordance with the improvement plan; and
 - (b) contain any other matter appropriate to the circumstances.
- (5) The Principal Environment Officer may amend an improvement plan by subsequent agreement with the person who made the improvement plan.
- (6) The Principal Environment Officer may terminate an improvement plan by notice in writing to the person who made the improvement plan.
- (7) A person who has agreed to an improvement plan and who breaches that plan commits an offence.

Maximum penalty: fine of \$10,000, imprisonment for two years

Division 5—Other Authorisations

64. Amending, suspending, revoking and withholding other authorisations

- (1) If the Principal Environment Officer reasonably believes that a person has contravened this Act, the Principal Environment Officer may recommend to any other public authority that a licence or other authorisation (however described) which is—
 - (a) issued by that authority; and
 - (b) held or proposed to be obtained by the person who is believed to have contravened this Act; and
 - (c) associated with the conduct or item involved in the contravention of this Act,

be amended, suspended, revoked or withheld.

- (2) If the Principal Environment Officer makes a recommendation to a public authority under subsection (1), the public authority may amend, suspend, revoke or withhold the licence or other authorisation (however described) as the public authority thinks fit.

Division 6—Injunctions

65. Injunctions

- (1) If a person has contravened, is contravening, or proposes to contravene this Act, any person may apply to a court for an injunction.
- (2) If the court is satisfied that a person has, is, or might contravene this Act, the court may grant an injunction—
- (a) restraining the person from engaging in conduct which would constitute a contravention of this Act; or
 - (b) require the person to do an act, which if not done, would constitute a contravention of this Act.
- (3) If the court grants an injunction under subsection (2), the court may make an order requiring the person to do an act (including repairing or mitigating damage to the environment).
- (4) Before deciding an application under this section, the court may grant an interim injunction—
- (a) restraining a person from engaging in conduct; or
 - (b) requiring a person to do an act.
- (5) On application, a court may discharge or vary an injunction or interim injunction.
- (6) Powers given to a court under this Act do not limit any other powers of the court.

PART VII—MISCELLANEOUS

Division 1—Provisions relating to contraventions of the Act

66. Liability for offence

Where a person commits an offence against a provision of this Act, or attempts to commit such an offence, that person shall be liable upon conviction to a fine not exceeding the amount specified immediately after the offence, imprisonment for not more than the period specified immediately after the offence, or both such fine and imprisonment.

67. Continuing contraventions

If there is a contravention of this Act that occurs over more than one day, each day that the contravention continues is a separate contravention.

68. Mental elements of contravention

Unless explicitly stated, no mental element need be proved to establish a contravention of this Act.

69. Effect on existing civil rights and remedies

This Act does not limit or alter any civil right or remedy that exists apart from this Act, whether at common law or otherwise.

70. Act to bind the Government

- (1) This Act affects the rights of and binds the Government
- (2) Each Ministry, department, agency, and instrumentality of the Government, is subject to, and shall comply with both the substantive and procedural provisions of this Act to the same extent as any person, but no Ministry, department, agency, or instrumentality of the Government shall be subject to any criminal sanction.

71. Actions by corporations and other persons

- (1) A contravention of this Act by a person—
 - (a) while an officer, employee or agent of a corporation or other person; and
 - (b) acting within the scope of his or her actual or apparent authority,is deemed also to be a contravention of that corporation or other person.
- (2) If a corporation or other person contravenes this Act, a director, officer, employee or agent of the corporation or other person who directed, authorised, assented to, acquiesced in or participated in the commission of the contravention, commits the contravention.

72. Certain persons deemed to allow conduct

- (1) The owner of, and the person in charge of or managing, a conveyance are deemed to allow any conduct involving the conveyance.
- (2) An occupier of premises is deemed to allow any conduct occurring on the premises.

73. Offences also deemed to be civil wrongs

- (1) Any conduct by a person which is an offence under this Act, is, by virtue of this section, also conduct which is a civil wrong.

- (2) Committing a civil wrong is not an offence.
- (3) A person must not—
 - (a) attempt or conspire to commit a civil wrong;
 - (b) aid, abet, counsel or procure or induce a person to commit a civil wrong; or
 - (c) be in any way party to the commission of a civil wrong.
- (4) A person who contravenes subsection (3) is deemed to have committed the civil wrong.
- (5) A court may not find a person to have committed an offence or civil wrong against this Act if a court has found the person to have committed an offence or civil wrong against this Act in relation to substantially similar conduct.

74. Proceedings for a civil wrong

- (1) Any person may apply to a court for an order that a person pay a monetary penalty for committing a civil wrong.
- (2) Rules of evidence and procedure for civil matters apply to proceedings under subsection (1).
- (3) If the court is satisfied that a person has committed a civil wrong, the court may order the person to pay a monetary penalty up to the maximum monetary penalty stated immediately after the offence which gives rise to the civil wrong.
- (4) Any monetary penalty must be paid into the Environment Fund under section 82 unless prescribed otherwise by regulation.

75. Defences to contraventions of this Act

- (1) It is a defence in any proceedings for a contravention of this Act if a person establishes that conduct giving rise to the contravention is allowed or required by—
 - (a) an environment licence;
 - (b) a management plan;
 - (c) an agreement made under section 43(4)(c);
 - (d) a direction or request of an environment inspector;
 - (e) a notice issued under Part VI, Division 2;
 - (f) an improvement plan under Part VI, Division 4; or
 - (g) an environment protocol made under Part VII, Division 2.

- (2) It is a defence in any proceedings for a contravention of this Act if a person establishes—
 - (a) that the contravention was not intentionally or knowingly caused or allowed and that all reasonable precautions were taken (if any were reasonable) to prevent the contravention; or
 - (b) that the contravention was reasonably necessary to deal with an emergency involving a serious threat to human life or property.
- (3) A defendant may only rely on a defence contained in subsection (2) if the defendant reported the contravention to the Principal Environment Officer as soon as practicable after the defendant knew that the contravention occurred.
- (4) A defendant must establish any defence or exemption contained in this Act by proving it on the balance of probabilities.
- (5) A person charged with a contravention of this Act must, no less than 14 days before the appointed date of hearing, notify the prosecution of an intention to rely on a particular defence contained in this Act.

76. Evidence

- (1) Any monitoring or recording equipment, or other instrument or installation used by an environment inspector (or any person directed or engaged by an environment inspector) is presumed to be accurate, precise and give a reading of the particular thing stated unless evidence to the contrary is presented.
- (2) Each attribute of a sample taken for any purpose under this Act is presumed not to be materially affected by its method of storage or preservation unless proven to the contrary.
- (3) An environment inspector may give evidence (without any need to call further opinion evidence) that the environment inspector formed the opinion based on the inspector's own senses that the discharge of noise, smoke, dust, fumes, light or odour caused unreasonable interference to the comfort of a person.
- (4) An allegation that an organism is a particular species shall be sufficient without proof of the matter, unless proven to the contrary.

77. Expanded jurisdiction of magistrates' courts

- (1) A magistrates' court shall have jurisdiction to hear any—
 - (a) criminal proceedings for a contravention of this Act;
 - (b) application under section 65 (dealing with injunctions); and

- (c) application under section 74 (dealing with civil wrongs), where the alleged conduct giving rise to the proceedings or application occurred, is occurring or may occur within the area over which such court has jurisdiction.
- (2) A magistrates' court shall have jurisdiction to make an order for a monetary penalty under section 74 not exceeding \$5000.
- (3) This section does not limit the jurisdiction or power of a court conferred by any other law.

78. Additional powers of courts

- (1) A court may order a person to pay an amount to the owner of any property (or if the property has no owner – the Republic), for any adverse effect caused to the property as a result of that persons contravention of this Act.
- (2) A court may order a person to clean up any substance, take actions, or pay an amount to the Republic for actual or anticipated costs, to remedy or mitigate any adverse effect caused as a result of the contravention of this Act.
- (3) A court may order, if a person does not pay an amount ordered to be paid within the time allowed, that any property of the person seized under this Act be sold to satisfy the amount.
- (4) A court may order payment of compensation to the Republic or any other person for costs involved in—
 - (a) investigation of the contravention of the Act;
 - (b) bringing court proceedings for the contravention; and
 - (c) seizing, storing, transporting or returning any evidentiary material.
- (5) A court may order the forfeiture of any evidentiary material to the Republic.
- (6) The powers under this section are in addition to and do not limit any other power of a court.

Division 2—Environment Protocols

79. Scope of environment protocols

- (1) An environment protocol sets out what is and what is not environmentally acceptable in relation to any—
 - (a) environmental issue;
 - (b) area;
 - (c) activity that may affect the environment; or

- (d) substance that may affect the environment.
- (2) An environment protocol may contain—
 - (a) methods for achieving what is and avoiding what is not environmentally acceptable; and
 - (b) any matter that is necessary or incidental to the effective operation of the protocol.
- (3) Without limiting the generality of subsections (1) or (2), examples of environmental protocols include environmental protocols in relation to—
 - (a) the foreshore;
 - (b) standards for—
 - (i) maximum quantities of waste to be discharged into the environment;
 - (ii) maximum quantities of noise to be emitted; and
 - (iii) the installation and operation of works or equipment to control waste or pollution;
 - (c) measures designed to minimise the possibility of the occurrence of pollution; and
 - (d) methods of distributing limited numbers of licences under this Act.
- (4) An environment protocol may—
 - (a) apply only to a certain area or at certain times;
 - (b) include offences punishable by fines not exceeding \$100,000 or terms of imprisonment not exceeding five years, or both; and
 - (c) require the payment of fees and charges.

80. Making and effect of environment protocols

- (1) The Minister, acting in accordance with the advice of Cabinet, may make an environment protocol, by notice published in the Gazette.
- (2) Before making an environment protocol under subsection (1), the Minister must undertake any consultations that may be—
 - (a) required by Cabinet; and
 - (b) prescribed by regulation.
- (3) A public authority may not act inconsistently with an environment protocol.

Division 3—Environment Committees

81. Environment committees

- (1) The Minister has the power to establish environment committees.
- (2) The Minister may, by instrument in writing, establish an environment committee and determine—
 - (a) the members of the committee;
 - (b) the title of the committee; and
 - (c) the functions and roles of the committee to further the objects of this Act.
- (3) The Minister may, by notice in writing to an environment committee—
 - (a) determine any issues in relation to the meetings of the committee;
 - (b) determine any matters of procedure applying to the committee; and
 - (c) determine the entitlement of members of the committee to receive allowances (if any).
- (4) In the absence of any determination as to the procedures of a committee, the committee may determine its own procedures.
- (5) Any instrument made under this section must, in due course, be published in the Gazette.

Division 4—Miscellaneous

82. Environment Fund

- (1) A special fund, to be known as the Environment Fund, is established in accordance with section 107(2) of the *Constitution*.
- (2) There shall be paid into the Environment Fund such moneys as may be prescribed by regulation.
- (3) There shall be paid out of the Environment Fund any money approved by the Minister responsible for finance, on receipt of a request from the Minister, in accordance with—
 - (a) the objects of this Act; and
 - (b) any requirements that may be prescribed by regulation.
- (4) No money shall be paid out of the Environment Fund other than in accordance with a warrant under the hand of the Minister responsible for finance authorising the Chief Accountant under the *Public Finance (Control and Audit) Ordinance* to issue the money to the accounting officer responsible for operating the Fund.

(5) The Minister responsible for finance shall, within six months after the end of each financial year, lay before the Maneaba ni Maungatabu a report dealing generally with the operations of the Special Fund during the preceding financial year and containing the audited statement of accounts for that financial year.

83. Public register of applications, licences, etc.

- (1) The Principal Environment Officer must keep a public register of every—
- (a) application for an environment licence;
 - (b) environment impact assessment report;
 - (c) environment licence;
 - (d) management plan;
 - (e) notice issued under Division 2 of Part VI;
 - (f) improvement plan;
 - (g) environment protocol; and
 - (h) any variation, suspension, termination and transfer of any of the above.
- (2) The Principal Environment Officer may exclude information from the public register to—
- (a) protect the environment;
 - (b) protect commercially sensitive information.
- (3) The public register must be made available to be inspected and copied during normal office hours.

84. Statements as to whether an activity is complying

- (1) Any person may apply to the Minister in writing for an opinion as to whether a particular person is complying, or has complied with this Act in relation to a particular activity.
- (2) Within 30 days after receiving an application under subsection (1), the Minister, acting in accordance with the advice of the Cabinet, must provide to the applicant an opinion as to whether the activity is complying or has complied with this Act, and the Minister must include a statement as to any actions the Republic is taking in relation to the activity to ensure compliance with this Act.
- (3) Any opinion under subsection (2) must be made available to be inspected and copied by members of the public during normal office hours.
- (4) Any opinion given under this section is not legally binding on the Republic.

85. Appeals to the Minister

- (1) Subject to subsection (5), any person who disagrees with a decision of the Principal Environment Officer or any environment inspector may, in writing within 30 days of the date of the decision, appeal against the decision to the Minister.
- (2) The Minister, acting in accordance with the advice of Cabinet, must—
 - (a) confirm the original decision; or
 - (b) vary the decision.
- (3) Any decision, remains valid while being considered by the Minister.
- (4) Any timeframe in a notice issued under Part VI, Division 2 does not run while an appeal in relation to that notice is being considered.
- (5) The regulations may prescribe decisions against which no appeal may be made.

86. Regulations

- (1) The Minister may, acting in accordance with the advice of the Cabinet, make regulations prescribing all matters permitted, necessary or convenient to be prescribed for carrying out or giving effect to this Act.
- (2) Without limiting the generality of subsection (1), regulations may be made—
 - (a) to give further effect to the object of this Act;
 - (b) to implement any international agreement, treaty, protocol, convention and other similar document relating to the environment;
 - (c) on procedures for seizure of items, and dealing with seized items;
 - (d) to provide for delegation of duties, powers and functions under this Act.
- (3) Regulations made under this section may prescribe or allow for penalties for offences, being terms of imprisonment not exceeding 10 years, fines not exceeding \$200,000, or both.”.

7.3. Existing authorisations

An authorisation or exemption (however described), under the principal Act that is valid immediately before this provision enters into force, is deemed to be an environment licence allowing the same conduct and subject to the same conditions (if any).

12. Pending authorisations

Any application, initial environment evaluation, or environmental impact statement that has been validly made under the principal Act, and at the time this provision enters into force is deemed to be the corresponding instrument validly submitted in relation to an environment licence.

ENVIRONMENT (AMENDMENT) BILL 2006

EXPLANATORY MEMORANDUM

This Bill seeks to consolidate and improve the environmental laws of Kiribati by amending the *Environment Act* 1999. Lessons learnt in the implementation of the *Environment Act* since it entered into force in March 2000 have demonstrated the need for refinement of the Act, to allow for its application in a more effective and functional manner. In addition, the Bill contains legislative provisions necessary for the implementation of the following international agreements—

- the *Convention for the Protection of the World Cultural and National Heritage*;
- the *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, and
- the *Convention on Biological Diversity*.

Clause 3 of the Bill inserts a number of new definitions into the interpretation section of the Act. Clause 4 introduces further refinement to the objects of the Act. New sections 4A and 4B are inserted by clause 5 to better clarify the application of the Act. The amendments to section 5 made by clause 6 establish the new position of Principal Environment Officer, who will play a major role in the administration of the Act. The powers of the Minister are restricted only to those of giving directions and policy guidelines; the implementation and administration of the Act is carried out by the Principal Environment Officer.

The most significant amendments are made to the Act by clause 10 of the Bill, which repeals and replaces Parts III, IV and V of the Act and inserts new Parts VI and VII.

The new Part III sets out the obligations of persons in protecting the environment. Issues such as pollution, the conduct of environmentally-significant activities (which will need to be carried out in accordance with the terms of an environment licence), conservation and World Heritage.

The replacement Part IV provides for the means by which environment licences are to be issued, and the matters to which consideration must be given. Depending on the scale and potential environmental impact of the activity, and applicant for an environment licence may need to first obtain an Initial Environmental Evaluation (IEE) or an Environmental Impact Statement (EIS). Licences will be subject to various conditions, to ensure that environmentally-significant activities are conducted with as little impact on the environment as possible.

A new Part V deals with conservation matters in greater depth. Species and ecological communities in need of protection are listed, and the means by which protected areas can be established are set out. This Part also covers matters provided for in the World Heritage Convention. It also provides for the making of management plans for protected areas and World Heritage Areas.

Part VI relates to enforcement of the Act. Environment inspectors are given powers to gather evidence and ensure compliance with the Act. It also provides for a range of tools to be used by environment inspectors and the Minister to encourage compliance with the Act. These tools are compliance notices, clean-up notices, infringement notices, mandatory audits and improvement plans. Part VI also provides that any offence under the Act is also a civil wrong which can be punished by a court. Bringing an action for a civil wrong uses civil rather than criminal procedures and standards of proof. This Part also allows for any person to bring an action in a court for a breach of this Act. Evidentiary provisions are set out, and the powers of the courts are clarified.

Part VII contains various miscellaneous provisions, covering such matters as: the maximum penalties for offences under the Act; the development of environment protocols; the establishment of environment committees; provisions for a special fund called the Environment Fund; appeals and the making of regulations.

Clauses 11 and 12 of the Bill provide for various transitional provisions. Existing and pending authorisations under the Act remain current, despite the changes.

Titabu Tabane
Attorney-General
19 October 2006


CERTIFICATE OF THE CLERK OF THE MANEABA NI MAUNGATABU

This printed impression has been carefully examined by me with the Bill which passed the Maneaba ni Maungatabu on 28 May 2007 and is found by me to be a true and correctly printed copy of the said Bill.



Ioataake Timeon
Clerk of the Maneaba ni Maungatabu

Published by exhibition at the Maneaba ni Maungatabu this *04th* day
of *September*, 2007.



Ioataake Timeon
Clerk of the Maneaba ni Maungatabu



PHOENIX ISLANDS PROTECTED AREA KIRIBATI

**Nomination for a
World Heritage site 2009**



Annex 4

PIPA announcement at CBD COP8



ANNOUNCEMENT OF PHOENIX ISLANDS PROTECTED AREA

BY

**HON. MARTIN PUTA TOFINGA
MINISTER OF ENVIRONMENT LANDS AND AGRICULTURAL
DEVELOPMENT**

REPUBLIC OF KIRIBATI

AT THE

HIGH LEVEL EVENT – COP8

“ISLANDS, MARINE BIODIVERSITY AND LIVELIHOODS:

A GLOBAL PARTNERSHIP”

(28 March 2006, Curitiba, Brazil)

Thank you your Excellency Mr. President, and the other co-hosts of tonight's wonderful event.

It is a great pleasure for Kiribati to be here tonight for this occasion to highlight the importance of Islands and Pacific Biodiversity. This is a vitally important topic to us, as well as all Pacific Island countries, because of our ancient connection to the sea and all that the sea provides.

Kiribati, the largest atoll nation in the world, is blessed with vast ocean resources stretching from the Gilbert Islands to the Phoenix Islands and on to the Line Islands, with a total EEZ of 3.5 million square kilometers. Because our nation depends on the ocean, both spiritually and financially, and because we are committed to the goals of the CBD, we have an announcement to make.

Tonight the Government of Kiribati is declaring the Phoenix Islands Protected area. This region has eight atolls and two submerged reef systems. The nearly uninhabited Phoenix Islands Protected Area is the largest marine protected area in

the Pacific Islands at 184,700 square kilometers, twice the size of Portugal, and the third largest marine protected area in the world. It contains a near pristine coral archipelago with abundant marine and terrestrial biodiversity, including native medicinal plants that are disappearing from our inhabited islands, and is the first marine protected area in the region with deep-sea habitat, including seamounts. The Government of Kiribati is also considering listing these islands as a World Heritage Site

The work leading to this announcement began six years ago, but we have recently completed several milestones that make this declaration possible and appropriate for the CBD COP8 venue. In collaboration with the New England Aquarium and other partners we have conducted a series of scientific research expeditions to the region documenting the terrestrial and shallow water marine biodiversity, and discovering new species of fish and coral. The results of this work will soon be published in the scientific journal ATOLL RESEARCH BULLETIN. This scientific information is guiding our conservation plan. There

will also be a deep sea research trip in the next year to further expand our knowledge of the region. We have also developed and signed a Memorandum of Understanding with the New England Aquarium and Conservation International that details the development of a management plan and a long-term financing mechanism.

At the heart of this program is the desire of Kiribati to promote both land and marine biodiversity protection and the long-term interests of I-Kiribati people. We believe this is possible because of a financially sustainable plan for this protected area that incorporates a diversity of funding sources and mechanisms including an endowment system that will compensate Kiribati for lost fishing license revenues as well as for management costs.

Since the beginning of human settlement of the Pacific Islands region, the Phoenix Island's coral reefs, terrestrial habitats and bird populations represent a marine wilderness area that has undergone very limited human exploitation due to

their extreme remoteness. With recent advances and pressures in the fishing industry and impacts of global climate change, isolation can no longer be relied on to conserve the biodiversity of these atolls.

The Government of Kiribati, in partnership with the New England Aquarium, Conservation International, and other partners and donors are working together to provide what we believe is an innovative and sustainable model for large scale conservation in the region. We welcome new partners and collaborators on this exciting and vitally important endeavor.

Thank you and good evening.



PHOENIX ISLANDS PROTECTED AREA KIRIBATI

**Nomination for a
World Heritage site 2009**

Annexes 5 and 5a

**Annex 5. PIPA Visitor Guidelines
Annex 5a. PIPA Visitor Permit**



PHOENIX ISLANDS PROTECTED AREA

PHOENIX ISLAND PROTECTED AREA (PIPA)

Ministry of Environment, Lands & Agricultural Development

P.O Box 234, Bikenibeu Tarawa

Telephone Number: (686) 29762, Fax Number (686) 28334

PIPA VISTOR'S GUIDELINES

INTRODUCTION - The Phoenix Islands Protected Area (PIPA) was created for the preservation of its pristine natural resources. The marine environment, especially coral reefs, is basically untouched by man. On land, the plant life includes many native species. Also, the Phoenix Islands provide a haven for sea birds that transmigrate the Pacific. These are especially critical for those bird species that nest here. There are several endangered species that live within the safety of PIPA. These include marine turtles, coconut crabs, and various species of birds. In addition, PIPA provides a bio-reserve for important medicinal plants that are now rare in the Gilbert Islands.

CONSERVATION - At present the Phoenix Islands are in excellent state of conservation due to their remoteness and isolation. Taken as a whole the marine values of the Phoenix Islands are significant on an international scale. There are few oceanic atolls in the world that can be observed in a virtually unfished state. The Phoenix Islands offers us this precious opportunity.

BIO-DIVERSITY - Biodiversity refers to the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. PIPA marine habitats are especially diverse in corals and fish species.

THREATENED OR ENDANGERED SPECIES - Threatened species are species that face increased risk of extinction. Endangered species are species which are at eminent risk of extinction. There are several species of both fish and birds that are threatened and endangered. These include many whale and turtle species, as well as bird species, such as the Phoenix petrel. With PIPA, threatened and endangered species have a safe haven to increase population sizes. As their populations grow, their status as threatened or endangered can be adjusted.

BIO-RESERVE - The PIPA is home to several endemic species of plants and animals. In addition, there are several species of medicinal plants there. These medicinal plants are becoming rare in the Gilbert Islands. The PIPA is providing a natural reserve or bank for these important genetic materials. Therefore, biosecurity is enhanced by PIPA.

SUMMARY OF RULES AND REGULATIONS

Zoning

1. In the area within 12 nautical miles around each of the Phoenix Islands, except Abariringa, all fishing is banned, except for catch and release of bonefish by rod and reel. However, a visitor should obtain a permit to conduct this type of activity.

2. The area between 12 nautical miles and the outer boundary of the PIPA is designated a no-take zone. All fishing is banned.
3. The area within 12 nautical miles of any of the eight Phoenix Islands and Winslow and Carondelet reefs are designed areas to avoid. Vessels that are solely transiting the PIPA area are to avoid these areas. However, a visitor can obtain a permit for recreational activities.
4. The area within 12 nautical miles of any of the eight Phoenix Islands are designed no discharge of ballast or sewage water, or rubbish

Living and non-living resources

1. No activity shall take place within the PIPA that harms or creates the risk of harm to any organism or the ecosystem within the protected area, except as is consistent with an environmental license as specified in the Environment (Amendment) Act 2007, Section 31.
2. No activity is permitted within the PIPA that creates the risk of harm or damage to any archaeological artefact.
3. No collection or harvest of living or non-living resources is permitted without a permit.
4. Vessels and individuals are not allowed to approach within 50 m of any species of whale in the PIPA. If they observe a whale within 50 m, the vessel or individual must back off to at least 50 m away.
5. In order to minimize disturbance of bird populations, aircraft are not allowed within 460 m (1,500 ft) elevation or 1,000 m laterally of any island in the Phoenix Islands, except in designated areas. Helicopter landings and take-offs should occur only during day light hours and only at the edge of an island, with approach from sea and landing site at least 300 m from any surface-nesting seabirds. Special permission is required for landing any aircraft in the PIPA, with the exception of the airfield at Abariringa (Kanton).

Visitors

1. Kiribati immigration requirements apply to all visitors to the PIPA.
2. PIPA visitors must comply with the PIPA requirement for visitor permits.
3. PIPA visitors must comply with surveillance requirements (reporting of vessels including yachts sighted in PIPA fishing. Reporting to be made to PIPA Office (email: tukabuttravel@yahoo.com). It is not the responsibility of the visitor to apprehend
4. PIPA visitors must pay a fee when engaged in recreational activities

VISITOR DO'S

When visiting the Phoenix Islands, please take special care of our natural resources.

1. Please enjoy the wildlife and marine species in this globally important marine protected area.
2. Please take the time to learn about the importance of the Phoenix Islands for conservation, biodiversity, threatened or endangered species, and its role as a bio-reserve.
3. Please obtain the appropriate permit for the activities you plan in the PIPA (visitor, diving, and fishing permit).
4. If you fish, please ensure that you follow the PIPA fishing regulations.
5. Please pick up your trash and deposit it in an appropriate receptacle.
6. If you operate any type of aircraft, please take extra care not to interfere or harm local bird populations. Please follow the PIPA aircraft operations rules and regulations.
7. If you operate a vessel, please ensure that you follow the PIPA vessel rules and regulations.

VISITOR DON'TS

1. Please do not litter. Litter can damage the delicate eco-system and kill marine life such as turtles.
2. Please do not touch, damage, harm, harvest or interfere with wildlife or marine species as well as archaeological sites.
3. Please do not collect souvenirs such as shells, pieces of coral, or historic artifacts.
4. Please do not approach within 50 m of any species of whale in the PIPA area. If whales are observed within 50 m, please back away.

VOLUNTARY PARTICIPATION IN THE PIPA MONITORING PROGRAMME.

- Observation on corals (for signs of bleaching – need to develop appropriate questionnaire)
- Observation on important marine species (humphead wrasse, turtles, sharks – need to develop appropriate questionnaire)
- Observation on terrestrial species (coconut crabs, rats, cats, - need to develop appropriate questionnaire)

Finally, please help us protect the PIPA by reporting any sightings of individuals or vessels within the PIPA area or of any unusual activities within the PIPA area. PIPA is the largest marine protected area in the world. YOUR CARE AND SUPPORT ARE CRITICAL TO THE SUCCESS OF PIPA.



PHOENIX ISLANDS PROTECTED AREA

Recreational Permit

Permit No: _____
 Issued To: _____
 Name: _____
 Nationality: _____
 Address: _____

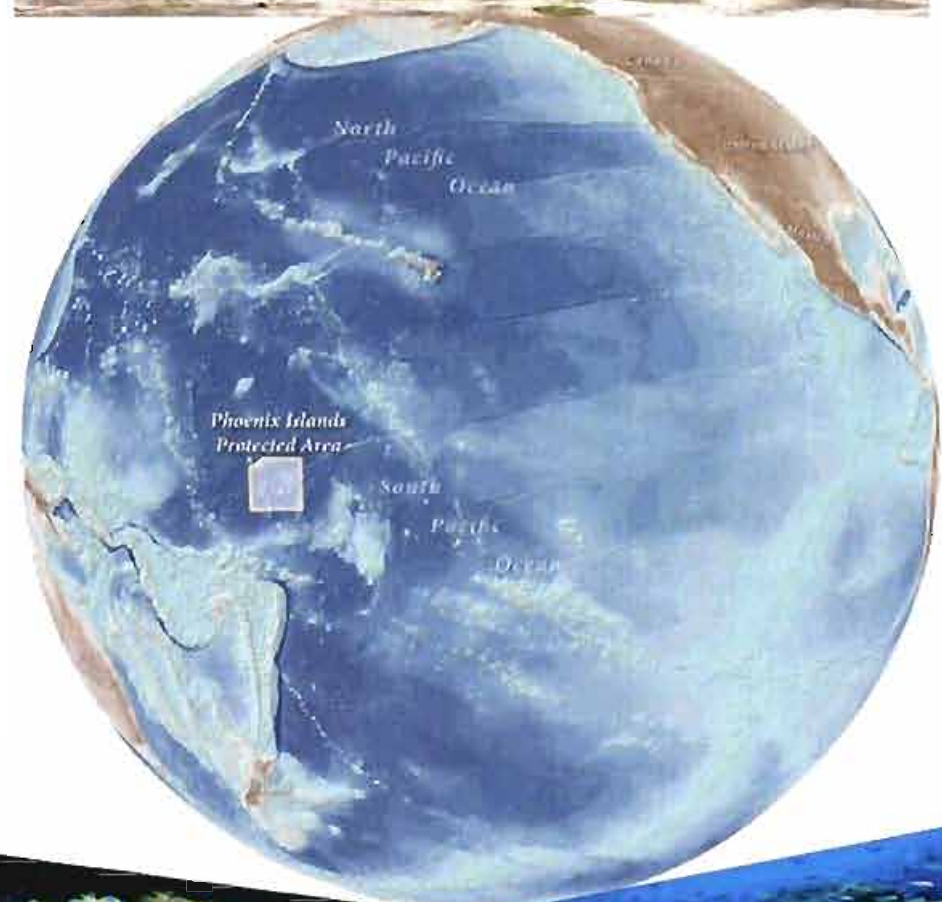
The holder of this permit is authorised to
 Conduct recreational activities in PIPA as
 Per Permit Application No: _____

This permit is valid for the duration of: _____
 Other conditions of this permit: refer to Visitor's Guidelines attached.

AUTHORISED
 ISSUING OFFICER _____

OFFICIAL STAMP _____ DATE _____

ISSUED BY PIPA OFFICE
 MINISTRY OF ENVIRONMENT, LANDS & AGRICULTURAL
 DEVELOPMENT
 GOVERNMENT OF KIRIBATI





**PHOENIX ISLANDS
PROTECTED AREA
KIRIBATI**

**Nomination for a
World Heritage site 2009**

Annex 6

**MOU & MOU extension between the Government of Kiribati,
Conservation International and New England Aquarium**

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU"), dated as of October 5, 2005, is by and among **THE GOVERNMENT OF THE REPUBLIC OF KIRIBATI** (the "GoK") acting by and through the Ministry of Environment, Lands, and Agricultural Development ("MELAD"), **THE NEW ENGLAND AQUARIUM CORPORATION** ("NEAq"), a non-profit conservation organization organized under the laws of the Commonwealth of Massachusetts, with offices at Central Wharf, Boston, Massachusetts, United States of America, and **CONSERVATION INTERNATIONAL FOUNDATION** ("CI"), a non-profit conservation organization organized under the laws of the State of California, with offices at 1919 M Street, NW, Washington, D.C. 20036, United States of America.

RECITALS:

WHEREAS, the GoK exercises sovereign and plenary territorial jurisdiction over the terrestrial and marine biological, cultural, and historic resources of the Pacific Ocean islands of Kanton, Enderbury, Birnie, Rawaki, Orona, Manra, Nikumaroro, and McKean, known collectively as the Phoenix Islands;

WHEREAS, the GoK acknowledges a deep and abiding public trust and responsibility for the abundant coral reef resources of the Phoenix Islands, resources that stand as a symbol for all that has sustained the I-Kiribati;

WHEREAS, the GoK takes pride in the fact that the pristine nature of the Phoenix Islands advances outstanding universal values for biological diversity that the GoK desires to conserve for the benefit of the world community, and the GoK is taking steps to advance inclusion of the Phoenix Islands in its nomination within the Central Pacific World Heritage Site as part of its national biodiversity conservation strategy;

WHEREAS, the GoK believes that the highest and best use of the biological, cultural, and historic resources of the Phoenix Islands is dependent on preserving and managing the health and integrity of the Phoenix Islands atoll and reef ecosystems in as pristine condition as is practically achievable;

WHEREAS, the GoK recognizes the fragile nature of the atoll, bird, and marine resources of the Phoenix Islands and the pressing need to control and limit economic activities and exploitation with respect to these resources for the benefit of current and future generations;

WHEREAS, the GoK desires to pursue the necessary legal, scientific, fiscal, and educational steps for the long-term protection of the resources of the Phoenix Islands as part of the GoK's national strategy for conserving the country's terrestrial and marine biodiversity;

WHEREAS, NEAq is a non-governmental organization dedicated to the conservation of marine life with technical expertise in research and monitoring of marine ecosystems;

WHEREAS, NEAq has conducted the first systematic scientific assessment and exploration of the marine and terrestrial biological resources of the Phoenix Islands through a series of expeditions conducted during 2000, 2002 and 2005;

WHEREAS, NEAq is committed to working in cooperation with the GoK to establish permanent protection for the land and marine resources of the Phoenix Islands, to develop appropriate long-term financing mechanisms to provide revenue to the GoK necessary for full protection of the Phoenix Islands, and to assist the GoK to develop the legislation, regulations, management plans, financial instruments and long-term financing mechanisms associated therewith;

WHEREAS, the Global Conservation Fund at CI ("GCF/CI") finances the creation, expansion and long-term management of protected areas in areas deemed to be of high biodiversity importance, high biodiversity wilderness areas and important marine regions; and

WHEREAS, in furtherance of the foregoing, the GoK, NEAq, and the GCF/CI have agreed to collaborate and cooperate to establish a protected area program for the Phoenix Islands to be managed and administered by the GoK.

NOW THEREFORE, in consideration of the mutual promises, understandings, obligations and undertakings set forth herein, the parties hereby agree as follows:

ARTICLE I JOINT OBJECTIVES AND COMMITMENTS

- 1.1. General. The GoK and NEAq desire to enter into a cooperative agreement with the joint objective of creating a long-term conservation and sustainable development program for the Phoenix Islands ("Phoenix Islands Conservation Project"). The GCF/CI has provided exploratory and implementation plan funding to NEAq in support of the project and intends to continue to participate in the project to insure the successful establishment of the Long-Term Financing Vehicle (the "Financing Vehicle"), as described in Article 4 below. The GoK and NEAq mutually agree to cooperate with the GCF/CI with respect to the development of the Financing Vehicle.
- 1.2. Protected Area. The GoK and NEAq agree to use reasonable efforts to collaborate to establish a protected area in and around the Phoenix Islands (the "Protected Area") to be managed and administered by the GoK. The objective of the Protected Area is to promote both land and marine biodiversity protection and the long-term interests of the GoK and the I-Kiribati. Specifically, the parties hereto agree as follows:
 - 1.2.1. The GoK shall formally establish the Protected Area as a "Protected Area" under the laws of Kiribati (such action hereinafter referred to as the "Declaration"). In furtherance of this objective, the GoK shall take all necessary actions related to formally establishing the Protected Area.
 - 1.2.2. NEAq agrees to advise and provide reasonable technical support to the GoK with respect to the Declaration of the Protected Area. Such activities shall include, e.g., technical assistance in the development of proposed research and monitoring protocols for the Protected Area. Such technical support shall extend to assisting the GoK in its efforts to secure designation of the Phoenix Islands as a World Heritage site of outstanding universal value.
- 1.3. Conservation Contract. The GoK and NEAq agree to use reasonable efforts to collaborate to create a binding conservation agreement (sometimes referred to as a 'reverse-fishing licence') (the "Conservation Contract") covering the Protected Area. Under the Conservation Contract, the GoK will guarantee the protection of the Protected Area and in return will be compensated for the loss of fishing revenue through payment by the Financing Vehicle of a yearly fee. Said yearly fee shall be determined by i) a resource valuation to be undertaken as more fully described in Section 1.3.3 below, and ii) an estimation of the management and administrative costs of running the Phoenix Islands Protected Area Program. Payments of fees pursuant to the Conservation Contract will be contingent upon satisfaction of the performance standards to be specified in the Management Plan and/or Conservation Contract. Specifically to that end, the parties hereto agree as follows:
 - 1.3.1. Upon satisfactory completion of all precedent conditions of each of the Financing Vehicle and the GoK, such satisfaction to be determined solely in the discretion of each such party, the GoK and the Financing Vehicle will execute the Conservation Contract,

which shall set forth the binding requirements with respect to all development activity, including specifically and foreign and domestic fishing rights to the area around the Phoenix Islands, such area to be definitively determined upon mutual agreement of the parties. The Financing Vehicle shall pay an annual fee to the GoK pursuant to the terms of the Conservation Contract.

- 1.3.2. NEAq agrees to provide technical assistance for the creation of the Conservation Contract. Pending successful incorporation and capitalization of the Financing Vehicle, NEAq further agrees to use reasonable efforts to secure funding to provide reasonable support for program staff responsibilities in MELAD for the Phoenix Islands Conservation Project during the implementation stage of the project. The nature and extent of this commitment will be set forth in a separate agreement between the GoK and NEAq.
- 1.3.3. The GoK commits to working with NEAq to develop a resource valuation for the fishery resources of the Protected Area. To that end, a working group that reports to the Phoenix Island Conservation Steering Committee will be formed with staff from the ministries of the GoK responsible for environment, fisheries and finance, representatives of NEAq, and external experts. The GoK and NEAq commit to exercising their best efforts to conclude the resource valuation process within six (6) months of execution of this document.
- 1.4. Management Plan. In connection with the declaration of the Protected Area as contemplated under this MOU, the GoK and NEAq agree to use their best efforts to collaborate to establish a mutually acceptable management plan and GoK Management Entity for the Protected Area (the "Management Plan"). Such plan shall be developed and finalized and such management entity shall be instituted in accordance with the following:
 - 1.4.1. (a) The GoK shall use reasonable efforts to collaborate with NEAq to finalize the Management Plan to the mutual satisfaction of all parties hereto. The Management Plan shall govern the management of the Protected Area upon final approval by the GoK and shall be binding on all ministries in the GoK. During the management planning process, a report will be undertaken by NEAq that will evaluate and make recommendations regarding the formation of a Management Entity that shall have responsibility for fulfilling the obligations of the Management Plan. The Management Plan shall also address issues of bio-prospecting in the Phoenix Islands Protected Area, including access and ownership interests in genetic material identified or discovered in the Protected Area.
 - (b) Upon approval of the Management Plan and the commitment of necessary funding through the Financing Vehicle or through independent funding sources, the GoK shall take all necessary actions prescribed by the Management Plan and shall take no actions which are adverse to the management of the Protected Area in accordance with the Management Plan.
 - 1.4.2. NEAq agrees to collaborate with the GoK and all relevant stakeholders concerned to draft the Management Plan. The draft Management Plan shall conform to appropriate international best practices and standards. In addition, the draft Management Plan shall take into account, where appropriate, the management standards associated with UNESCO World Heritage designation to avoid duplication and repetition of conservation efforts in the Phoenix Islands area. Following submission of the draft plan to the GoK, NEAq shall use reasonable efforts to work with the GoK to finalize the Management Plan to the mutual satisfaction of all parties. The NEAq recognizes the interest of the GoK in developing staffing capacity and expertise within the ministries of the GoK in protected area management and administration and commits to working with the GoK in the training and education of GoK ministerial staff during the development of the protected area Management Plan.

- 1.5. Long-term Financing Vehicle. In order to support and finance the long-term management of the Protected Area and the implementation of the Management Plan, the GoK, NEAq, and GCF/CI shall jointly cooperate to establish the Financing Vehicle with the principal purpose of financing the management of the Protected Area. This Financing Vehicle shall be organized and governed pursuant to Article 4 hereunder.
- 1.6. Legal Authorities Review. The GoK and NEAq agree to collaborate in and undertake a legal review of Kiribati law to determine the need for new or supplementary legislation in order to accomplish the purposes of the Phoenix Islands Conservation Project and create the Financing Vehicle.

ARTICLE 2 GoK COMMITMENTS

- 2.1 Consistent Action. The GoK is committed to the joint objectives described in Article 1 above and, in this regard, the GoK shall not promote or permit any activities, or adopt any legislation or issue any licenses, permits or orders that are inconsistent with the Protected Area and the objectives of the Management Plan or that would reduce the biodiversity and resource values in the Protected Area during the development of the Management Plan.
- 2.2 Cooperation. The GoK commits to take all reasonable efforts to support the Phoenix Islands Conservation Project in connection with (i) the joint development of the Financing Vehicle, (ii) fundraising for the Financing Vehicle, and (iii) joint promotional activities relating to the Protected Area.
- 2.3 Legal Authority. The GoK agrees to exercise reasonable efforts to enact such legislation as the GoK considers to be needed or desirable to accomplish the purposes of the Phoenix Islands Conservation Project taking into account the recommendations of the legislative review undertaken pursuant to Section 1.6 above.
- 2.4 Finance and Technical Assistance. The commitments of the GoK under this MOU are contingent upon receiving appropriate financial and technical assistance.

ARTICLE 3 NEAq COMMITMENTS

- 3.1 Technical Support. NEAq agrees to provide reasonable technical support and expertise towards establishment of the Financing Vehicle. NEAq and GCF/CI will collaborate with the GoK to develop a mutually acceptable legal structure and governance structure for the Financing Vehicle (as more fully described in Article 4 hereof).
- 3.2 2006 Research Cruise. NEAq commits to using reasonable efforts to secure funding to enable a further research cruise in the Phoenix Islands in 2006 to assess and evaluate the island's resources, including bird and botanical values, and to further document reef biological recovery from the 2002 bleaching event. NEAq undertakes to work with the GoK to bring representatives of the government on the expedition to participate in the scientific endeavor.

**ARTICLE 4
FORMATION OF LONG-TERM
FINANCING VEHICLE**

4.1 Establishment of Financing Vehicle; Objective.

- (a) The GoK and NEAq hereby agree to establish a mutually acceptable Financing Vehicle to support the management of the Protected Area and finance mutually acceptable related activities.
- (b) The principal objectives of the Financing Vehicle will be to provide a steady flow of funds to support the implementation of the Management Plan and management of the Protected Area and to cover the fees associated with the Conservation Contract. To increase capital available to the Financing Vehicle, NEAq and the GoK will use their best efforts to jointly fundraise on behalf of the Financing Vehicle. Until additional capital is raised, funds available to the Financing Vehicle shall be initially applied to cover the following three costs: (i) administrative and operational costs of the Financing Vehicle; (ii) costs associated with managing the Protected Area; and (iii) fees associated with the Conservation Contract.
- (c) As additional capital is raised for the Financing Vehicle, and following the distribution of funds to cover the costs described in Section 4.1(b), excess funds may be made available to finance additional activities including the following: (i) sustainable development activities consistent with the Management Plan; (ii) long term data gathering and analysis, documentation and information sharing; (iii) promoting collaboration with local government and natural resources institutions and interested parties to build national commitment to conservation; and (iv) supporting environmental awareness and education programs that promote biodiversity conservation. Such funds would be made available at the discretion of the Financing Vehicle Board of Directors only after fully covering core costs described in Section 4.1(b).

4.2 Legal Structure. The Financing Vehicle will be organized as an autonomous legal entity with an independent governance and management structure. It is currently contemplated that the Financing Vehicle will be structured as a Trust under the Laws of Kiribati; however NEAq, GCF/CI and the GoK shall collaborate to develop the most effective, mutually acceptable legal structure for the Financing Vehicle.

4.3. Governance/Management Structure. The governance, management and operations of the Financing Vehicle will be governed by certain principal instruments to be developed and mutually agreed upon by the GoK and other donors contributing to the Financing Vehicle (including By-Laws). It is currently contemplated that the Financing Vehicle will have a Board of Directors which shall be predominantly non-governmental. The exact size and composition of said Board of Directors will be mutually agreed upon by the parties hereto taking into account international best practices standards. Each of the GoK, CI and NEAq shall be represented on the Board of Directors of the Financing Vehicle; however, none shall have a controlling vote.

4.4 Management of Funds. The Financing Vehicle will be required to manage and invest its capital according to strict guidelines mutually acceptable to NEAq, GCF/CI and the GoK, and as to the funds of any donor, such donor. Further, funds will be invested by one or more internationally recognized Fund Managers approved by NEAq, GCF/CI and the GoK.

IN WITNESS WHEREOF, the parties hereto have executed and delivered this Memorandum of Understanding as of the date and year first above written above.

On Behalf of

THE GOVERNMENT OF THE REPUBLIC OF KIRIBATI



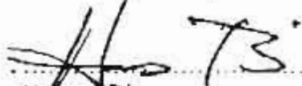
Tukabu Teroroko

Secretary

Ministry of Environment, Lands and Agricultural Development

On Behalf of

THE NEW ENGLAND AQUARIUM CORPORATION

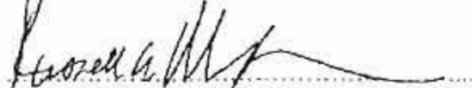


Howard Ris

President

On Behalf of

CONSERVATION INTERNATIONAL FOUNDATION



Russ Mittermeier

President

AMENDMENT TO
MEMORANDUM OF UNDERSTANDING
OF OCTOBER 5, 2005

This is an Amendment dated as of September 22, 2008 to the Memorandum of Understanding ("MOU"), dated as of October 5, 2005, by and among **THE GOVERNMENT OF THE REPUBLIC OF KIRIBATI** (the "GoK") acting by and through the Ministry of Environment, Lands and Agricultural Development ("MELAD"), **THE NEW ENGLAND AQUARIUM** ("NEAq"), and **CONSERVATION INTERNATIONAL FOUNDATION** ("CI"), pursuant to Article 6.5 thereof for the purposes of extending the term of said MOU and other matters.

RECITALS:

WHEREAS, the MOU sets forth a series of mutual promises, understandings, obligations and undertakings between the signatories (affixed hereto as Attachment 1);

WHEREAS, significant progress has been made on a number of activities outlined in said MOU with respect to the creation of the Phoenix Island Protected Area ("PIPA") and the subsidiary actions associated with that goal;

WHEREAS, the terms of the MOU specify that the MOU is effective through October 5, 2008 unless earlier terminated as provided in the MOU;

WHEREAS, the terms of the MOU provide that the MOU may be amended by a written instrument signed by the parties thereto;

WHEREAS, the 2006 Research Cruise identified in Article 3.2 of the MOU was unable to be undertaken because of the lack of availability of a suitable research vessel but is in the process of being re-scheduled for 2009;

WHEREAS, the parties to the MOU continue to be committed in full measure to accomplishing the purposes of the MOU by establishing the PIPA and by taking any and all necessary actions to that end; and

WHEREAS, the parties to the MOU agree that additional time is necessary to fully accomplish the joint objectives and commitments undertaken in the MOU and that amendment of the term of the MOU is appropriate for that purpose.

NOW, THEREFORE, the parties hereby agree as follows:

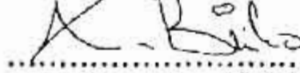
1. The MOU is hereby extended for a term of two (2) years to October 5, 2010, unless earlier terminated as provided in the MOU.

2. The NEAq will continue to use reasonable efforts to secure funding and logistical support to enable a third research cruise to the PIPA as described further in the MOU and expect that such cruise will now happen in 2009.
3. Other than the term of the MOU and the date for the research cruise, all other mutual promises, understandings, obligations and undertakings set forth in the MOU continue in full force and effect.
4. Each of the GoK, NEAq, and CI hereby represent and warrant that their representative signatories below have been duly and validly authorized to execute and deliver this Amendment to the MOU.

IN WITNESS WHEREOF, the parties hereto have executed and delivered this Amendment to the MOU as of the date and year first written above.

On Behalf of:

THE GOVERNMENT OF THE REPUBLIC OF KIRIBATI



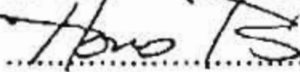
~~Tebwe Tebwe~~ T. B. B. B.

Secretary to Cabinet

~~Ministry of Environment, Lands and Agricultural Development~~

On Behalf of:

THE NEW ENGLAND AQUARIUM CORPORATION



Howard Rjs

President

On Behalf of:

CONSERVATION INTERNATIONAL FOUNDATION



Niels Crane
 Chief Operating Officer

Amelia Smith
 General Counsel & Sr. Vice President
 Conservation International
 per attached delegation



**PHOENIX ISLANDS
PROTECTED AREA
KIRIBATI**

**Nomination for a
World Heritage site 2009**

Annex 7

**Species Lists for the
Phoenix Islands Protected Area**

Annex 7. PIPA Species Lists:

7a. Corals

Revised master species list of Phoenix Islands corals reported by David Obura (2000, 2002, 2005) and Jim Maragos at Kanton (1973, 2008), and Birnie and Orona (2008). Some species names changed in accordance with sheet 2. Also included are notes from the late John Wells and Tom Dana from McKean Island. Obura's list is his total for the Kiribati Phoenix Islands and was not broken down by individual island. Contact information: dobura@cordioea.org, jim_maragos@fws.gov, jimmaragos@yahoo.com, maragosje@hawaii.nr.com

*= anemone (Order Actiniaria), **= soft corals (Order Octocorallia), *** = corallimorph (Order Corallimorpharia), **** = black corals (Order Antipatharia), ***** = hydrozoan corals or cnidarian (Class Hydrozoa), ***** = zoanthid soft coral (Family Zoanthidea), remainder without asterisks are stony corals (Order Scleractinia).

Species names in parentheses are considered junior synonyms by Maragos for corals species in the Phoenix Is.

	NEAq	Dana &	David	Jim Maragos					U.S. totals	
	2001	Wells	Obura	Kiribati Phoenix Islands			U.S. Phoenix Islands			
	Kiribati totals	Kiribati Phoenix Is. all sites	McKean	all sites	Birnie	Orona	Kanton	Baker	Howland	
<i>Acanthas(rea echinata)</i>								1		1
<i>Acropora abrotanoides</i>	1				1		1			1
<i>Acropora acuminata</i>	1	1		1			1	1		1
<i>Acropora bushiensis</i>	1	1								
<i>Acropora cerealis</i>	1		1		1			1	1	1
<i>Acropora clathrata</i>	1	1						1	1	1
<i>Acropora cytherea</i>	1	1		1		1		1		1
<i>Acropora digitifera</i>	1	1						1	1	1
<i>Acropora divaricata</i>	1	1								
<i>Acropora echinata</i>	1						1			
<i>Acropora elseyi</i>								1		1
<i>Acropora florida</i>	1						1			
<i>Acropora grandis</i>	1				1					
<i>Acropora gemmitera</i>								1	1	1
<i>Acropora globiceps</i>	1			1				1	1	1
<i>Acropora hempelchi</i>	1	1								
<i>Acropora humilis</i>	1		1				1	1	1	1
<i>Acropora hyacinthus (surculosa)</i>	1	1	1	1		1	1	1	1	1
<i>Acropora intermedia</i>	1			1						
<i>Acropora irregularis</i>	1			1						
<i>Acropora latistella</i>								1	1	1
<i>Acropora longicyathus (syningodes)</i>	1						1			
<i>Acropora lovelli</i>	1	1								
<i>Acropora lutkeni</i>	1	1		1				1	1	1
<i>Acropora loripes (rosaria)</i>	1			1			1			
<i>Acropora microclados</i>	1				1					
<i>Acropora microphthalma</i>	1			1						
<i>Acropora muncata (formosa)</i>	1			1	1		1	1	1	1

<i>Acropora nana</i>	1			1			1		1
<i>Acropora nasuta</i>	1	1					1	1	1
<i>Acropora nobilis</i>	1						1		
<i>Acropora paniculata</i>	1				1	1			
<i>Acropora polystoma</i>							1	1	1
<i>Acropora retusa</i>	1			1					
<i>Acropora robusta</i> (<i>canigera</i>)	1	1		1			1	1	1
<i>Acropora samoensis</i>	1			1					
<i>Acropora secale</i> (<i>diversa</i>)	1			1			1	1	1
<i>Acropora selago</i> (<i>delicatula</i>)							1		1
<i>Acropora subulata</i>	1			1			1	1	1
<i>Acropora valida</i>	1	1	1	1			1	1	1
<i>Acropora vaughani</i>							1	1	1
<i>Acropora verweyi</i>	1					1	1	1	1
<i>Acropora</i> sp.	1	1							
<i>Acropora</i> sp. 1	1			1	1				
<i>Acropora</i> sp. 2	1			1					
<i>Acropora</i> sp. A	1					1			
<i>Acropora</i> sp. B	1					1			
<i>Acropora</i> sp. C	1					1			
<i>Acropora</i> sp. [slanted cones]	1					1			
<i>Acropora</i> sp. [unid endemic Phoenix Is.]	1				1	1			
<i>Anecropora forbesi</i>									
<i>Aiptasia</i> sp. *							1		1
<i>Astreopora</i> <i>myriophthalma</i>	1	1					1		1
<i>Barbatia amicornum</i>	1	1		1					
<i>Cirrhopathes</i> <i>spiralis</i> ****	1					1		1	1
<i>Cladialta</i> sp. **	1					1			
<i>Cladopsammia</i> <i>eguchii</i>							1		1
<i>Coscinaraea columna</i>	1	1		1	1		1	1	1
<i>Coscinaraea</i> sp.							1	1	1
<i>Coscinaraea wellsi</i>	1						1		
<i>Cryptodendrum</i> <i>adhaesivum</i>	1				1				
<i>Gulicta rubeola</i>	1						1		
<i>Cycloseris costulata</i>	1			1					
<i>Cycloseris</i> <i>patelliformis</i>	1						1	1	1
<i>Cycloseris vaughani</i>								1	1
<i>Cyphastrea</i> <i>chacidicum</i>	1	1		1	1	1	1		
<i>Cyphastrea</i> <i>microphthalma</i>	1		1	1	1	1	1		
<i>Cyphastrea serailia</i>	1				1	1	1	1	1

<i>Cyphastrea</i> sp.									1		1
<i>Diploastrea heliopora</i>									1		1
<i>Distichopora violacea</i>	1					1	1				
<i>Echinophyllia aspera</i> (<i>taylorae</i>)	1	1		1	1			1			
<i>Echinopora</i> <i>hirsutissima</i>	1	1						1			
<i>Echinopora</i> <i>gemmacea</i>	1	1		1	1						
<i>Echinopora lamellosa</i>	1		1	1	1	1	1	1	1	1	1
<i>Echinopora pacificus</i>	1			1	1	1	1	1			
<i>Entacmaea</i> <i>quadricolor</i> *									1		1
<i>Favia fava</i>	1	1								1	1
<i>Favia matthaii</i>	1			1	1			1	1	1	1
<i>Favia pallida</i>	1	1		1				1		1	1
<i>Favia rotumana</i>	1	1						1		1	1
<i>Favia speciosa</i> (<i>lizardensis</i>)	1	1		1	1	1	1	1	1		1
<i>Favia stelligera</i>	1	1	1	1	1	1	1	1	1	1	1
<i>Favia</i> sp.	1			1				1			
<i>Favia</i> sp. 1	1	1									
<i>Favites abdita</i>	1	1	1	1	1			1			
<i>Favites chinensis</i>	1				1			1			
<i>Favites complanata</i>									1	1	1
<i>Favites flexuosa</i>	1						1	1		1	1
<i>Favites haicora</i>	1	1					1				
<i>Favites pentagona</i>	1	1	1	1			1	1	1	1	1
<i>Favites russelli</i>	1	1					1	1		1	1
<i>Favites</i> sp. 1	1	1									
<i>Favites</i> sp.	1							1		1	1
<i>Fungia concinna</i>	1		1	1	1	1	1	1			
<i>Fungia corona</i>	1			1				1			
<i>Fungia danai</i> (<i>valida</i>)	1	1		1	1	1			1		1
<i>Fungia fungites</i>	1	1		1				1			
<i>Fungia granulosa</i>	1			1					1	1	1
<i>Fungia horrida</i>	1				1	1	1	1			
<i>Fungia moluccensis</i>	1			1				1			
<i>Fungia paumotensis</i>	1			1			1	1			
<i>Fungia repanda</i>	1	1		1	1	1	1	1	1	1	1
<i>Fungia scularia</i>	1	1	1	1	1	1	1	1	1	1	1
<i>Fungia</i> sp.	1	1		1							
<i>Gardineroseris</i> <i>planulata</i>	1	1						1	1	1	1
<i>Goniastrea edwardsi</i>	1	1						1			
<i>Goniastrea favulus</i>	1							1			
<i>Goniastrea pectinata</i>	1			1			1	1			
<i>Goniastrea retiformis</i>		1								1	1
<i>Goniastrea</i> sp.	1							1		1	1
<i>Gymnangium</i> sp *****	1							1			
<i>Halomitra pileus</i>	1	1	1	1	1	1	1	1	1	1	1
<i>Herpolitha limax</i> (<i>weberi</i>)	1	1		1	1	1	1	1	1		1
<i>Heteractis magnifica</i> *									1		1
<i>Hydnophora exesa</i>	1						1	1			
<i>Hydnophora</i> <i>microcanos</i>	1	1	1	1	1	1	1	1			1
<i>Hydnophora rigida</i>	1	1	1	1			1	1		1	1
<i>Hydnophora</i> sp.	1						1	1			

hydroid unid.****	1						1			
<i>Isopora</i>										
<i>brueggemanni</i>								1		1
<i>Isopora</i>	1						1			
<i>palifera</i>										
<i>Leptastrea aequalis</i>	1			1						
<i>Leptastrea</i>										
<i>bewickensis</i>								1	1	1
<i>Leptastrea pruinosa</i>	1			1	1	1	1		1	1
<i>Leptastrea purpurea</i>	1	1	1	1	1	1	1	1	1	1
<i>Leptastrea</i> sp. [large										
irregular calices]	1						1			
<i>Leptastrea</i> sp. [small										
round calices]	1						1			
<i>Leptastrea transversa</i>	1	1	1	1	1	1	1		1	1
<i>Leptaria phrygia</i>										
(irregularis)	1	1					1			
<i>Leptoseris explanata</i>	1									
<i>Leptoseris foliosa</i>	1						1	1	1	
<i>Leptoseris</i>										
<i>hawaiiensis</i>	1	1								
<i>Leptoseris incrustans</i>	1	1								
<i>Leptoseris</i>										
<i>mycetoserioides</i>	1		1	1	1	1	1	1	1	1
<i>Leptoseris scabra</i>	1									
<i>Leptosens</i> sp. [dark,										
smooth surface]	1						1	1		
<i>Lithophyllon edwardsi</i>	1	1								
<i>Lobophyllia</i>										
<i>corymbosa</i>	1							1		1
<i>Lobophyllia hatai</i>	1						1			
<i>Lobophyllia hemprichi</i>	1	1	1	1	1	1	1			
<i>Lobophytum</i> sp.**	1						1		1	1
<i>Millepora dichotoma</i>	1							1		
<i>Millepora platyphylla</i>	1	1	1					1	1	1
<i>Millepora tenella</i>	1	1								
<i>Montastrea curta</i>	1	1						1	1	1
<i>Montastrea annuligera</i>	1	1					1	1	1	1
<i>Montastrea</i> sp.	1							1		
<i>Montastrea</i>										
<i>valenciennesii</i>	1	1					1			
<i>Montipora</i>										
<i>aequituberculata</i>	1	1	1	1	1	1	1	1	1	1
<i>Montipora caliculata</i>	1							1	1	1
<i>Montipora capitata</i>	1									
<i>Montipora danae</i>									1	1
<i>Montipora</i>										
<i>efflorescens</i>	1	1						1	1	1
<i>Montipora foliosa</i>									1	1
<i>Montipora loveolata</i>	1	1	1	1	1	1	1	1	1	1
<i>Montipora grisea</i>	1						1	1		
<i>Montipora hispida</i>	1							1	1	1
<i>Montipora hoffmeisteri</i>	1	1					1	1	1	1
<i>Montipora incrassata</i>	1	1								
<i>Montipora informis</i>	1		1	1				1	1	1
<i>Montipora lobulata</i>	1							1		
<i>Montipora millepora</i>	1						1	1	1	1
<i>Montipora</i>										
<i>monasteriata</i>	1	1					1			
<i>Montipora nodosa</i>	1	1								
<i>Montipora pelliformis</i>										
(non verrilli)	1		1				1	1	1	1
<i>Montipora</i> sp. (non										
cryptus)	1	1					1	1	1	1
<i>Montipora</i> sp. 1	1	1								

<i>Montipora</i> sp. [smooth]	1	1								
<i>Montipora spumosa</i>	1	1								
<i>Montipora tuberculosa</i>	1	1		1			1	1	1	1
<i>Montipora venosa</i>	1		1					1		1
<i>Montipora verrucosa</i>	1			1			1			
<i>Oxypora lacera</i>	1	1		1	1					
<i>Pachyseris speciosa</i>	1	1		1	1		1	1	1	1
<i>Palythoa tuberculosa</i> *****	1					1		1	1	1
<i>Pavona cactus</i>	1	1	1	1			1			
<i>Pavona chiriquiensis</i>	1		1	1	1	1	1			
<i>Pavona clavus</i>	1	1	1		1	1	1	1	1	1
<i>Pavona decussata</i>	1	1		1			1			
<i>Pavona duerdeni</i>	1			1						
<i>Pavona explanulata (gigantea)</i>	1	1	1	1		1	1	1	1	1
<i>Pavona frondifera</i>	1			1						
<i>Pavona maldivensis</i>	1	1		1		1	1			
<i>Pavona minuta</i>	1	1	1	1	1			1	1	1
<i>Pavona</i> sp.	1						1			
<i>Pavona varians</i>	1	1	1	1	1	1	1	1	1	1
<i>Pavona venosa</i>	1			1			1			
<i>Platygyra daedalea</i>	1	1	1	1	1	1	1	1		1
<i>Platygyra lamellina</i>	1		1				1			
<i>Platygyra pini</i>	1			1	1					
<i>Platygyra ryukyuensis</i>	1			1	1		1			
<i>Platygyra sinensis</i>	1	1			1	1	1	1		1
<i>Platygyra</i> sp.	1						1			
<i>Pterogyra sinuosa</i>	1	1		1			1			
<i>Plesiastrea versipora</i>	1	1	1							
<i>Pocillopora brevicornis</i>	1						1			
<i>Pocillopora damicornis</i>	1	1	1	1		1	1			
<i>Pocillopora eydouxi</i>	1	1	1	1		1	1	1	1	1
<i>Pocillopora ligulata</i>	1			1	1	1	1			
<i>Pocillopora meandrina (elegans)</i>	1	1	1	1	1	1	1	1	1	1
<i>Pocillopora molokensis</i>	1						1			
<i>Pocillopora paucistellata</i>	1						1			
<i>Pocillopora verrucosa (ankelii)</i>	1	1	1	1		1	1	1	1	1
<i>Pocillopora zellii</i>	1			1	1	1	1			
<i>Pocillopora</i> sp. 2 (non lungiformis)	1			1						
<i>Podabacia crustacea</i>	1	1		1			1		1	1
<i>Porites annae</i>	1	1					1	1	1	1
<i>Porites australiensis (deformis)</i>	1			1	1	1	1		1	1
<i>Porites</i> sp. [lingercoral]	1	1								
<i>Porites lichen</i>	1		1	1			1		1	1
<i>Porites lobata</i>	1		1	1	1	1	1	1	1	1
<i>Porites lutea</i>	1	1	1	1		1	1	1	1	1
<i>Porites murrayensis</i>	1				1	1	1			
<i>Porites nigrescens (profundus)</i>	1			1						
<i>Porites rus</i>	1		1	1					1	1
<i>Porites solida (armaudi)</i>	1	1	1	1		1	1	1	1	1
<i>Porites</i> sp. 1	1	1								

<i>Porites</i> sp. 2	1	1										
<i>Porites</i> sp. 3	1	1										
<i>Porites superflua</i>	1		1					1		1		1
<i>Porites vaughani</i>	1			1	1	1		1		1		1
<i>Psammocora contigua</i>	1	1			1	1		1				
<i>Psammocora digitata</i>	1			1								
<i>Psammocora</i> <i>halmeana</i>	1	1		1					1	1		1
<i>Psammocora</i> <i>nierstraszi</i>	1		1	1	1	1		1	1	1		1
<i>Psammocora</i> <i>profundacella</i>	1			1				1	1	1		1
<i>Psammocora stellata</i>	1			1				1		1		1
<i>Psammocora</i> <i>superficialis</i>	1			1					1			1
<i>Rhizopsammia verrilli</i>									1			1
<i>Rhodactis howesii</i> ***	1							1	1	1		1
<i>Sandacolitha robusta</i> <i>(dentata)</i>	1	1	1	1	1	1		1				1
<i>Sarcophyton</i> sp.**	1				1	1						
<i>Sinularia</i> sp.**	1					1						
<i>Stichodactyla</i> <i>haddonii</i> *	1				1			1				
<i>Stylaster elegans</i>	1					1		1				
<i>Stylocoeniella</i> <i>guentheri</i>	1			1								
<i>Symphylia recta</i>									1	1		1
<i>Tubastraea coccinea</i>	1	1						1	1			1
<i>Tubastraea micrantha</i> <i>(ciphans)</i>	1	1		1				1		1		1
<i>Tubastraea</i> sp.	1			1								
<i>Turbinaria frondens</i>	1							1				
<i>Turbinaria irregularis</i>	1							1				
<i>Turbinaria</i> <i>mesenterina</i>	1	1										
<i>Turbinaria reniformis</i>	1	1		1					1			1
<i>Turbinaria</i> sp.	1							1				
<i>Turbinaria stellulata</i>	1			1								
	223	100	45	116	64	80	134	90	90		118	
	Kiribati										U.S.	
	total										total	

7b. Algae

Algae: List of species for the Phoenix Islands (source: South et al 2001)

Species	Abarirings (Kaaitoa)	Enderbury	Maura (Sydney)	McKean	Nikumaroro (Gardner)	Orona (Hull)	Rawaki (Phoenix)
<i>Blechnanthus longicauda</i>							X
<i>Lycopodium complanatum</i>				X	x		
<i>Lycopodium obscurum</i>				x	X		
<i>Lycopodium complanatum</i>		X	X				
<i>Lycopodium sp.</i>					x		
<i>Polypodium sp.</i>				X			
<i>N. Kermadecensis</i>	X			x			
<i>Cladonia acutata</i>		X					
<i>Cladonia filamentosus</i>			X	x			
<i>Cladonia acutata</i>			X				
<i>Asparagopsis taxiformis</i>			X				
<i>Pyrosoma-like cyanobacteria</i>		X					
<i>Hydrocoleum sp.</i>				X			
<i>Leptothamnium proliferum</i>		X					x
<i>Hypnea pinnata</i>	x			X			
<i>Cladophora imbricata</i>	x						X
<i>Agardhiella subquadrata</i>		X					
<i>Amathya setacea</i>				X			
<i>Amathya setacea-like elongata</i>							X
<i>Ceramium affine</i>		X					
<i>Ceramium fluviatile</i>				x		X	
<i>Ceramium sp. aff. C. murchisonii</i>						X	
<i>Ceramium-like filament</i>					x		
Species	Abarirings (Kaaitoa)	Enderbury	Maura (Sydney)	McKean	Nikumaroro (Gardner)	Orona (Hull)	Rawaki (Phoenix)
<i>Ceramium minutissimum</i>			X	x			
<i>Cylindrocapsa heteromorphus</i>		x					X
<i>Ptilothamnion setaceum</i>		x					
<i>Leptothamnium</i>			X				
<i>Heterosiphonia crispithorax</i>			x	X		X	
<i>Myrtilocapsa</i>							X
<i>Myrtilocapsa</i>						X	
<i>Cladophora imbricata</i>			X				X
<i>Cladophora imbricata</i>	X		X				
<i>Polysiphonia sp.</i>		x			X		
<i>Leptothamnium</i>	x			X		X	
<i>Dictyota trilobata</i>				X			
<i>Dictyota sp.</i>					X		
<i>Leptothamnium</i>	X						
<i>Lophosiphonia</i>						X	
<i>Lophosiphonia hookerioides</i>							X
Species	Abarirings (Kaaitoa)	Enderbury	Maura (Sydney)	McKean	Nikumaroro (Gardner)	Orona (Hull)	Rawaki (Phoenix)
<i>Cladophora-like</i>					X		
<i>Dictyosphaerium carolinense</i>	x	x			X		
<i>Dictyosphaerium variolatum</i>							X
<i>Valoniopsis</i>	X						
<i>Myrtilocapsa</i>				X			
<i>Myrtilocapsa pennata</i>				X			
<i>Myrtilocapsa pennata var. secunda</i>							
<i>Myrtilocapsa pennata var. thalassia</i>		X					X
<i>Myrtilocapsa pennata var. cyclopsium</i>	x					X	
<i>Myrtilocapsa pennata</i>	x			X		X	
<i>Myrtilocapsa pennata</i>				X			
<i>Halimeda bakanaia</i>					X		
<i>Halimeda opuntia</i>	X						
<i>Halimeda cuneata</i>			X		x		x
<i>Halimeda gracilis</i>			x			X	
<i>Halimeda murchisonii</i>					X		
<i>Halimeda opuntia</i>				X			
<i>Halimeda murchisonii</i>							X
Species	Abarirings (Kaaitoa)	Enderbury	Maura (Sydney)	McKean	Nikumaroro (Gardner)	Orona (Hull)	Rawaki (Phoenix)
<i>Halimeda-like filament</i>						X	
<i>Halimeda-like filament</i>					X		
<i>Halimeda-like filament</i>	X						
<i>Rhaphidolepis pinnata</i>				X			
<i>Rhaphidolepis</i>				x		X	X
<i>Rhaphidolepis</i>					x	X	x
<i>Neomeris attenuata</i>				x		X	
<i>Acetabularia purpurata</i>				x			

7c. Bivalves

Bivalves: List of Bivalvia found on Abariringa (Kanton) and Enderbury (Source Bryan 1974)

Scientific name	Common name	Family	Island
BIVALVIA			
<i>Arca</i> sp. ^{1,2}	Ark shell	Arcidae	Abariringa (Canton)
<i>Pectunculus perna</i> ³	Purse shell	Isogonuridae	Abariringa (Canton)
<i>Pinctada margaritifera</i> ³	Pearl oyster	Pteridae	Abariringa (Canton)
<i>Abdufdufus aureolatus</i>	Mussel	Mytilidae	Abariringa (Canton) ³
<i>Peruglyphis reticulata</i> ³	Venus shell	Veneridae	Abariringa (Canton), Enderbury
<i>Asaphus deflorata</i> ³	Rayed cockle	Asaphidae	Abariringa (Canton)
GASTROPODA ³			
<i>Trochus nitidus</i>	Top shell	Trochidae	Abariringa (Canton), Enderbury
<i>Turbo argyrostomus</i>	Turban shell	Turbinidae	Enderbury
<i>Turbo annerosus</i> ³	Turban shell	Turbinidae	Abariringa (Canton)
<i>Astrafium confusiosum</i>	Turban shell	Turbinidae	Enderbury
<i>Nerita plicata</i> ³	Sea snail	Neritidae	Abariringa (Canton), Enderbury
<i>Littorina succinea</i> ³	Periwinkle	Littorinidae	Abariringa (Canton), Enderbury
<i>Plaxatus subrotus</i> ³	Grooved shell	Plaxidae	Abariringa (Canton)
<i>Cerithium breve</i> ³	Horn shell	Cerithiidae	Abariringa (Canton)
<i>Cerithium echinatum</i> ³	Horn shell	Cerithiidae	Abariringa (Canton)
<i>Cerithium tuberosum</i> ³	Horn shell	Cerithiidae	Abariringa (Canton)
<i>Cypraea moneta</i> ³	Money cowry	Cypraeidae	Abariringa (Canton)
<i>Cypraea depressa</i>	Cowry	Cypraeidae	Enderbury
<i>Cypraea pinnata</i>	Cowry	Cypraeidae	Enderbury
<i>Cypraea canaliculata</i> ³	Cowry	Cypraeidae	Abariringa (Canton), Enderbury
<i>Cypraea isabella</i>	Cowry	Cypraeidae	Enderbury
<i>Cypraea intermedia</i> ³	Cowry	Cypraeidae	Abariringa (Canton)
<i>Cypraea mariae</i> ³	Cowry	Cypraeidae	Abariringa (Canton)
<i>Cymatium mabarratum</i> ³	Enion shell	Cymatidae	Abariringa (Canton)
<i>Machidivona pusillus</i> ³	Dye shell	Thaididae	Abariringa (Canton)
<i>Dryas ruvims</i> ³	Dye shell	Thaididae	Abariringa (Canton), Enderbury
<i>Dryas morum</i>	Dye shell	Thaididae	Enderbury
<i>Morula granulata</i> ³	Dye shell	Thaididae	Abariringa (Canton)
<i>Morula rufa</i>	Dye shell	Thaididae	Enderbury
<i>Morula nodus</i> ³	Dye shell	Thaididae	Abariringa (Canton)
<i>Paupia hippocanthum</i> ³			
<i>Chicorella madrypororum</i>		Corallicophilidae	Enderbury
<i>Lygia lineata</i> ³	Whelk	Buccinulidae	Abariringa (Canton)
<i>Lygia meridiana</i> ³	Whelk	Buccinulidae	Abariringa (Canton)
<i>Littorina prismatica</i> ³	Spindle shell	Fasciolaridae	Abariringa (Canton)
<i>Mitra bicolorata</i>	Miter shell	Mitridae	Abariringa (Canton)
<i>Vasum cerasinum</i> ³	Vase shell	Vasidae	Abariringa (Canton)
<i>Vasum ornatum</i>	Vase shell	Vasidae	Enderbury
<i>Conus sporadicus</i> ³	Cone shell	Conidae	Abariringa (Canton)
<i>Conus reboursi</i> ³	Cone shell	Conidae	Abariringa (Canton), Enderbury
<i>Conus lividus</i> ³	Cone shell	Conidae	Abariringa (Canton)
<i>Conus catus</i>	Cone shell	Conidae	Enderbury
PULMONATES			
<i>Alchamptus</i> sp. ³	Ear snail	Ellobiidae	Abariringa (Canton)

³Note:

1. Also identified in Bryan (1955).
2. Bryan (1955) also listed *Mitra bicolorata* and *Mitra cerasinifera*, Mitridae, the mita shell as a gastropod found on Abariringa (Canton).
3. Bryan (1974) listed *Dryas ruvims*.

7d. Arthropods

Degener and Gillaspy (1955) reported the following arthropods from Abariringa (Canton):

- 1) Limnoriidae isopod - *Limnoria multipunctata*
- 2) Palemonidae shrimp - *Anchistus miersi*
- 3) Stenopodidae shrimp - *Gonodactylus sp.*
- 4) Pontoniidae shrimp - *Conchodytes meleagrinae*
- 5) Coenobitidae land hermit crab - *Coenobita perlatus*
- 6) Paguidae hermit crab - *Calcinus elegans*, *Calcinus elegans* var., *Calcinus herbstii*, *Clibinarius corallinus*
- 7) Porcellanidae crab - *Pachycheles pisoides*
- 8) Inachidae - *Micippa patypes*
- 9) Portunidae crab - *Thalmita picta*
- 10) Xanthidae - *Actaea sp.*, *Carpilodes bellus*, *Chlorodopsis scabricula*, *Chlorodopsis areolata*, *Eriphia scabricula*, *Eriphia laevimana*, *Leptodius sanguinesus*, *Phymodius ungulatus*, *Polydectus cupulifer*
- 11) Grapsidae - *Geograpsus grayi*, *Metopograpsus messor*, *Pachygrapsus minutus*, *Percnon planissimum*
- 12) Ocypodidae - *Ocypode ceratophthalma*
- 13) Lepadidae - *Lepas anatifera*
- 14) Scalpellidae - *Lithotrya pacifica*

Banner and Banner (1964) reported the following species of Alpheid shrimps from Abariringa (Kanton) based on a 1954 collection of that island. Species noted included:

1) <i>Automate gardineri</i>	19) <i>Alpheus macrochirus</i>
2) <i>Athanas indicus</i>	20) <i>Alpheus obesomanus</i>
3) <i>Athanas routhionastes</i>	21) <i>Alpheus malleodigitus</i>
4) <i>Athanas djiboutensis</i>	22) <i>Alpheus ovaliceps</i>
5) <i>Athanas dorsalis</i>	23) <i>Alpheus bucephalus</i>
6) <i>Salmoneus sibogae</i>	24) <i>Alpheus bradypus</i>
7) <i>Alpheopsis equalis</i>	25) <i>Alpheus brevipes</i>
8) <i>Alpheopsis diabolus</i>	26) <i>Alpheus ehlersii</i>
9) <i>Synalpheus paraneomeris</i>	27) <i>Alpheus diadema</i>
10) <i>Synalpheus charon</i>	28) <i>Alpheus paracrinitus</i>
11) <i>Synalpheus streptodactylus</i>	29) <i>Alpheus gracilipes</i>
12) <i>Synalpheus tumidomanus</i>	30) <i>Alpheus leviusculus</i>
13) <i>Synalpheus coutierei</i>	31) <i>Alpheus crassimanus</i>
14) <i>Synalpheus heroni</i>	32) <i>Alpheus pacificus</i>
15) <i>Alpheus collumianus inermis</i>	33) <i>Alpheus strenuus</i>
16) <i>Alpheus lottini</i>	34) <i>Alpheus funatutensis</i>
17) <i>Alpheus gracilis</i>	35) <i>Alpheus parvirostris</i>
18) <i>Alpheus clippertoni</i>	36) <i>Thunor microscaphis</i>

7e. Plants

Plants: List of species recorded on six of the Phoenix Islands during previous surveys (Garnet 1983) and in April-May 2006 (Pierce et al). Note: numbers denote number of individuals of rarely recorded species for that island. "Not seen" denotes specifically searched for but not found. * Denotes presumably reestablished.

Family	Species	Rawaki	Enderbury	Birnie	McKean	Orona	Nikunibro
Pandanaceae	<i>Pandanus tectorius</i> , te kaina					✓	✓
Rupraceae	<i>Ruppia maritime</i>		Not seen				
Graminae	<i>Cenchrus echinatus</i>		Not seen			✓	Not seen
	<i>Chloris infata</i>					Not seen	
	<i>Digitaria pacifica</i>		Not seen		Not seen	Not seen	Not seen
	<i>Digitaria cespitosa</i>						Not seen
	<i>Digitaria ciliata</i>					Not seen	
	<i>Eleusine indica</i>					✓	Not seen
	<i>Eragrostis amabilis</i> (E. tenella)					✓	Not seen
	<i>Eragrostis whitneyi</i>		Not seen			Not seen	
	<i>Lepturus pilgerianus</i>	✓	✓			✓	
	<i>Lepturus repens</i>		✓		✓	✓	Not seen
Cyperaceae	<i>Cyperus javanicus</i>					✓	✓
	<i>Fimbristylis cynosu</i>		Not seen			✓	✓
Palmae	<i>Cocos nucifera</i> , ni		✓(14)			✓	✓
Araceae	<i>Cyrtosperma chamissoana</i>						Not seen
Amaryllidaceae	<i>Cinnam asiaticum</i>					Not seen	✓
Moraceae	<i>Artocarpus altilis</i>					✓	
Urticaceae	<i>Laportea ruderalis</i>	✓	✓			Not seen	✓
Polygonaceae	<i>Coccoloba uvifera</i>					Not seen	Not seen
Nyctaginaceae	<i>Boerhavia diffusa</i>	✓	✓	✓	✓	✓	Not seen
	<i>Boerhavia tetrandra</i>					✓	✓
	<i>Mirabilis jalapa</i>					Not seen	
	<i>Pisonia grandis</i>		✓(3)		✓	✓	✓
Alnoaceae	<i>Sesuvium portulacastrum</i>	✓	✓	✓	✓	✓	✓
Portulacaceae	<i>Portulaca aff. lutea</i>	✓		✓	✓	✓	✓
	<i>Portulaca oleracea</i>		Not seen			✓	Not seen
	<i>Portulaca australis</i> (samoensis)		Not seen				
Lauraceae	<i>Coccoloba filiformis</i>		✓				
Zygophyllaceae	<i>Tribulus castoides</i>		✓		✓	Not seen	Not seen
Surianaceae	<i>Suriana maritima</i>					✓	
Euphorbiaceae	<i>Euphorbia cyathophora</i>					Not seen	Not seen
	<i>Euphorbia pluvifera</i>					Not seen	Not seen
	<i>Chamaesyce hirta</i>		Not seen			✓	Not seen
	<i>Chamaesyce prostrata</i>					✓	
	<i>Pedicularis fitymaloides</i>						Not seen
	<i>Phyllanthus amarus</i>					Not seen	Not seen

Tiliaceae	<i>Triumfetta procumbens</i>	Now absent	✓			✓	Not seen
Malvaceae	<i>Sida foilar</i>	✓(2)	✓	✓	✓	✓	Not seen
	<i>Hibiscus bilaceus</i>					✓	
	<i>Hibiscus</i> s. sp.					Not seen	
	<i>Thecopsis populnea</i>		Not seen				
Guttiferaceae	<i>Calophyllum inophyllum</i>					✓	
Cannaceae	<i>Carica papaya</i>					✓	Not seen
Combretaceae	<i>Terminalia samoensis</i>						✓?
Cucurbitaceae	<i>Cucurbita pepo</i>					✓	
	<i>Cucumis melo</i>						
Lythraceae	<i>Pennisetum acidula</i>					✓	✓?
Convolvulaceae	<i>Ipomoea macrantha</i>		✓			✓	✓
	<i>Ipomoea brasiliensis</i> (or <i>I. pes-caprae</i> ?)					✓	
Boraginaceae	<i>Cordia subcordata</i> : to kava	✓(1)	✓	✓	✓(1)	✓	✓
	<i>Heliotropium procumbens</i>					Not seen	
	<i>Tournefortia argentea</i> : te ten		✓			✓	✓
Verbenaceae	<i>Clerodendrum inerme</i>					✓(2)	
	<i>Lantana camara</i>					Not seen	
	<i>Physalis angulata</i>					Not seen	
	<i>Pseudocentropus caruthersii</i>					Not seen	
Rubiaceae	<i>Goussardia speciosa</i>					✓	✓
	<i>Morinda citrifolia</i> : te fon					✓	✓
Goodeniaceae	<i>Scaevola sericea</i> : te mato		✓			✓	✓
Compositae	<i>Tindar procumbens</i>					Not seen	
	<i>Vernonia cinerea</i>					✓	
	<i>Premna serratifolia</i>					✓	
	<i>Ficus tinctoria</i>					✓?	
Combretaceae	<i>Conocarpus erectus</i>		✓(1, new addition)				

7f. Native and medicinal plants.

Native and medicinal plants found in PIPA (Source: PIPA Office)

<i>Scientific name</i>	<i>Common name</i>	<i>Kiribati name</i>
<i>Tournefortia argentea</i>	Beach helicopter	Ren
<i>Scaevola frutescens</i>	Salt bush	Mao
<i>Morinda citrifolia</i>		Noni
<i>Pisonia grandis</i>		Buka
<i>Cordia subcordata</i>	Sea trumpet	Kanawa
<i>Pemphis acidula</i>	Pemphis	te ngea
<i>Scaevola taccada</i>		te mao
<i>Sida fallax</i>		te kaura
<i>Cordia subcordata</i>		te ango
<i>Triumfetta procumbens</i>		te kiaou
<i>Finbristylis cymosa</i>		te uteute ni mwane
<i>Cocos nucifera</i>		te ni
<i>Pisonia grandis</i>		te buka
<i>Morinda citrifolia</i>		te non
<i>Suriana maritima</i>		
<i>Tribulus cistoides</i>		
<i>Sesuvium portulacastrum</i>		
<i>Lepturus repens</i>		te uteute
<i>Digitaria pacifica</i>	Crab grass	
<i>Eragrostis whinevi</i>		
<i>Boerhavia diffusa</i>	Boerhavia creeper	
<i>Sesuvium portulacastrum</i>	Sea purslane	
<i>Portulaca lutea</i>	Pig weed	te booi
<i>Cassipoupa filiformis</i>	Beach dooder	te ntanini
<i>Lepturus repens</i>	Wiry bunchgrass	uteute
<i>Messerschmidia argentea</i>	Tree helicopter	
<i>Portulaca oleraceae</i>	common purslane	
<i>Ipomoea pes-caprae</i>		
<i>Ipomoea grandiflora</i>		
<i>Ipomoea alba</i>	white moonflower	
<i>Eragrostis whiney</i>	native lovegrass	
<i>Ipomoea brasiliensis</i>	beach morning glory	
<i>Portulaca lutea</i>	yellow portulaca	
<i>Boerhavia tetrandra</i>	Broad-leaved purslane	te wao
<i>Guettarda speciosa</i>	Guettarda	te uri
<i>Pandanus sp.</i>	Screw pine	te kaina

7g. Reef Fish

Reef Fish: List of the reef fish species of the Phoenix Islands

(Source: Gerald Allen and Steve Bailey 2002)

This list includes all species of coral reef fishes known from the Phoenix Islands at 10 July 2002. The list is based on the following sources: 1) collections reported by Schultz (1943); 2) fishes collected, photographed, or observed during the Primal Oceans 2000 Expedition.; 3) observations and collections made during the current Expedition., and 4) a few species reported in recent literature such as the review of *Ctenochaetus* by Randall and Clements (2001). The family classification follows that of Eschmeyer (1998) except for the placement of Cirrhitidae. Genera and species are arranged alphabetically within each family.

Terms relating to relative abundance are as follows: *Abundant* - Common at most sites in a variety of habitats with up to several hundred individuals being routinely observed on each dive. *Common* - seen at the majority of sites in numbers that are relatively high in relation to other members of a particular family, especially if a large family is involved. *Moderately common* - not necessarily seen on most dives, but may be relatively common when the correct habitat conditions are encountered. *Occasional* - infrequently sighted and usually in small numbers, but may be relatively common in a very limited habitat. *Rare* - less than 10, often only one or two individuals seen on all dives. Species that lack abundance and site record information were not recorded during the 2002 survey. An asterisk (*) after the species citation indicates that it was photographed by G. Allen during the 2002 survey. Site records correspond to site numbers of the New England Aquarium studies in 2002.

SPECIES	SOURCE	ABUNDANCE	SITE RECORDS
GINGLYMOSTOMATIDAE			
<i>Nelusetta ferruginea</i> (Lesson, 1830)	New record	Rare, only one seen.	46
CARCHARHINIDAE			
<i>Carcharhinus adiminimus</i> (Rüppell, 1832)	New record	Rare.	One seen by Paul Nickol at Eastway Island
<i>C. amblyrhynchus</i> (Bleeker, 1856)*	2000 Expedition.	Locally common.	1, 8, 34, 37, 39, 21, 23, 31, 33, 43, 62, 63, 64, 67, 69, 76
<i>C. melanostris</i> (Quoy and Gaimard, 1824)*	Schultz, 1943; 2000 Expedition.	Locally common.	1, 5, 7, 8, 10, 11, 15, 17, 19, 21, 27, 31, 38, 41, 45, 46, 63, 65
<i>Triacodon triserius</i> (Rüppell, 1831)*	Schultz, 1943; 2000 Expedition.	Locally common.	1, 2, 14, 17, 21, 23, 25, 19, 48, 42, 49, 50, 62, 68
DASYATIDAE			
<i>Taeniota aenei</i> Muller & Heale, 1841	New record.	Rare, only one seen.	21
MYLIOBATIDAE			
<i>Aetobatus narinari</i> (Forsk., 1790)	New record.	Rare, only one seen.	30*
MOBULIDAE			
<i>Musa persians</i> (Walbaum, 1792)*	2000 Expedition	About 10 sighted.	4, 24, 34, 47, 50, 57, 68
MORINGUIDAE			
<i>Moringua ferruginea</i> (Blain, 1883)	2000 Expedition.	Collected with rotenone.	37, 25, 46, 64, 76, 81
<i>M. macrarchis</i> Bleeker, 1853	Schultz, 1943.	Collected with rotenone.	41
<i>M. maculata</i> Bleeker, 1853	Schultz, 1943.		
CILLOPSIDAE			
<i>Kaupichthys aurimaculata</i> Schultz, 1953	New record.	Collected with rotenone.	44
<i>K. diodonata</i> (Schultz, 1953)	New record.	Collected with rotenone.	31, 42, 43, 64, 76
MURAENIDAE			
<i>Alopiurus leucurus</i> (Snyder, 1904)	Schultz, 1943.		
<i>A. zurocherensis</i> (Smith, 1962)	New record.	Collected with rotenone.	27, 31, 46, 64, 76
<i>Echidna leucostriata</i> Schultz, 1943	Schultz, 1943. Paludary G. is type locality.		
<i>E. nebulosa</i> (Thunberg, 1789)	Schultz, 1943.	Collected with rotenone.	49, 29
<i>Echeluscaia bayeri</i> Schultz, 1953	New record.	Collected with rotenone.	36

<i>P. pardalis</i> (Schlegel, 1846)	Schultz, 1943		
<i>P. schwanerhynchus</i> (Bleeker, 1853)	Schultz, 1943	Collected with rotenone.	79
<i>Gymnocheilus ainihi</i> Pietschmann, 1835	New record.	Collected with rotenone.	30
<i>G. buroensis</i> (Bleeker, 1857)	Schultz, 1943	Collected with rotenone.	61, 64
<i>G. chilospilus</i> (Bleeker, 1865)	2000 Expedition.		
<i>G. fimbriatus</i> (Bennett, 1831)	Schultz, 1943		
<i>G. flavomarginatus</i> (Ruppell, 1828)*	Schultz, 1943, 2000 Expedition	Occasional.	6, 29, 31, 33, 42, 46, 50, 62, 69
<i>G. gracilicaudus</i> (Jenkins, 1905)	Schultz, 1943		
<i>G. javanicus</i> (Bleeker, 1865)*	Schultz, 1943, 2000 Expedition	Occasional.	17, 30-32, 42, 50, 72, 80
<i>G. margariophorus</i> Bleeker, 1864	Schultz, 1943		
<i>G. melatremus</i> Schultz, 1953	New record.	Collected with rotenone.	34
<i>G. melanotis</i> (Shaw & Nodder, 1795)	2000 Expedition.	Rare, only 3 seen.	7, 8, 21
<i>G. monostigmus</i> (Regan, 1909)	Schultz, 1943		
<i>G. pictus</i> (Ahl, 1789)	Schultz, 1943	Locally common	15, 42, 51
<i>G. pseudothyrsoideus</i> (Bleeker, 1852)	Schultz, 1943		
<i>G. ruppelliae</i> (McClelland, 1845)	Schultz, 1943		17
<i>G. thyrsoideus</i> (Richardson, 1844)	Schultz, 1943		
<i>G. undulatus</i> (Lacepède, 1803)	New record.	Collected with rotenone.	79
<i>G. unipunctus</i> Seale, 1906	Schultz, 1943	Collected with rotenone.	79
<i>Uropterygius cantonensis</i> Schultz, 1943	Schultz, 1943		
<i>U. concolor</i> Ruppell, 1837	New record.	Collected with rotenone.	64
<i>U. fasciatus</i> (Regan, 1909)*	New record.	Collected with rotenone.	34, 64, 79
<i>U. maculatus</i> (Lacepède, 1803)	Schultz, 1943		
<i>U. micropteris</i> (Bleeker, 1852)	Schultz, 1943		
<i>U. supraforatus</i> (Regan, 1909)	2000 Expedition.		
<i>U. xanthopterus</i> Bleeker, 1859	Schultz, 1943		
OPHICHTHIDAE			
<i>Callichelys maculatus</i> (Bleeker, 1853)	Schultz, 1943		
<i>C. melanotaenia</i> Bleeker, 1864	Schultz, 1943		
<i>Leuraeus semicinctus</i> (Lay and Bennett, 1839)	Schultz, 1943		
<i>Myriechthys luhys, macropterus</i> Bleeker, 1857	Schultz, 1943		
<i>M. schultzei</i> Bleeker, 1857	Schultz, 1943		
<i>Myriechthys volubrum</i> (Boddson, 1781)	Schultz, 1943		
<i>M. maculatus</i> (Cuvier, 1817)	Schultz, 1943	Collected with rotenone.	17
CONGRIDAE			
<i>Conger eimareus</i> Ruppell, 1828	2000 Expedition.		
<i>Heteroconger haasi</i> (Klausewitz & Fribl-Fibersfeldt, 1959)	New record.	Several seen on 3 occasions	24, 30, 52
CHANDIDAE			
<i>Chanos chanos</i> (Forsskål, 1775)	New record.	Occasional.	8, 19, 24, 25, 27, 36, 39, 41-43, 48, 50, 53, 71
CLUPEIDAE			
<i>Spratelloides delicatulus</i> (Bennett, 1832)	Schultz, 1943		
SYNODONTIDAE			
<i>Saurida gracilis</i> (Quoy & Gaimard, 1824)	2000 Expedition		
<i>Syndus jarulium</i> Russell and Cresay, 1979	2000 Expedition.		
<i>S. variegatus</i> (Lacepède, 1803)	Schultz, 1943; 2000 Expedition.		
OPHIIDIDAE			
<i>Brachia mitibarbatia</i> Temminck & Schlegel, 1846	2000 Expedition.	Collected with rotenone.	31, 64
RYTHIDIDAE			
<i>Dugesiella luhys</i> sp.	Schultz, 1943; 2000 Expedition.	Collected with rotenone.	17, 55, 64

ANTENNARIIDAE			
<i>A. unimaculata</i> Currier, 1837	2000 Expedition	Collected with rotenone	48
ATHERINIDAE			
<i>Atherinomorpha lucinosa</i> (Pomier, 1801)	New record	Common at one site in Canton lagoon.	25
<i>Hyporhamphus ovalis</i> (Herre, 1935)	Schultz, 1943		
MUGILIDAE			
<i>Neomugilus leuciscus</i> (Günther, 1871)	Schultz, 1943	Locally common in lagoons.	19, 11, 87
<i>C. reevesi</i> (Cuvier) (Pomier, 1801)	Schultz, 1943	Locally common in lagoons.	17, 38, 14, 78
<i>Leiostomus xanthurus</i> (Quoy and Gaimard, 1825)	Schultz, 1943	Locally common in lagoons.	11, 32, 34
BELONIDAE			
<i>Atherina lineata</i> (Valenciennes, 1846)	Schultz, 1943		
<i>Platypharodon platypharodon</i> (Bonnat, 1832)	Schultz, 1943	Occasional	
HEMIRAMPHIDAE			
<i>Hyporhamphus acutus</i> (Günther, 1871)*	Schultz, 1943		7, 8, 37, 34, 38, 48
ANOMALOPIDAE			
<i>Platypharodon palpebratus</i> (Boddart, 1781)	New record	Observed on one night dive.	30
HOLICENTRIDAE			
<i>Myripristis muriei</i> Bleeker, 1853*	Schultz, 1943; 2000 Expedition	Common	1, 3, 7, 23, 27, 31, 34, 38, 43, 46, 50, 58, 62, 71, 75, 80
<i>M. muriei</i> (Cuvier, 1829)	2000 Expedition	Occasional	18, 19, 21, 22, 33, 38, 40, 44, 46, 52, 67
<i>M. muriei</i> Jordan and Evermann, 1902*	2000 Expedition	Common	1, 8, 14, 15, 17, 23, 25, 27, 31, 34, 38, 43, 46, 50, 62, 69, 73, 78, 79, 82
<i>M. muriei</i> Randall, Allen & Roberson, 2003*	New record	Moderately common	28, 39, 42, 43, 50, 62, 64, 66, 68
<i>M. muriei</i> Valenciennes, 1831*	New record	Occasional	5, 23, 27, 31, 34, 38, 40, 42, 46, 50, 63, 66, 67
<i>M. muriei</i> Cuvier, 1829	New record	Locally common, but usually seen at night.	8, 28, 31, 40, 46, 79
<i>M. muriei</i> Bleeker, 1853	Schultz, 1943	Occasional	27, 30, 40, 42, 50, 71, 72
<i>M. muriei</i> Valenciennes, 1831	New record	Common below 25 m.	1, 3, 8, 9, 14, 15, 18, 19, 23, 25, 27, 31, 33, 34, 38, 43, 46, 50, 62, 67
<i>M. muriei</i> Froese, 1974*	Schultz, 1943 as <i>M. muriei</i>	Moderately common	4, 6, 18, 30, 31, 34, 62, 64, 66, 68
<i>Neomugilus argenteus</i> (Valenciennes, 1831)	Schultz, 1943		
<i>N. argenteus</i> (Valenciennes, 1831)	New record	Occasional	16, 17, 23, 25, 27, 29, 47, 48, 67, 71, 80
<i>N. argenteus</i> (Forsk.) (1775)	Schultz, 1943; 2000 Expedition	Common	1, 2, 7, 11, 23, 24, 25, 27, 30, 32, 34, 39, 40, 42, 43, 46, 50, 55, 65, 66, 68, 71
<i>Plecoglossus lineatus</i> (Valenciennes, 1831)	New record	One collected with rotenone	29
<i>Sargocentron caudimaculatum</i> (Rüppell, 1835)	2000 Expedition	Common	1, 2, 5, 9, 13, 17, 21, 24, 27, 31, 34, 38, 47, 48, 65, 67, 69
<i>S. caudimaculatum</i> (Lacepède, 1801)	New record		
<i>S. caudimaculatum</i> (Randall, 1908)	New record	Three specimens collected with rotenone	11, 69
<i>S. caudimaculatum</i> (Günther, 1859)	Schultz, 1943	Rarely seen, but nocturnal	48, 67
<i>S. caudimaculatum</i> (Cuvier, 1829)	Schultz, 1943	Collected with rotenone	37
<i>S. caudimaculatum</i> (Forsk.) (1775)*	Schultz, 1943; 2000 Expedition	Moderately common	1, 6, 7, 18, 19, 21, 24, 25, 31, 34, 38, 43, 46, 50, 54, 58, 68, 69, 74, 81
<i>S. caudimaculatum</i> (Cuvier, 1829)*	Schultz, 1943; 2000 Expedition	Common	1, 2, 6, 18, 19, 21, 24, 25, 31, 34, 38, 43, 46, 50, 54, 58, 68, 69, 74, 76, 79
<i>S. caudimaculatum</i> (Bleeker, 1853)	2000 Expedition	One collected with rotenone	37
<i>S. caudimaculatum</i> (Bleeker, 1853)	Schultz, 1943		
AULOSTOMIDAE			
<i>Aulostomus chinensis</i> (Linnaeus, 1766)	Schultz, 1943	Occasional	1, 2, 24, 39, 45, 54, 71, 76
FISTULARIIDAE			
<i>Fistularia commersoni</i> (Rüppell, 1835)	Schultz, 1943	Occasional	1, 34, 35, 45, 46, 64, 69, 72, 74, 81
SYNGNATHIDAE			
<i>Chaetodon lineatus</i> (Günther, 1870)	Schultz, 1943		
<i>Chaetodon lineatus</i> (Rüppell, 1878)	New record	Collected with rotenone	44, 76

<i>Dorythamphus desjardinsii</i> (Bleeker, 1853)	New record.	Collected with rotenone.	34, 35
<i>D. excisus</i> Kouy 1856	New record.	Rare, only 2 seen	29-31
SCORPAENIDAE			
<i>Dendrothys borealis</i> (Fowler, 1938)	New record	One collected with rotenone	44
<i>Pterois antennata</i> (Bloch, 1787)	2000 Expedition.	Rare	1, 4, 20, 21
<i>P. radiata</i> Cuvier, 1829	Schultz, 1943	Rare	1, 20, 40, 52, 60, 70
<i>Scorpaenodes castaneus</i> (Quoy and Gaimard, 1824)	Schultz, 1943; 2000 Expedition.	Two collected with rotenone.	40, 79
<i>S. hispidus</i> (Smith, 1957)	2000 Expedition.	Several collected with rotenone.	11, 20, 44, 60, 64
<i>S. variegatus</i> Smith, 1957	New record	Collected with rotenone.	40, 70, 81
<i>Sebastes cyanostigma</i> (Bleeker, 1856)	2000 Expedition.	Common	5, 23, 25, 27, 27, 42, 50, 62, 65, 69, 71
<i>Tenisonius tetracanthus</i> Lacépède, 1802	Schultz, 1943; 2000 Expedition.		
CARACANTHIDAE			
<i>Caracanthus maculatus</i> (Gray, 1831)	Schultz, 1943, 2000 Expedition.	Common	1, 2, 3, 6, 14, 15, 21, 23, 25, 27, 36, 32, 38, 45-49, 60, 63-69, 71, 76, 80
<i>C. unipinnis</i> (Gray, 1831)	New record.	One collected with rotenone.	24
SERRANIDAE			
<i>Achoalimera rigata</i> (Forsk., 1775)	New record	Rare	6, 14, 46
<i>Ayeyerides leucogrammus</i> (Valenciennes, 1828)*	Schultz, 1943.	Common	1, 2, 4, 7, 7, 8, 15, 18-25, 27, 28, 29-33, 38-43, 49, 50, 61-65, 71, 80
<i>Aporops himantia</i> Schultz, 1943	Schultz, 1943, 2000 Expedition. Orange type locality	Collected with rotenone.	33
<i>Belaoperca chabramondi</i> Fowler & Bean, 1930	New record	Rare, only 3 seen	25-46
<i>Cephaloplectis argus</i> Bloch and Schneider, 1801*	Schultz, 1943; 2000 Expedition.	Common	1, 8, 14, 15, 18, 25, 27, 31-34, 38-43, 45, 50, 52, 63-69, 71, 72, 74, 78, 77, 80, 81
<i>C. leopoldus</i> (Lacépède, 1802)	Schultz, 1943; 2000 Expedition.	Common	1-4, 11, 13, 15, 18-25, 27, 29, 31-34, 38-43, 45, 50, 52, 61-64, 66-69, 72, 79, 80
<i>C. minuta</i> (Forsk., 1775)*	2000 Expedition.	Moderately common.	1-3, 5-8, 14, 15, 18-21, 25, 31-34, 38-43, 45, 51, 62-65, 68-69, 76, 80
<i>C. rotundirostris</i> (Rüppell, 1828)	New record.	Occasional.	8, 7, 42, 65, 67
<i>C. sinensis</i> (Valenciennes, 1828)*	New record.	Occasional	8, 7, 21, 76, 77, 82, 88
<i>C. spinipinna</i> (Valenciennes, 1828)	New record	Moderately common below 20 m.	4, 6, 10, 21, 23, 27, 31, 34, 38, 39, 41-43, 45, 52, 61, 67, 68, 71, 80
<i>C. uvulata</i> (Schneider, 1801)	Schultz, 1943; 2000 Expedition.	Common	1-4, 11, 13, 15, 17, 19, 21, 23, 27, 31, 33, 34, 38-43, 45, 51, 52, 61-65, 71, 76, 79, 80
<i>Epiplatys fasciatus</i> (Forsk., 1775)*	2000 Expedition.	Occasional	1, 3, 7, 18, 21, 69, 68, 71
<i>E. fuscus</i> (Forsk., 1775)*	New record	Moderately common.	1, 2, 5, 7, 24-27, 30, 34, 36, 39, 41, 51, 52, 54, 66-69, 71, 72, 75, 76, 77, 80
<i>E. longistatus</i> (Bloch & Schneider, 1901)*	Schultz, 1943.	Moderately common.	1, 2, 4, 7, 14, 15, 17, 18, 20, 21, 27, 31, 34, 38, 41, 46, 64, 71, 79
<i>E. longulus</i> (Günther, 1873)	New record.	Rare.	26, 76, 80
<i>E. lanceolatus</i> (Bloch, 1790)	New record.	Rare, only one seen	the larval of <i>Protonotus</i> Takahashi described by H. Bana
<i>E. macrops</i> (Bleeker, 1855)	New record.	Occasional.	21, 37, 42, 45, 46, 52
<i>E. melanostigma</i> Schultz, 1953	2000 Expedition.	Occasional.	5, 15, 41, 43, 65, 68, 71
<i>E. nana</i> Bloch, 1793	Schultz, 1943.	Common in lagoons.	10, 11, 24, 29, 36, 60, 69, 82, 83, 75, 77, 81
<i>E. polyphthalon</i> (Bleeker, 1849)*	New record.	Moderately common.	1, 2, 5, 21, 39, 41, 46, 51, 52, 54, 55, 64, 65, 66, 69, 76, 80
<i>E. variabilis</i> (Günther, 1873)*	Schultz, 1943.	Rare	74
<i>E. spilargenteus</i> Schultz, 1953*	New record	Occasional	1, 7, 7, 7, 8, 42, 43, 60, 69
<i>E. taeniatus</i> (Forsk., 1775)	New record	Rare	31, 33, 34, 39
<i>Gracila albomarginata</i> (Fowler & Bean, 1930)*	New record.	Common.	1-4, 6, 7, 14, 15, 18, 19, 22, 23, 25, 27, 31-34, 38-43, 46, 49, 62, 69, 71, 76, 80
<i>Gregorypis murrayi</i> Lubbock & Randall, 1978	New record	Collected with rotenone.	30
<i>G. senni</i> (Jordan & Seale, 1906)	New record	Collected with rotenone.	44
<i>Lutjanichthys whitei</i> (Smith, 1955)	Schultz, 1943.		8, 1, 14, 21, 18, 38, 45, 41, 46-53, 55, 67, 69
<i>Plectroplites nanus</i> Randall, 1980*	2000 Expedition.	Collected with rotenone.	22, 33, 34, 38, 44
<i>Plectropterus areolatus</i> Rüppell, 1830	Randall & Hoemius, 1991	Moderately common.	34, 25, 37-39, 50-53, 55, 64, 65, 69, 71, 76, 80
<i>Pseudoplites brevifrons</i> (Randall & Lubbock, 1961)*	2000 Expedition	Abundant	1-3, 5-8, 14, 15, 19, 21, 25, 27, 31-34, 38, 39, 41-43, 46, 50, 51-60, 71, 76, 80
<i>P. caudat</i> (Regan, 1902)*	New record	Rare, but moderately common at site 18.	18, 34, 38
<i>P. dispar</i> (Herr, 1955)	New record	Occasional.	1, 51, 23, 25, 27, 41, 52, 54

<i>P. line</i> (Lubbock & Randall, 1976)	New record	Rare, only one seen in 55 m.	38, 39, 41-43, 46, 52-54, 60
<i>P. olivaceus</i> Randall & McCosker, 1982*	New record	Occasional in 4-10 m on windward reefs.	7-5, 7, 8, 14, 15, 22, 29, 37, 41, 42, 46, 65, 66
<i>P. punctatus</i> (Jordan & Tanaka, 1927)*	New record	Moderately common, usually below 20 m	7, 8, 6, 11, 13, 19, 21-23, 25, 27, 32-34, 35, 41, 42, 46, 63, 65-69, 71, 76, 80
<i>P. unguiculatus</i> (Randall & Lubbock, 1981)*	New record	Abundant below 30 m	25, 32-34, 35, 36, 41, 46, 62-64, 71, 76, 80
<i>Pseudogramma polycanthum</i> (Bleeker, 1856)	2000 Expedition	Collected with rotenone	
<i>Sarissia lineata</i> Gothardt, 1960	2000 Expedition		
<i>Variola line</i> (Forsk.) (1775)	2000 Expedition	Occasional	4, 14, 22, 31, 37, 47, 54, 61
PSEUDOCROMIDAE			
<i>Pseudocromis ruffei</i> Schultz, 1953	2000 Expedition		
PLESIOPIDAE			
<i>Plesiosa curatilis</i> Bleeker, 1853	Schultz, 1943		
CIRRHITIDAE			
<i>Cirrhitichthys oxycetulus</i> (Bleeker, 1855)	2000 Expedition	Moderately common	1, 2, 7, 13, 17, 18, 20, 24, 27, 31, 32, 34, 35, 38, 41-43, 50, 55, 66, 71, 79, 80
<i>Cirrhitops leleup</i> (Schultz, 1943)*	Schultz, 1943, 2000 Expedition; Enderbury I. is-type locality	Rare	1, 4, 25, 41, 54, 61
<i>Cirrhitops punctatus</i> (Schneider, 1801)	Schultz, 1943	Occasional	7, 8, 31, 31, 47, 61, 76
<i>Neocirrhites armatus</i> Casablanca, 1873	Schultz, 1943; 2000 Expedition	Common	1, 1, 14, 15, 20, 23, 24, 27, 31, 34, 38, 41-43, 51, 62, 69, 71, 76, 80
<i>Paracirrhites armatus</i> (Cuvier, 1829)*	2000 Expedition	Common	1, 8, 14, 15, 17-25, 27, 31, 34, 38, 39, 41, 43, 51, 62-64, 71, 76, 79, 80
<i>P. jayaker</i> (Schneider, 1801)*	2000 Expedition	Common	1, 3, 5-8, 14, 15, 17-25, 27, 31-34, 36, 39, 40-43, 46-48, 50, 61, 65-69, 71, 76, 79, 80
<i>P. lemniscatus</i> (Günther, 1874)*	Schultz, 1943; 2000 Expedition	Moderately common	1, 8, 14, 15, 17-19, 21, 23, 25, 31, 34, 36, 40, 43, 46, 50, 62, 69, 71
<i>P. niger</i> Randall, 1963*	2000 Expedition	Occasional	1, 3, 5, 8, 15, 41, 52, 74, 76, 80-82, 85, 86
<i>P. samalis</i> Randall, 1963*	2000 Expedition	Moderately common	1, 1, 8, 14, 15, 18, 23, 25, 27, 31, 33, 38, 41-43, 51, 62-69, 71, 76
KOHLEIIDAE			
<i>Kuhlia pinn</i> Schultz, 1943*	Schultz, 1943, Orana I. is-type locality	Locally common at one site	54
<i>K. niger</i> (Forster, 1801)	Schultz, 1943 as <i>K. sandrichthys</i>	Rare, one seen	54
APOGONIDAE			
<i>Apogon nigricaudatus</i> (Smith and Radcliffe, 1911)	2000 Expedition	Occasional	18, 71, 74, 80, 85, 88
<i>A. crassiceps</i> (Garman, 1901)	New record	Collected with rotenone	17, 20, 40, 44, 61, 69
<i>A. dorsalis</i> (Jordan & Seale, 1906)	Schultz, 1943	One collected with rotenone	75
<i>A. erythrinus</i> Jordan and Starks, 1906	2000 Expedition	Occasional	20, 55, 72
<i>A. fuscatus</i> Valenciennes, 1812	Schultz, 1943		
<i>A. kallipectus</i> Bleeker, 1856	New record	Occasional	38, 41, 71, 76
<i>A. nasutus</i> (Cuvier, 1828)	Schultz, 1943		
<i>A. niger</i> Günther, 1871	Schultz, 1943, as <i>A. bandonensis</i> ; 2000 Expedition as <i>A. jayaker</i>	Occasional. More common at night.	41, 74, 61
<i>A. semistriatus</i> Peters, 1876	New record	One collected with rotenone	38
<i>A. taenipectus</i> (Bennett, 1833)	New record	Moderately common at night.	1
<i>Cercamia eremia</i> (Allen, 1987)	New record	Collected with rotenone	39, 53
<i>Chelodactylus macrodus</i> (Lacépède, 1802)	New record	Rare	
<i>C. quinquefasciatus</i> Cuvier, 1828	Schultz, 1943; 2000 Expedition	Moderately common in lagoons.	26, 36, 37, 52, 55, 67, 73, 74, 77
<i>Fowlera punctulata</i> (Rüppell, 1838)	Schultz, 1943 as <i>F. sanguinea</i>	Collected with rotenone	55
<i>Gomnapogon nigrifasciatus</i> Lachner, 1953	2000 Expedition		
<i>Pseudanipogon gracilicauda</i> (Lachner, 1953)	New record	Collected with rotenone	26
MALACANTHIDAE			
<i>Malacanthus brevicauda</i> (Günther, 1848)	2000 Expedition	Occasional	14, 18, 20, 21, 23, 36, 32, 47, 67
<i>M. latidorsus</i> (Lacépède, 1801)	New record	Rare	8, 62
ECHENEIDAE			
<i>Echeneis naucrates</i> Linnaeus, 1758	New record	Rare, only one seen	66
CARANGIDAE			
<i>Catargodes ferdus</i> (Forsk.) (1775)*	New record	Occasional	4, 7, 11, 22, 19, 46, 52, 64, 67
<i>C. orthogrammus</i> (Jordan & Gilbert, 1881)*	New record	Occasional	1, 4, 7, 15, 17, 26, 33, 34, 34, 50, 42, 54, 57

<i>Caranx ignobilis</i> (Forsk.) (1775)*	New record.	Occasional.	4, 6, 21, 24, 27, 31, 42, 43, 46, 51, 52, 54, 63, 67, 69
<i>C. lugubris</i> Poy, 1851*	2000 Expedition.	Common to locally abundant.	1, 4, 5, 8, 14, 15, 17, 19, 25, 27, 31, 34, 36, 43, 46, 100, 101, 102
<i>C. melampygus</i> Cuvier, 1833*	Schultz, 1943.	Common to locally abundant.	1, 8, 10, 11, 14, 15, 17, 24, 27, 31, 34, 36, 43, 46, 51, 52, 54, 55, 63, 67, 71, 77, 79, 79, 79, 80
<i>C. sexfasciatus</i> Quoy and Gaimard, 1825*	2000 Expedition.	Locally common.	3, 4, 7, 8, 14, 15, 17, 24, 27, 31, 34, 36, 43, 46, 51, 52
<i>Elegans opanianus</i> (Quoy and Gaimard, 1825)	Schultz, 1943.	Locally common.	3, 4, 7, 24, 30, 33, 65, 66, 68, 79, 80
<i>Gastromodon speciosus</i> (Forsk.) (1775)	New record.	rare	Observed in Karim Shoals by C. McIlwain
<i>Scorpaenodes lysian</i> (Forsk.) (1775)*	New record.	Occasional.	1, 2, 3, 6, 27, 31, 34, 43, 54, 80
<i>Soler erismatophthalmus</i> (Bleeker, 1791)	New record.	Rarely seen, but locally common.	18, 31, 67
<i>Trachinotus haitianus</i> (Lacépède, 1802)*	Schultz, 1943.	Common at 2 sites.	20, 34
LUTJANIDAE			
<i>Aphareus furca</i> (Lacépède, 1801)*	New record.	Common.	1, 1, 4, 7, 14, 15, 16, 25, 27, 31, 34, 36, 43, 46, 51, 52, 65, 67, 71, 79, 80
<i>Aprion brevicaudus</i> Valenciennes, 1830	New record.	Moderately common, but always in low numbers.	1, 2, 8, 14, 17, 18, 21, 25, 32, 34, 36, 43, 46, 65, 66, 68, 77
<i>Lucania bairdii</i> (Forsk.) (1775)*	Schultz, 1943, 2000 Expedition.	Common.	1, 6, 17, 24, 27, 31, 34, 36, 43, 46, 51, 52, 54, 55, 63, 67, 71, 73, 74, 76, 77, 80
<i>L. fulva</i> (Schneider, 1801)*	Schultz, 1943; 2000 Expedition.	Common.	1, 2, 4, 6, 8, 10, 11, 15, 17, 24, 27, 31, 34, 36, 43, 46, 51, 52
<i>L. gibbus</i> (Forsk.) (1775)	Schultz, 1943.	Abundant.	1, 2, 6, 8, 21, 25, 27, 28, 29, 43, 46, 51, 52, 54, 66, 69, 71, 73, 74, 76, 77, 80
<i>L. aganina</i> (Forsk.) (1775)	2000 Expedition.	Moderately common.	14, 15, 17, 18, 19, 20, 25, 35, 34, 40, 43, 46, 67, 68, 67
<i>L. minor</i> (Cuvier, 1828)*	Schultz, 1943.	Moderately common.	1, 4, 14, 14, 15, 17, 25, 27, 30, 35, 35, 36, 43, 46, 50, 52, 54, 55, 62, 65, 74, 74, 76, 77, 80
<i>Micralar macularis</i> Fowler, 1931	2000 Expedition.	Occasional.	4, 6, 7
<i>M. niger</i> (Forsk.) (1775)	New record.	Occasional.	7, 30, 31, 35, 37, 40, 64, 66, 68, 70
<i>Parascia sashimus</i> (Bleeker, 1869)	New record.	Seen below 80 m with remote video.	
CAKIONIDAE			
<i>Caesia levis</i> Stead, 1906*	2000 Expedition.	Common.	1, 2, 3, 7, 8, 18, 20, 24, 27, 31, 34, 40, 41, 43, 46, 51, 54, 62, 64, 66, 67, 72
<i>Platycephalus tenuissimus</i> Carpenter, 1957*	New record.	Occasional, but locally common.	1, 3, 4, 14, 41, 46, 57, 65
<i>P. tatei</i> (Cuvier, 1830)*	New record.	Locally abundant.	1, 1, 6, 7, 8, 11, 23, 34, 38, 37, 54, 54, 42, 46, 65, 67
GERREIDAE			
<i>Gerres argenteus</i> (Forsk., 1801)	New record.	About 200 seen at one site.	37
LETHRINIDAE			
<i>Gnatholepis maculatus</i> (Lacépède, 1802)*	New record.	Moderately common.	1, 21, 21, 21, 27, 31, 34, 34, 34, 41, 42, 43, 46, 61, 67
<i>Lethrinus erythranthos</i> Valenciennes, 1830	New record.	Occasional.	3, 6, 17, 20, 31, 33, 38, 40, 43, 46, 51, 79, 80
<i>L. olivaceus</i> (Forsk.) (1775)	Schultz, 1943.	Occasional.	5, 7, 11, 24, 30, 36, 39, 42, 44, 46, 57, 61, 74
<i>L. olivaceus</i> Valenciennes, 1830*	New record.	Moderately common.	1, 2, 3, 7, 11, 15, 17, 24, 29, 34, 35, 36, 43, 44, 51, 54, 63, 65, 71, 72, 74, 76, 80
<i>L. squarrotus</i> Klunzinger, 1870	New record.	Moderately common.	3, 6, 8, 15, 24, 27, 35, 34, 41, 43, 40, 52, 61, 64, 68, 70, 80
<i>Mancosia grandoculis</i> (Forsk.) (1775)	New record.	Common.	1, 2, 3, 6, 7, 8, 15, 17, 27, 30, 35, 36, 43, 46, 51, 55, 62, 64, 66, 69, 71, 72, 74, 76, 77, 80
MULLIDAE			
<i>Mullusichthys flavolineatus</i> (Lacépède, 1802)	Schultz, 1943.	Occasional.	11, 14, 18, 20, 25, 32, 67
<i>M. mimus</i> Randall & Guezé, 1989*	New record.	Occasional.	24, 25, 31, 46, 67
<i>M. variegatus</i> (Valenciennes, 1831)*	Schultz, 1943.	Occasional.	1, 2, 1, 15, 18, 20, 23, 27, 42, 64, 67
<i>Paripomus kuersteni</i> (Lacépède, 1801)	2000 Expedition.	Occasional.	11, 15, 24, 26, 30, 31, 34, 36, 46, 52, 54, 60, 71, 72, 74, 77
<i>P. cyclopterus</i> (Lacépède, 1801)	New record.	Occasional.	14, 17, 24, 30, 64
<i>P. ovalifasciatus</i> (Quoy & Gaimard, 1825)	New record.	Common.	1, 8, 11, 15, 17, 27, 27, 30, 34, 36, 41, 43, 46, 50, 52, 54, 55, 62, 65, 71, 76, 80
<i>P. subtruncatus</i> Randall & Myers, 2002*	Schultz, 1943.	Common.	1, 8, 14, 15, 17, 26, 29, 30, 34, 36, 39, 41, 43, 46, 50, 54, 62, 65, 68, 69, 71, 76, 80
<i>Upeneia arge</i> (Jordan & Evermann, 1902)	Schultz, 1943 as <i>U. nemipterus</i> .		

PEMPHERIDAE			
<i>Pempheris aotiensis</i> Lesson 1830*	Schultz, 1943 as <i>P. aotiensis</i>	Moderately common.	0, 1, 14, 18-23, 27, 31, 40-43, 46, 52-63, 67-69
KYPHOSIDAE			
<i>K. cinerascens</i> (Forsskål, 1775)	New record.		0, 2, 4, 7, 8, 14, 15, 18, 19, 21, 23, 24, 27, 28, 31-34, 38, 39, 42, 43, 46, 53, 54, 62-63, 66-69, 71, 80
<i>K. vagiensis</i> (Quoy & Gaimard, 1825)*	New record.		20, 21, 27, 31, 42, 50, 54, 62, 63
CHAETODONTIDAE			
<i>Chaetodon aurogatus</i> Forsskål, 1775*	Schultz, 1943; 2000 Expedition.	Common.	1-5, 7, 8, 10, 11, 13, 17-19, 46, 50, 52, 54, 55, 63-69, 71, 72-74, 76, 77, 80
<i>C. heemtsi</i> Cuvier, 1831	Schultz, 1943; 2000 Expedition.	Common.	3, 7, 12, 15, 19, 22-25, 27, 30-34, 38, 39, 41-43, 46, 50, 52, 54, 62, 65-68, 72, 74, 76, 77, 80
<i>C. cirrhotus</i> Cuvier, 1831	Schultz, 1943.	Occasional.	21, 25, 32, 54, 58, 64
<i>C. declivus</i> Randall, 1975	New record.	Seen below 80 m with remote video.	
<i>C. ephippium</i> Cuvier, 1831	Schultz, 1943; 2000 Expedition.	Common.	1, 3, 5, 7, 8, 11, 14, 15, 17-20, 30, 35, 37, 38, 39, 40-43, 50, 52, 54, 55, 64, 67-69, 71, 72-74, 77, 80
<i>C. kleini</i> Bloch, 1790	2000 Expedition.	Moderately common.	15, 18, 19, 21, 23, 30, 34, 38, 50, 62, 63, 80
<i>C. lineolatus</i> Cuvier, 1831	New record.	Rare, less than 10.	31, 32, 39, 74
<i>C. lunula</i> Lacepède, 1803*	Schultz, 1943, 2000 Expedition.	Common.	1, 2, 5, 7, 8, 11, 14, 15, 17, 18, 20-25, 27, 30-34, 38, 39, 41-43, 46, 50, 54, 55, 62-69, 71, 72, 74, 76, 77, 80
<i>C. lunulatus</i> Quoy and Gaimard, 1824	2000 Expedition, as <i>C. trifasciatus</i>	Moderately common.	3, 7, 24, 25, 27, 30, 32-34, 38-43, 46, 55, 60, 71, 73, 74, 76, 77
<i>C. meyeri</i> Schneider, 1801	Schultz, 1943, 2000 Expedition.	Common.	1, 2, 6, 7, 14, 15, 18-25, 27, 30-31, 33-43, 46, 50, 62-69, 71, 76, 80
<i>C. ornatus</i> Cuvier, 1831*	Schultz, 1943, 2000 Expedition.	Common.	1-6, 14, 15, 17-23, 25, 29, 30-34, 38-43, 46, 50, 62-69, 76, 80
<i>C. peivensis</i> Kner, 1867	2000 Expedition.	Occasional.	3, 4, 6, 18, 19, 25, 34, 41, 64, 67, 69, 71, 76, 80
<i>C. punctifasciatus</i> Cuvier, 1831	Schultz, 1943, 2000 Expedition.		
<i>C. quadrifasciatus</i> Gray, 1831*	Schultz, 1943, 2000 Expedition.	Occasional.	1-5, 7, 8, 14, 15, 17-24, 32, 34, 38, 63-69, 71
<i>C. reticulatus</i> Cuvier, 1831*	2000 Expedition.	Occasional.	13, 15, 17-19, 22, 23, 25, 63, 67-69, 71, 76, 80
<i>C. semion</i> Bleeker, 1855	2000 Expedition.	Rare, less than 10.	2, 11, 68, 69, 74, 77
<i>C. trifasciatus</i> Quoy and Gaimard, 1824	Schultz, 1943, 2000 Expedition.	Generally scarce, but common at Kanton lagoon.	1, 2, 6, 7, 15, 23, 27, 30-35, 38-43, 46, 50, 52, 54, 55, 55
<i>C. ulienensis</i> Cuvier, 1831*	2000 Expedition.	Common.	1-8, 11, 15, 17-25, 27, 30-34, 38-40, 42-43, 46, 52, 54, 62, 60, 71, 75, 74, 77, 80
<i>C. umbraculatus</i> Bloch, 1787*	2000 Expedition.	Occasional.	3, 15, 19, 21, 23, 39, 41, 65-67
<i>C. vagabundus</i> Linnaeus, 1758	2000 Expedition.	Occasional.	1, 2, 7, 24, 27, 32, 31, 38, 42, 53, 54, 68
<i>Faenipiger flavissimus</i> Jordan and McGregor, 1898	2000 Expedition.	Common.	1-8, 14, 15, 17-25, 27, 30-33, 38-43, 46, 50, 53, 55, 61-69, 71, 80
<i>F. longirostris</i> (Brissonot, 1782)*	2000 Expedition.	Occasional.	1, 2, 8, 18, 80
<i>Heimtauchitiga thompsoni</i> Fowler, 1923*	New record.	Locally common on deep dropoffs.	4, 6, 8, 14, 18, 19, 21, 23, 32, 62, 68, 76
<i>Hemiodus acuminatus</i> (Linnaeus, 1758)*	2000 Expedition.	Moderately common.	24, 25, 27, 30-34, 38, 39, 41-43, 46, 50, 52, 54, 55
<i>H. chrysostris</i> Cuvier, 1831*	2000 Expedition.	Moderately common.	23, 25, 27, 31-34, 38, 41-43, 46, 50, 54, 62, 64, 67-69, 71, 76, 80
<i>H. nanoceros</i> Cuvier, 1831*	2000 Expedition.	Occasional.	1, 2, 5, 7, 15, 17, 23, 32, 34, 41-43, 67-69, 71, 80
<i>H. varius</i> (Cuvier, 1829)*	2000 Expedition.	Occasional.	1-3, 7, 23, 25, 31-34, 38, 39, 41-43, 46, 62, 68, 71, 80
POMACANTHIDAE			
<i>Apolectanthys griffis</i> Carlson & Taylor, 1981*	2000 Expedition.	Common.	1-8, 14, 15, 17-25, 27, 32, 34, 38, 41-43, 46, 62-69, 76, 80
<i>A. xenohoplacanthus</i> Burgess, 1974*	New record.	Occasional.	8, 15, 34, 77, 79, 84, 39, 42, 65
<i>Centropyge bicolor</i> (Bloch, 1795)	2000 Expedition.	Rare, only a few seen on one dive.	24
<i>C. bispinosa</i> (Günther, 1860)	2000 Expedition.		
<i>C. flavicauda</i> Fraser-Brunner, 1933	Schultz, 1943, 2000 Expedition.	Seen at only 2 sites, but locally common.	50, 62
<i>C. flavissima</i> (Cuvier, 1831)	2000 Expedition.	Abundant.	1-5, 7, 8, 14, 15, 17-27, 30-34, 38, 39, 41-43, 46, 50, 54, 63-69, 71, 73, 76, 80
<i>C. heraldi</i> Woods & Schultz, 1953	New record.	Occasional, usually below 70 m.	6, 18, 34, 62, 71, 80
<i>C. horrida</i> (Günther, 1874)*	2000 Expedition.	Abundant.	1-8, 14, 15, 17-25, 27, 31-34, 38, 39, 41-43, 46, 50, 60-69, 71, 76, 80
<i>C. multicolor</i> Randall & White, 1974	New record.	Rare, only 3 seen in 55 m.	68
<i>C. nigricollis</i> Schultz, 1953	2000 Expedition.		

<i>Paracentrotus aurifer</i> (Smith & Radcliffe, 1911)	2000 Expedition	Moderately common, usually below 20 m.	1, 2, 6, 7, 21, 25, 27, 31, 46-48, 49, 65, 66, 68-69, 71, 76, 80
<i>Pomacentrus imperator</i> (Bloch, 1787)*	2000 Expedition	Occasional	14, 15, 19, 21, 23, 29-32, 34, 44, 47, 48, 51, 67
<i>Physoglyphis dimidiatus</i> (Boddaert, 1772)*	2000 Expedition	Rare	A, 24, 29, 31, 44, 72
POMACENTRIDAE			
<i>Abudefduf nasutus</i> (Day, 1869)*	New record	Occasional	10, 18, 20, 36, 53
<i>A. septemfasciatus</i> (Cuvier, 1830)*	Schultz, 1943	Occasional in shallow surge zone	10, 52, 54
<i>A. seifasensis</i> Lacépède, 1802	Schultz, 1943		
<i>A. sandilis</i> (Forsk.) (Forsk.), 1775)*	Schultz, 1943	Occasional in shallow surge zone	14, 24, 42, 56, 68
<i>Abudefduf vaigiensis</i> (Quoy & Gaimard, 1825)*	New record	Occasional on windward slopes	3, 19, 26, 46, 67
<i>Amphiprion chrysopterus</i> Cuvier, 1830*	2000 Expedition	Common	1, 2, 3, 6, 14, 31, 34, 35, 37, 44, 38-41, 43, 45, 49, 52, 54-59, 75
<i>A. peridermium</i> Blocker, 1855*	2000 Expedition	Common only at Nikumaroro	1, 4, 7
<i>Chromis acanes</i> Randall & Swardloff, 1973	2000 Expedition	Abundant	14, 19, 24, 19, 29, 28, 27, 31, 34, 36, 38, 41-43, 45, 49, 62, 69, 71, 76, 79, 80
<i>C. aegleis</i> Smith, 1960	New record	Occasional	1, 2, 4, 6, 7, 14, 19, 21, 31, 36, 44, 65, 67, 69
<i>C. nigra</i> Randall, 1968*	New record	Moderately common below 30 m	4, 6, 7, 14, 18, 19, 21-23, 25, 27, 31, 34, 41, 43, 45, 46, 58, 60
<i>C. ampa</i> Fowler & Bean, 1928*	New record	Rare, about 5 seen	67
<i>C. caudata</i> Randall, 1987*	New record	Abundant below 15 m	1, 3, 6, 14, 21, 23, 25, 27, 31, 34, 38, 41, 43, 45, 46, 62, 65, 71, 76, 80
<i>C. lepidolepis</i> Bleeker, 1877	New record	Rare, only a few small groups seen	18, 24
<i>C. morganii</i> Fowler, 1946	2000 Expedition	Common above 15 m	14, 18, 19, 21, 23, 27, 31, 34, 36, 41, 43, 45, 46, 62, 65, 71, 76, 79, 80
<i>C. semistriata</i> (Bleeker, 1856)	New record	Rare, only a few small groups seen	24
<i>C. vanderhulsi</i> (Fowler, 1941)	2000 Expedition	Common	19, 24, 19, 29, 28, 27, 31, 34, 36, 38, 41-43, 45, 49, 54, 62, 69, 71, 76, 80
<i>C. viridis</i> (Cuvier, 1830)	Schultz, 1943	Common in Kanton lagoon	11, 14, 20, 24, 30, 34, 44, 45, 52, 75, 79
<i>C. viridi</i> Fowler & Bean, 1928*	New record	Rare, only one seen	38, 54
<i>C. umbrata</i> (Blocker, 1854)*	New record	Common	44, 46, 48, 49, 52, 57, 61, 64, 71, 43, 46, 58, 54, 62, 65, 71, 80
<i>Chrysiptera albata</i> Allen & Bailey, 2002*	New record	Common at one site in 47-55 m	85
<i>C. brownriggii</i> (Bennett, 1828)	Schultz, 1943, 2000 Expedition, as <i>C. leucostoma</i>		1, 2, 4, 6, 14, 15, 17, 18, 21, 22, 23, 24, 38, 41, 43, 44, 62-64, 67, 69, 71, 76, 80
<i>C. glauca</i> (Cuvier, 1830)	Schultz, 1943	Common in tide pools and shallow passages	40, 44, 72, 80
<i>Davidiella domus</i> (Linnaeus, 1758)*	Schultz, 1943	Common around lagoon corals	11, 14, 20, 30, 34, 44, 45, 52, 75, 79
<i>D. aurigata</i> Randall & Randall, 2001*	Randall & Randall, 2001	Common	1, 2, 4, 6, 13, 17, 21, 23, 34, 36, 39, 43, 45, 62, 69, 71
<i>Lepidoglyphis taprobanensis</i> (Bleeker, 1856)	Schultz, 1943, 2000 Expedition	Abundant	1, 3, 6, 14, 15, 17, 25, 27, 31, 34, 36, 38, 41-43, 45, 49, 62, 69, 71, 76, 80
<i>Plectroglyphidodon nudi</i> (Liénard, 1839)	Schultz, 1943, 2000 Expedition	Common	1, 3, 6, 14, 15, 17, 25, 27, 31, 34, 36, 38, 41-43, 45, 49, 54, 62, 69, 71, 80
<i>P. imperipennis</i> (Vaillan & Sevrage, 1875)	Schultz, 1943	Moderately common in shallow surge zone	1, 2, 4, 14, 15, 17, 25, 27, 31, 34, 36, 38, 41, 43, 62, 64, 67, 71, 76, 80
<i>P. johnstonianus</i> Fowler & Ball, 1924	2000 Expedition	Common	14, 18, 19, 21, 19, 29, 28, 27, 31, 34, 36, 38, 41-43, 45, 49, 62, 69, 71, 76, 80
<i>P. leucostoma</i> (Bleeker, 1859)	Schultz, 1943	Occasional in shallow surge zone	1, 2, 11, 18, 21, 31, 34, 41, 43, 52, 65, 64, 80
<i>P. phoeniceus</i> (Schultz, 1943)	Schultz, 1943, Enderbury type locality	Moderately common in shallow surge zone	3, 4, 11, 19, 18, 26, 23, 31, 34, 41, 43, 54, 62-64, 66, 67, 69, 76, 80
<i>Pomacentrus coelestis</i> Jordan & Starks, 1903	New record	Moderately common	4, 6, 14, 18, 21, 23, 27, 44, 46, 52, 64, 62, 64, 67, 69, 71, 76
<i>P. pavo</i> (Bloch, 1781)*	Schultz, 1943, 2000 Expedition	Common in lagoons	10, 26, 28, 31, 36, 38, 43, 54, 55, 61, 73, 74, 77, 80
<i>Stegastes alboblattatus</i> (Schlegel and Müller, 1830)*	Schultz, 1943	Occasional	30, 41, 24, 26, 31, 42, 54, 57, 70
<i>S. aureus</i> (Fowler, 1927)*	Schultz, 1943, 2000 Expedition	Moderately common just below surge zone	1, 3, 7, 8, 14, 15, 17, 25, 27, 31, 34, 36, 41-43, 45, 49, 62, 64, 66, 69, 71, 76, 80
<i>S. fasciatus</i> (Ogilby, 1889)	New record	Moderately common just below surge zone	1, 3, 4, 7, 8, 14, 15, 17, 19, 24, 25, 27, 31, 34, 36, 38, 41, 43, 45, 49, 62, 67, 69, 71, 76, 80
<i>S. niger</i> (Lacépède, 1802)*	Schultz, 1943	Moderately common in lagoons	14, 24, 26, 30, 31, 34, 35, 37, 44, 46
LABRIDAE			

<i>Anomopus caeruleopunctatus</i> Rüppell, 1828	Schulz, 1943	Occasional	1, 2, 3, 6, 15, 34, 39, 39, 41, 41, 60, 64, 67, 69, 71, 76
<i>A. melanocephalus</i> Bleeker, 1857	New record	Rare, only a few seen	18, 19, 46, 65, 80
<i>A. melanogaster</i> Valenciennes, 1839*	New record	Occasional	25, 25, 25, 34, 34, 39, 42, 66, 67, 71, 80
<i>A. nana</i> Bleeker, 1857	New record	Moderately common	1, 3, 5, 6, 8, 14, 18, 19, 21, 23, 23, 27, 32, 31, 31, 48, 46, 50, 64-66, 71, 75, 80
<i>Bodianus ocellatus</i> (Bonnat, 1831)*	New record	Rare, only one seen	81
<i>B. aculeatus</i> (Finnen, 1811)*	2000 Expedition	Occasional	7, 18, 22-23, 33, 34, 42, 45, 66-69
<i>B. diava</i> (Lacepède, 1802)*	New record	Occasional	1, 3, 4, 7, 23, 27, 31, 34, 38, 40, 42, 46, 50, 62-67
<i>B. insularis</i> (Snyder, 1908)*	New record	Rare	8, 34, 35, 38, 39, 41, 48
<i>B. prognathus</i> Lebel, 1961*	New record	Generally rare, but several seen at Bimis and Findahury.	61-69, 76
<i>Chromis nigropunctatus</i> Bleeker, 1853*	New record	Occasional	18, 37, 39, 46, 65, 68, 71, 80
<i>C. andulatus</i> Rüppell, 1845*	Schulz, 1943	Common	13, 3, 3, 6, 14, 18, 17-23, 29, 30, 31, 40-41, 45, 60, 62, 62, 65-69, 69, 71, 73-74, 76, 77, 80
<i>Chromis equisetus</i> Smith, 1957	New record	Occasional, but locally common	4, 8, 13, 24, 33, 36, 50, 52, 54, 62, 71, 76
<i>Coris aegula</i> Lacépède, 1801*	Schulz, 1943; 2000 Expedition	Occasional	4, 19, 21, 21, 31, 36, 50, 54, 62, 62, 69, 71, 80
<i>Coris ventralis</i> Randall, 1999*	New record	Occasional	18, 37, 26-27, 37, 37, 34, 38, 39, 41-43, 50, 65, 68, 71
<i>C. gaimardi</i> (Quoy & Gaimard, 1824)	New record	Moderately common	1, 7, 14, 15, 17, 21, 21, 21, 24, 33, 33, 42, 48, 59, 59, 67, 67, 71, 76, 80
<i>Cyrotatus tricoloratus</i> (Quoy & Gaimard, 1834)	Schulz, 1943	Rare, only seen at one site by S. Bailey	52
<i>Epibulus insidiator</i> (Pallas, 1770)	Schulz, 1943	Moderately common	24, 26, 30, 31, 38, 39, 41, 46, 49, 50, 54, 55, 67, 68, 69, 71, 73, 74, 76, 77, 80
<i>Gomphosus varius</i> Lacépède, 1801*	Schulz, 1943	Common	1, 5, 14, 14, 17-25, 27, 30, 34, 35, 39, 41, 43, 46, 50, 54, 55, 62-69, 71, 72, 74, 76, 80
<i>Halichoeres chrysus</i> Randall, 1981	New record	Rare	24, 27, 42
<i>H. horridus</i> (Lacepède, 1802)	Schulz, 1943; 2000 Expedition	Common	1, 8, 14, 15, 17-23, 24, 31-34, 35, 39, 41-43, 46, 50, 52, 54, 62-69, 71, 76, 80
<i>H. margaritaceus</i> (Valenciennes, 1839)	Schulz, 1943	Occasional	15, 27, 67
<i>H. metaequeus</i> Randall, 1980*	2000 Expedition	Moderately common	1, 3, 6, 14, 18, 19, 21, 21, 25, 27, 32-34, 36, 36, 41-43, 46, 62-69, 71, 76, 80
<i>H. umatissimus</i> (Günther, 1863)	2000 Expedition	Common	1-8, 14, 15, 17-25, 27, 28, 31, 31, 34, 36, 39, 41-43, 46, 50, 52, 54, 62-69, 71, 76, 80
<i>H. pallidus</i> Kuiter & Randall, 1994*	New record	Rare, about 8 seen below 40 m	38, 39
<i>H. trimaculatus</i> (Quoy & Gaimard, 1834)	Schulz, 1943	Occasional, mainly in lagoons	11, 18, 21, 21, 24, 26, 31, 31, 36, 37, 52, 54, 65, 67, 68, 72-74, 77
<i>Hemigomus fasciatus</i> Bloch, 1792	2000 Expedition	Moderately common	1, 7, 14, 15, 17-19, 21-21, 27, 27, 34, 39, 42, 41, 46, 62, 64-66, 71, 76, 80
<i>H. melanocephalus</i> (Bloch, 1791)	New record	Occasional	33, 50, 52, 71-74, 76, 77
<i>Melogomus delaisi</i> (Lacepède, 1801)	New record	Rare	17, 30
<i>Labridius bicolor</i> Fowler & Bean, 1928	New record	Moderately common	4, 6, 14, 18, 20-22, 30, 34, 36, 39, 43, 46, 50, 62, 65-69, 71, 76, 77, 79, 80
<i>L. dimidiatus</i> (Valenciennes, 1839)*	Schulz, 1943; 2000 Expedition	Moderately common	1-8, 14, 15, 17, 18, 20-24, 27, 30, 41, 38, 39, 41-43, 46, 50, 52, 54, 55, 62-69, 71, 73, 76, 80
<i>L. rubrivittatus</i> Randall, 1958	2000 Expedition	Common	1-8, 14, 15, 17-25, 27, 31, 34, 39, 41-43, 46, 50, 54, 62-69, 71, 76, 80
<i>Lalropsis polyneica</i> Read, 1981	New record	Rare, one male seen	64
<i>L. saubianina</i> Randall, 1981	New record	Moderately common	1, 3, 5, 14, 18, 20, 25, 27, 31-33, 34, 39, 40-43, 46, 65-69, 71, 76, 80
<i>Macropodusopsyllus melanocephalus</i> (Valenciennes, 1839)	Schulz, 1943	Moderately common	1, 3, 4, 14, 15, 18, 21, 26, 31, 34, 38, 41-43, 46, 62, 63, 67-69, 71, 76, 80
<i>Nogopsyllus melanocephalus</i> (Lacepède, 1802)	Schulz, 1943; 2000 Expedition	Occasional	4, 15, 18, 21, 21, 30, 36, 42, 54, 67, 76, 80
<i>Oreochromis ornatus</i> (Valenciennes, 1840)*	New record	Rare, only one seen	21
<i>O. imitator</i> (Steeds, 1877)*	2000 Expedition	Moderately common	1, 4, 6, 8, 14, 15, 17-23, 25, 27, 31, 33, 34, 41-43, 46, 62, 63, 65-69, 71, 76, 80
<i>Pseudochromis eximius</i> Jordan & Evermann, 1903	New record	Rare	24, 41
<i>P. hexataenia</i> (Bleeker, 1857)	Randall, 1999	Moderately common	1, 2, 7, 14, 21-23, 27, 31-34, 36, 39, 41, 46, 55, 62-69, 71, 76, 79, 80
<i>P. nelsoni</i> Randall, 1999*	New record	Occasional, usually below 40 m	51, 25, 68, 74, 79
<i>P. nomania</i> Jenks, 1900	2000 Expedition	Common	1, 4, 6, 7, 14, 15, 17-20, 22, 23, 25, 27, 31-33, 34, 39, 41-43, 46, 62-69, 71, 76, 79, 80
<i>P. tetraodon</i> Schulz, 1969	New record	Occasional	43, 17, 18, 42, 65, 76

<i>Pseudodax moluccensis</i> (Valenciennes, 1839)	New record	Occasional	6, 15, 17-19, 21, 23, 25, 31, 33, 38, 43, 66-68
<i>Stethojulis bandanensis</i> (Bleeker, 1851)	Schultz, 1943	Occasional	31, 54, 76, 54, 64, 67, 68, 71
<i>S. sirigiventer</i> (Bennett, 1833)	Randall, 2000		
<i>Thalassoma amblycephalum</i> (Bleeker, 1856)	Schultz, 1943	Common	1, 2, 4, 15, 17-21, 23-25, 27, 31-33, 38, 39, 41-43, 46, 50, 52, 54, 62-65, 67-69, 71, 72, 74, 76, 80
<i>T. hardwicke</i> (Benetti, 1828)	Schultz, 1943	Rare, except Orona lagoon	30, 32, 73, 74
<i>T. lunare</i> (Linnacus, 1758)*	New record	Occasional	11, 24, 26, 30, 50, 52, 54, 55, 66, 68, 72
<i>T. lutescens</i> (Lay & Bennett, 1839)*	Schultz, 1943	Rare, less than 10 seen	33, 65, 67
<i>T. purpureum</i> (Forskål, 1775)	Schultz, 1943	Moderately common in shallow surge zone	1, 3, 7, 18, 20, 21, 25, 27, 31, 32, 41, 43, 46, 54, 62, 63, 66-68, 80
<i>T. quinquevittatum</i> (Lay & Bennett, 1839)	New record	Common	1-4, 6-8, 14, 15, 17-23, 25, 27, 31-34, 38, 41, 43, 46, 50, 54, 62-69, 71, 72, 74, 76, 80
<i>T. trilobatum</i>	New record	Occasional in shallow surge zone	27, 31, 32, 41, 43, 62, 64, 67, 68
<i>Weimorella nigropinnata</i> (Scale, 1900)	New record	Three specimens collected with rotenone	2
SCARIDAE			
<i>Bulbonotopon taeniatum</i> (Valenciennes, 1840)*	New record	Generally rare, but common at Orona	33, 68, 69, 71, 72, 74, 75, 80
<i>Colomesus carolinus</i> (Valenciennes, 1839)	New record	Occasional	3-6, 15, 19, 23, 62, 64, 65, 69, 76, 80
<i>Cetoscarus bicolor</i> (Rüppell, 1828)**	Schultz, 1943	Occasional	8, 30, 71, 80
<i>Chlorurus frontalis</i> Valenciennes, 1839	New record	Rare, only 5 seen	30
<i>C. microrhinos</i> (Bleeker, 1854)*	Schultz, 1943	Common	1-8, 14, 15, 17-25, 27, 28, 30-34, 38-43, 46, 50, 54, 62-64, 66-69, 71, 72, 74, 76, 80
<i>C. sordidus</i> (Forskål, 1775)	2000 Expedition	Common	1, 3, 7, 24, 25, 27, 30-34, 38, 39, 41-43, 46, 50, 52, 54, 53, 67, 68, 71, 76, 80
<i>Hippocampus luniceps</i> (Bleeker, 1862)*	2000 Expedition	Abundant in passage at Kanton	3, 8, 24, 27, 30-34, 39, 42, 43, 46, 50, 52, 54, 55, 67, 68, 71, 73, 74, 76, 77, 80
<i>Leptocarpus vaigiensis</i> (Quoy & Gaimard, 1824)	Schultz, 1943		
<i>Scarus alipinnis</i> (Steindachner, 1879)*	New record	Common at Kanton	24, 30-32, 38, 39, 41, 43, 50, 52, 54, 67
<i>S. frenatus</i> Lacepede, 1802	Schultz, 1943	Moderately common	3, 14, 15, 18, 21, 24, 25, 30, 32-34, 38, 39, 42, 43, 46, 54, 62, 64, 66, 68, 71, 76, 80
<i>S. globban</i> Forskål, 1775	Schultz, 1943	Common	1-7, 24-28, 30-32, 34, 37, 39, 42, 43, 50, 52, 54, 55, 68, 69, 71, 74, 76, 77, 80
<i>S. oviceps</i> Valenciennes, 1839	New record	Moderately common	7, 24, 25, 27, 30-34, 38, 39, 41-43, 46, 50, 54, 55, 71, 74, 76
<i>S. psittacus</i> Forskål, 1775	Schultz, 1943	Occasional	3, 11, 24, 54, 55
<i>S. rubroviolaceus</i> Bleeker, 1849	New record	Moderately common	1-8, 14, 15, 17-25, 27, 30-34, 38, 39, 41-43, 46, 50, 52, 54, 62-69, 71, 76, 80
<i>S. tricolor</i> Bleeker, 1847*	New record	Moderately common	1-3, 6, 7, 14, 15, 17, 24, 27, 31, 34, 38, 41-43, 46, 62-69, 71, 76, 80
PINGUIPEDIDAE			
<i>Parapercis lata</i> Randall & McCosker, 2002*	Schultz, 1943 and 2000 Expedition as <i>P. tetraocanthus</i>	Occasional	23, 24, 27, 32, 38, 41, 50, 63, 69
<i>Parapercis millepunctata</i> (Günther, 1860)*	2000 Expedition	Occasional	25, 38, 43, 54, 67
<i>P. schwanstadi</i> (Steindachner, 1900)	New record	Occasional	24, 38, 41, 43
CREPIDIDAE			
<i>Chalixodites taenensis</i> Schultz, 1943	New record	Collected with rotenone	7
<i>Crystallodites cooki</i> Fowler, 1923	Schultz, 1943		
TRIPTERYGIIDAE			
<i>Enneapterygius minus</i> (Günther, 1877)	2000 Expedition		
<i>E. nigricauda</i> Fricke, 1997	2000 Expedition	Collected with rotenone	6
<i>E. umilae</i> Jordan & Scale, 1906	2000 Expedition	Collected with rotenone	17, 21, 44, 61, 64, 79
<i>Heicogramma capidamum</i> Rosenblatt, 1960	2000 Expedition	Collected with rotenone	19, 2, 4, 44
<i>H. chica</i> Rosenblatt, 1960	2000 Expedition		
<i>H. hudsoni</i> (Jordan & Scale, 1906)	Schultz, 1943		
BLENNIIDAE			
<i>Aspidontus taenatus</i> Quoy & Gaimard, 1834	New record	Occasional	46, 62, 63, 67, 70
<i>Blenniella caudolineata</i> (Günther, 1877)*	New record	Collected with rotenone	19
<i>B. gibbifrons</i> (Quoy & Gaimard, 1824)	Schultz, 1943; 2000 Expedition		

<i>B. paula</i> (Bryan & Herre, 1903)*	Schultz, 1943.	Collected with rotenone	10, 41
<i>Cremipetox auritus</i> Carlson, 1981	2000 Expedition.		
<i>C. jenningsi</i> Schultz, 1943	2000 Expedition.		
<i>C. philippina</i> (Bleeker, 1868)	Schultz, 1943.	Rare, only one seen.	78
<i>C. spinosa</i> (Fowler & Ball, 1924)	2000 Expedition.		
<i>E. leucostylus</i> (Valenciennes, 1835)	Schultz, 1943, 2000 Expedition.	Common.	1, 4, 8, 11, 15, 16, 17, 19, 21, 25, 27, 28, 31, 34, 35, 36, 41, 43, 62, 66-67, 69, 71, 76, 78, 79
<i>Ersilia nuda</i> Starck, 1969	2000 Expedition.		
<i>Etmopterus cadotianus</i> (Megan, 1909)*	Springer, 1967		
<i>E. crinitus</i> Schultz & Chapman, 1960	Springer, 1967		
<i>F. saiki</i> Bryan & Herre, 1903	Springer, 1967		
<i>F. unguis</i> (Quoy and Gaimard, 1836)	Schultz, 1943		
<i>F. thalassius</i> (Jordan & Seale, 1906)	Schultz, 1943		
<i>Exallia brevis</i> (Kerr, 1808)	New record	Rare, only a few seen.	5, 11, 37
<i>Halibrama edentulus</i> Bleeker and Schneider, 1801*	Schultz, 1943	Common in intertidal.	10, 41
<i>I. lineatus</i> (Valenciennes, 1836)*	Schultz, 1943	Common in intertidal.	10, 41
<i>Petrostius testis</i> Jordan & Seale, 1906	Schultz, 1943 as <i>P. murinus</i>		
<i>Plagusium thalichthys</i> (Bleeker, 1852)	2000 Expedition	Rare, only two seen and one collected.	12, 79
<i>P. rapinivorus</i> (Bleeker, 1857)	2000 Expedition		
<i>Rhabdionotus rhabdionotus</i> (Fowler & Ball, 1924)	Schultz, 1943		
<i>R. sveni</i> (Fowler, 1928)	New record	Common in intertidal.	10, 41
CALLIONYMIDAE			
<i>Callionymus duploisius</i> Valenciennes, 1837	New record	Collected with quinoline.	28, 70
<i>Synthronus murivorus</i> Schultz, 1960	New record	Rare, only one seen.	74
GOBIIDAE			
<i>Amblygobius naevius</i> (Herre, 1945)	New record.	Moderately common in Kanton lagoon.	28, 29, 36
<i>A. phalaena</i> (Valenciennes, 1837)	Schultz, 1943, 2000 Expedition.	Occasional.	28, 29, 29, 32, 33, 37, 54, 71
<i>A. sp. 1</i>	New record	Occasional in lagoons.	11, 28, 37, 52
<i>A. sp. 2</i>	New record		
<i>A. virgatus</i> (Ruppell, 1830)	New record	Occasional in lagoons.	11, 28, 37, 52
<i>Bathygobius solatus</i> (Bennet, 1832)*	New record.	Collected with rotenone.	41
<i>B. vauoni</i> (Steindachner, 1880)	New record.	Collected with rotenone.	10
<i>Cabillus unguis</i> (Fowler, 1927)	Schultz, 1943		
<i>Calligobius haasi</i> (Bleeker, 1851)*	New record	Collected with rotenone.	17
<i>C. plumosus</i> (Smith, 1959)	2000 Expedition.	Collected with rotenone.	64
<i>C. zosteri</i> (Steindachner, 1880)	2000 Expedition.	Collected with rotenone.	17, 44, 61, 63
<i>Ctenogobius</i> sp.	2000 Expedition		24, 26, 37, 52
<i>Erioso cinctus</i> Jewett & Lachner, 1983	Jewett & Lachner, 1983	Common in lagoon at Kanton & Orona	24, 26, 37, 55, 72, 74, 77
<i>E. infuscatus</i> Jewett & Lachner, 1983	New record	Common, collected with rotenone.	17, 28, 31, 44, 61, 64
<i>E. prasites</i> Jordan & Seale, 1906	Schultz, 1943		
<i>E. sp. 1</i>	New record.	Collected with rotenone.	17, 28, 79
<i>E. sp. 2</i>	New record.	Collected with rotenone.	17, 28, 31, 35, 64, 78
<i>E. sumus</i> Jordan & Seale, 1906	Schultz, 1943	Collected with rotenone.	6, 41
<i>Fistigobius neigihonus</i> (Günther, 1877)	Schultz, 1943	Rare in lagoons.	38, 71
<i>Gambusia angrensis</i> Bleeker, 1851	Schultz, 1943.		
<i>G. caurivensis</i> Bleeker, 1853	2000 Expedition.	Common on fine sand bottom.	11, 13, 18, 24, 26, 29, 34, 36, 48, 49, 52, 54, 55, 61, 62, 64, 65, 66, 72, 74, 77, 79
<i>Gobius eriger</i> Lachner & McKinney, 1983*	New record	Collected with rotenone.	41
<i>Lutia gracilis</i> Klauswitz, 1960	New record.	One photographed by M.J Adams.	44
<i>Macrodontogobius walburi</i> Herre, 1936	Schultz, 1943	Occasional in lagoons.	28, 29, 37, 71
<i>Oplopus diacanthus</i> Schultz, 1943	Kanton I. is type locality.	Occasional in lagoons.	14, 28, 37
<i>Oplopus oplopus</i> Valenciennes, 1837	New record	Occasional in lagoons.	28, 37, 71
<i>Oryzias papuanus</i> (Valenciennes,	Schultz, 1943.		

1837)			
<i>Paraglyptodon modestus</i> (Regan, 1908)	Schultz, 1943; 2000 Expedition.		
<i>Pleuroscya micheli</i> Fourmanoir, 1971*	New record.	Collected with rotenone.	55
<i>Prionlepis aulina</i> Winterbottom & Burridge, 1993*	New record.	Collected with rotenone.	64
<i>P. cincta</i> (Regan, 1908)	Schultz, 1943.		17
<i>P. nocturna</i> (Smith, 1957)	Schultz, 1943		
<i>P. semidilatatus</i> (Valenciennes, 1837)	Schultz, 1943	One specimen collected with rotenone.	81
<i>Sueviota</i> sp.*	New record	Collected with rotenone.	20, 39, 55, 64, 79
<i>Tramma sostra</i> Winterbottom, 2004	New record	Collected with rotenone.	33, 34, 38, 39, 41, 44, 76
<i>Tramma squamicana</i> Winterbottom, 2004*	New record.	Collected with rotenone.	6, 17, 22, 27, 52, 54, 55, 61, 41, 44, 55, 61, 64, 79
<i>Trinmatom eviotops</i> (Schultz, 1945)*	New record.	Collected with rotenone.	20
<i>Valenciennesa virgata</i> (Broussonet, 1782)	New record.	Occasional.	13, 21, 23, 52, 62
PTERELEOTRIDAE			
<i>Nemateleotris decora</i> Randall & Allen, 1973*	New record	Rare, one seen in 42 m	46
<i>Ptereleotris evides</i> (Jordan & Hubbs, 1925)	New record	Rare, only 3 seen on one dive	33
<i>P. heteroptera</i> (Bleeker, 1855) 18 m	New record.	Rare, only 2 seen.	62
<i>P. mitrolepis</i> Bleeker, 1856	Schultz, 1943.	Occasional	36, 73, 74
<i>P. zebra</i> (Fowler, 1938)	New record.	Occasional.	1, 13, 27, 52, 68
EPITHIPPIDAE			
<i>Platys orbicularis</i> (Forskål, 1775)*	New record.	Rare, only 2 seen	63
<i>P. teira</i> (Forskål, 1775)	New record.	Rare, less than 10 seen.	25, 38, 65
SIGANIDAE			
<i>Siganus argenteus</i> (Quoy & Gaimard, 1925)	New record.	Occasional.	25, 27, 33
ZANCLIDAE			
<i>Zonclus cornutus</i> Linnaeus, 1758	2000 Expedition.	Common.	1-8, 14, 15, 17-23, 27, 30-34, 38, 43, 45, 50, 54, 55, 62, 64-69, 71, 76, 80
ACANTHURIDAE			
<i>Acanthurus achilles</i> Shaw, 1803*	Schultz, 1943.	Common.	1-4, 6, 7, 15, 17-23, 25, 32-34, 38, 41, 62-64, 66-69, 71, 72, 76, 80
<i>A. blochi</i> Valenciennes, 1835*	New record	Occasional.	5, 18, 24, 28, 30, 34, 38, 52, 68, 74
<i>A. gulosus</i> Bloch & Schneider, 1801	Schultz, 1943; 2000 Expedition.	Common.	1, 2, 4, 6, 7, 15, 18, 20, 21, 27, 31, 38, 43, 54, 62-65, 67, 68, 71, 80
<i>A. leucocheilus</i> Herre, 1927*	New record.	Occasional.	21, 30, 32, 34, 38, 41-43, 46, 59, 54, 55, 62-64
<i>A. lineatus</i> (Linnaeus, 1758)*	Schultz, 1943; 2000 Expedition.	Common.	1-4, 6-8, 14, 15, 17-25, 27, 31-34, 38, 39, 41-43, 46, 50, 54, 62-64, 66-69, 71, 80
<i>A. maculiceps</i> (Ahl, 1923)	New record.	Rare, only 5 seen	23, 41
<i>A. nana</i> (Cuvier, 1829)	New record.	Occasional.	1, 2, 15, 46
<i>A. nigricans</i> (Linnaeus, 1758)	Schultz, 1943; 2000 Expedition.	Common.	1-5, 7, 8, 14, 15, 17-25, 27, 30-34, 38, 39, 41-43, 46, 50, 54, 62-69, 71, 74, 76, 80
<i>A. nigricaudus</i> Duncker & Mohr, 1929	New record.	Moderately common.	1, 2, 7, 15, 18, 20-22, 24-27, 30-33, 41, 43, 46, 50, 52, 55, 67, 68, 71, 76, 80
<i>A. nigrofasciatus</i> (Forskål, 1775)	2000 Expedition.	Occasional.	7, 27, 31, 34, 67, 68, 76, 80
<i>A. nigeris</i> Valenciennes, 1835*	Randall, 1956.	Moderately common.	1, 2, 4, 6, 7, 15, 17, 19-21, 23-25, 27, 30, 31, 34, 38, 39, 41-43, 50, 67, 68, 71, 76, 80
<i>A. nubilus</i> (Fowler & Bean, 1929)*	New record.	Rare, only one seen	23
<i>A. olivaceus</i> Bloch and Schneider, 1801	2000 Expedition.	Moderately common	5, 7, 15, 17-25, 27, 30, 32-34, 38, 50, 52, 54, 62, 67-69, 71, 76, 80
<i>A. pyrocephalus</i> Kirtitz, 1834*	New record	Occasional.	14, 15, 19, 21, 68
<i>A. thompsoni</i> (Fowler, 1923)	New record.	Moderately common	3, 4, 6, 7, 14, 15, 8, 19, 21, 23, 25, 27, 32, 38, 39, 41, 43, 46, 62-69, 76, 80
<i>A. tostegus</i> (Linnaeus, 1758)*	Schultz, 1943, 2000 Expedition.	Abundant	1-7, 14, 15, 17-21, 23-27, 31-34, 36, 38, 40, 42, 43, 46, 50, 52, 62-69, 71, 80, 81

<i>A. sauripinnis</i> Valenciennes, 1835*	New record	Abundant	2, 4, 7, 10, 11, 18, 20-24, 26-32, 34-43, 46, 50, 52, 54, 55, 63, 64, 71, 72, 74, 76, 77, 80
<i>C. cyanostriatus</i> Randall & Clemens, 2001*	Schultz, 1943; 2000 Expedition	Common	5, 14, 15, 17-18, 25, 27, 31, 34, 36, 39, 41-43, 46, 50, 54, 55, 62, 69, 71, 76, 80
<i>C. flaviventris</i> Forster, 1738*	New record	Moderately common	1, 2, 3, 6, 8, 14, 18, 19, 21, 23, 25, 31, 34, 36, 37, 41, 46, 62, 69, 71, 76, 80
<i>C. marginatus</i> (Valenciennes, 1835)*	2000 Expedition, Randall & Clemens, 2001	Abundant	1, 8, 14, 15, 17, 25, 27, 30, 31, 34, 36, 39, 41, 43, 46, 50, 54, 63, 69, 71, 76, 80
<i>C. striatus</i> (Quoy & Gaimard, 1825)	Randall & Clemens, 2001	Occasional	1, 2, 34, 35, 37, 60, 65, 68, 70, 72, 73, 46, 50, 52, 54, 55, 68, 69, 71, 72
<i>N. unimaculatus</i> (Quoy & Gaimard, 1825)	New record	Rare, only one seen.	39
<i>N. brevicaudus</i> (Valenciennes, 1835)	New record	Occasional	1, 8, 14, 25, 30, 34, 36, 39, 41-43, 46, 50, 63, 65, 69, 71, 80
<i>N. caesus</i> Randall & Bull, 1992*	New record	Rare, one photographed	67
<i>N. haasi</i> Günther (Bleeker, 1855)	New record	Occasional	1, 3, 5, 6, 8, 14, 15, 17, 19, 27, 46, 47, 65, 67, 69
<i>N. litvinovi</i> (Bloch & Schneider, 1801)	New record	Common	1, 8, 14, 15, 17, 19, 20, 22, 23, 25, 27, 30, 34, 36, 39, 41, 43, 46, 50, 52, 54, 55, 63, 64, 69, 71, 76, 80
<i>N. minor</i> (Forsk., 1775)	New record	Rare, less than 10 seen	7
<i>N. viviparus</i> Valenciennes, 1835*	2000 Expedition	Common	1, 2, 3, 6, 14, 15, 18, 21, 23, 25, 31, 34, 36, 39, 41, 43, 46, 63, 65, 67, 80, 81
<i>Paracanthus</i> sp. nov. (Linnaeus, 1766)	New record	Occasional	1, 42, 68, 80
<i>Z. bicinctus</i> Günther, 1859*	New record	Moderately common	1, 8, 14, 15, 17, 19, 20, 22, 23, 25, 27, 46, 64, 66, 69, 76, 80
<i>Z. scopus</i> Cuvier, 1829	2000 Expedition	Common	1, 8, 14, 15, 17, 19, 21, 23, 25, 27, 30, 34, 36, 39, 41, 43, 46, 50, 52, 54, 55, 63, 64, 69, 71, 76, 80
<i>Z. veliferum</i> Bloch, 1797	Schultz, 1943	Common	1, 2, 3, 24, 27, 31, 34, 36, 39, 41, 43, 46, 50, 54, 55, 68, 69, 71, 72, 74, 76, 77, 80
SPHYRAENIDAE			
<i>Sphyraena tibialis</i> Day, 1876*	New record	Occasional large schools	37, 40, 44, 47
<i>S. tibialis</i> (Walbaum, 1792)	Schultz, 1943	Moderately common	1, 2, 7, 14, 15, 19, 21, 23, 25, 31, 32, 34, 43, 45, 48, 51, 80, 82
<i>S. genivittata</i> (Linnaeus, 1759)	New record	Occasional large schools	
SCOMBRIDAE			
<i>Kohyomus affinis</i> (Cantor, 1849)	2000 Expedition		
<i>C. maculatus</i> (Ruppell, 1838)	New record	Rare, only a few seen	1, 3, 40, 91, 92
<i>T. maculatus</i> (Linnaeus, 1759)	New record	Rare, only one seen	23
BOTIIDAE			
<i>Botia</i> sp. nov. (Linnaeus, 1759)	Schultz, 1943	Rare, but cryptic	1, 47, 56
<i>B. pinnifera</i> (Ruppell, 1830)	Schultz, 1943		
SOLEIDAE			
<i>Asterogadus melanostomus</i> (Peters, 1876)	New record	Collected with roach	39
<i>A. striatus</i> Woods, 1966	New record	Collected with roach	89
SAMARIIDAE			
<i>Samarina</i> sp. nov. (Woods, 1966)	2000 Expedition	Collected with roach	7, 97
BALISTIDAE			
<i>Balistes</i> sp. nov. (Parr, 1947)	Schultz, 1943; 2000 Expedition	Common	1, 8, 14, 15, 17, 19, 20, 22, 23, 25, 27, 30, 34, 36, 39, 41, 43, 46, 50, 52, 54, 55, 63, 64, 69, 71, 76, 80
<i>Balistes</i> sp. nov. (Bloch & Schneider, 1801)	New record	Occasional	1, 3, 23, 24, 30, 34, 41, 43, 46, 63, 64, 69, 76, 80
<i>Melichthys niger</i> (Bloch, 1766)	New record	Common	1, 8, 14, 15, 17, 19, 21, 23, 25, 27, 30, 34, 36, 39, 41, 43, 46, 50, 52, 54, 55, 63, 64, 69, 71, 76, 80
<i>M. niger</i> (Schneider, 1844)	New record	Common	1, 8, 14, 15, 17, 19, 21, 23, 25, 27, 30, 34, 36, 39, 41, 43, 46, 50, 52, 54, 55, 63, 64, 69, 71, 76, 80
<i>M. niger</i> (Ruppell, 1837)	New record	Moderately common, but locally abundant	1, 8, 14, 15, 17, 19, 21, 23, 25, 27, 30, 34, 36, 39, 41, 43, 46, 50, 52, 54, 55, 63, 64, 69, 71, 76, 80
<i>Parabalistes</i> sp. nov. (Ruppell, 1829)	New record	Occasional	1, 3, 6, 7, 14, 15, 19, 24, 26, 31, 34, 36, 39, 41, 43, 46, 50, 52, 54, 55, 63, 64, 69, 71, 76, 80
<i>Rhinobalistes</i> sp. nov. (Linnaeus, 1758)	Schultz, 1943	Occasional in lagoon	41, 36, 39, 41, 43, 46, 50, 52, 54
<i>R. radiatus</i> (Bloch & Schneider, 1801)	Schultz, 1943	Occasional in shallow lagoon	1, 3, 6, 14, 15, 17, 19, 21, 23, 25, 27, 30, 34, 36, 39, 41, 43, 46, 50, 52, 54, 55, 63, 64, 69, 71, 76
<i>S. fuscus</i> (Bloch & Schneider, 1801)	2000 Expedition	Common	1, 3, 14, 15, 17, 19, 21, 23, 25, 27, 30, 34, 36, 39, 41, 43, 46, 50, 52, 54, 55, 63, 64, 69, 71, 76
<i>S. striatus</i> (Bloch & Schneider, 1801)	New record	Moderately common	1, 15, 18, 21, 24, 25, 27, 30, 34, 36, 39, 41, 43, 46, 63, 64, 69, 71, 76

<i>Xanthichthys novaezelandiae</i> (Bennett, 1871)	New record	Occasional, usually below 15 m.	15, 17, 22, 25, 30, 34, 37, 44-45
<i>X. xerobombinatus</i> Randall, Masumoto, & Zama, 1978*	New record	Rare, usually below 30 m.	22-24
MONACANTHIDAE			
<i>Aluterus scriptus</i> (Osbeck, 1765)	New record	Occasional	6, 7, 24, 31, 32, 41, 50, 64, 68
<i>Alopiurus scapae</i> (Cuvier, 1829)	New record	Occasional	3, 7, 8, 22, 33, 41, 46, 62
<i>Lophorhynchus albertii</i> (Hollard, 1854)	New record	Moderately common	3-6, 8, 18, 21, 22-27, 30-34, 38, 39, 42, 43, 50, 62, 64-67, 71
<i>C. panopliis</i> (Ruppell, 1837)	New record	Rare, less than 10 sites	4, 22, 43, 46
OSTRACIIDAE			
<i>Dactylopus megalops</i> Shaw, 1796	2000 Expedition	Occasional	1-3, 8, 14, 15, 17-21, 25, 27, 33, 38, 47, 62, 64-68, 76
TETRAODONTIDAE			
<i>Arothron hispidus</i> (Linnaeus, 1758)*	New record	Rare, less than 10 sites	3, 6, 24, 37, 46
<i>A. melanocephalus</i> (Lacépède, 1799)*	2000 Expedition	Occasional, but common at site 22	16, 22-24, 27, 47, 53, 62
<i>A. nigropunctatus</i> (Bloch and Schneider, 1801)	2009 Expedition		
<i>Cambigaster anthracinus</i> (Bleeker, 1865)	New record	Occasional	3, 13, 28, 33, 47, 54, 67
<i>C. iwethinotum</i> (Bleeker, 1855)	New record	Occasional	44, 47, 18, 20, 31, 43, 67
<i>C. mundaui</i> (Richardson, 1844)	Schultz, 1943; 2000 Expedition		
DIODONTIDAE			
<i>Diodon holocentrus</i> Linnaeus, 1758*	New record	Occasional	12, 25, 27, 34, 44, 67-69
<i>D. hystrix</i> Linnaeus, 1758	New record	Occasional	11, 32, 50, 44, 48



PHOENIX ISLANDS PROTECTED AREA KIRIBATI

**Nomination for a
World Heritage site 2009**

Annexes 8-10

Annex 8. DVDs of Uwate & Teroroko 2007 Compilation of Reports Related to the Phoenix Islands (included with nomination materials)

Annex 9. DVD of Phoenix Islands References (PIPA Office) Greenstone Digital Library (included with nomination materials)

Annex 10. DVD movie of Phoenix Islands (NEAq) (included with nomination materials)



PHOENIX ISLANDS PROTECTED AREA

KIRIBATI

Draft Management Plan 2010 – 2014

Foreword

Kiribati is an ocean nation. We have ocean-faring tradition going back 1000s of years traversing the shared history of Micronesia and Polynesia peoples in the central and South Pacific. The sea and islands are our blood.

In this new millennium in which humanity has reached the limits of the planet we share and our activities are changing the very climate that nurtured us, we recognize the shared future that all people on the planet face. With this in mind, we have established the Phoenix Islands Protected Area affectionately known as the “PIPA” with two goals in our mind and hearts.. One is as a real commitment to living sustainably in our environment, to learn and show how nature and people can function harmoniously where distance and isolation are both the challenge and the saving grace. Second is as a symbol for how the world’s people must come together to sustain our common future; this is our gift to humanity, from a country that is humble by number of people and size of economy, but rich in ocean heritage. PIPA is what we can give to a shared future with others, that says ‘this is what we believe in’, ‘this is a belief we would like to share with other peoples of the world’.

The Phoenix Islands, lying in the heart of the Pacific Ocean, contain 8 out of our 33 islands Kiribati and constitute 11.34% of Kiribati’s Exclusive Economic Zone (EEZ). PIPA was born through the hard work and shared vision of many people and institutions, both from within Kiribati and internationally. In a few short years it has gone from just an idea to the largest marine protected area in the world. The most important foundation for this has been that while the islands have supported different people over their history, their small size and isolation, even by Pacific standards, have meant they have not been able to support permanent human settlements. And because of this isolation, the islands and seas around them have retained a pristine condition that few other islands have been able to. Recognizing that this was not only significant to Kiribati but to the world, my government has founded PIPA in partnership with New England Aquarium (NEAq) and Conservation International. Together we have put together the expertise and the framework to protect and sustain these islands in a way that benefits our economy and people that live on populated islands and the partnerships is growing with governments and agencies from around the world supporting the PIPA.

This Management Plan is the core expression of that expertise and commitment. Compiled over two years of hard work and consultations, it condenses all the elements that are necessary to maintain PIPA as a pristine set of islands in the middle of a vast ocean. From laws to staffing to enforcement to monitoring to financing, it summarizes all the elements needed to manage and maintain the Phoenix Islands. Backed up by an endowed Trust, that raises investment funds to maintain PIPA values intact, and laws enacted in Kiribati Parliament, this Management Plan shows how we are committed to keeping our part of the planet intact, for the betterment of the Kiribati people and the world..

This Management Plan is the expression of the Kiribati’ peoples’ commitment to take care of our planet for the good of mankind. We welcome your support.

President Anote Tong
Republic of Kiribati

Executive Summary

The Phoenix Islands lie in the heart of the Pacific Ocean and are one of the most remote island chains on Earth. They are located approximately halfway between Fiji and Hawaii. The largest atoll, Kanton, is 1,750 km (1,087 miles) from the Kiribati capital Tarawa. The eight islands are uninhabited except for Kanton Atoll that houses a small caretaker population.

Due to its remoteness and isolation, the Phoenix Islands could be the last atolls on earth with unique values still unspoiled, including pristine coral reefs, abundance of fish and other marine wildlife including globally important seabird populations. This prompted the Kiribati government to declare it the Phoenix Islands Protected Area (PIPA) in 2006 which became the largest marine protected area with a total area of 408,250 sq.km (157,626 sq.miles) with the adoption of the PIPA Regulations 2008. With the PIPA Trust Conservation Act 2009 enacted Kiribati and its partners aim to ensure the sustainable financing needed for the conservation and management of PIPA.

The PIPA Management Plan is divided into 4 main chapters: (1) the description of PIPA; (2) PIPA human uses, threats, issues and challenges; (3) PIPA vision and management objectives and ; (4) PIPA strategic action plan 2010 – 2014.

Chapters 1 to 3 provides the background information on PIPA including its location in the world map, boundaries, current uses by the government, potential world heritage values or PIPA properties, threats and challenges and some others. In other words, the first three chapters form the basis for the formulation of the PIPA strategic action plan.

Chapter 4 is considered the heart of the plan. It contains the PIPA strategic plan for the next four years (2010 – 2014). The plan provides the framework, actions and targets to implement PIPA's Management Objectives through the implementation of this Plan. The three key components of the strategic action plan (SAP) include: – PIPA Core Management; PIPA "Issues to Results" and the State of PIPA report 2014.

The PIPA Core Management (SAP 1) provides for the requisite decision making, administration, management, resourcing and operation of the PIPA. These activities are regarded as essential for the basic maintenance of the PIPA to allow meeting obligations under the relevant statute(s).

In addition to the core management requirements, a number of key prioritized issues for PIPA requiring targeted action are identified for this management plan (SAP 2). These include: - PIPA atoll & reef restoration and biosecurity; coral reefs and coastal management; endangered and threatened species; offshore fisheries; cultural and historical heritage; seamounts and deep sea conservation; and addressing climate change issues in PIPA c. For each 'issues to results', a summary end desired target state is identified for this Plan (SAP 2.1 – SAP 2.7), the baseline status of the issue summarised as at January 2010, and a series of actions outlined.

As required under the PIPA Regulations 2008 and from the outcome of the various actions strategic implemented, the State of PIPA Report 2014 will be produced (SAP 3). This report will be used as a basis for evaluation of the effectiveness of PIPA management to date, issues arising and will provide input to the next PIPA Management Plan to be effective from 1 January 2015.

PIPA Management Plan Process

The first PIPA management plan was completed and approved by the then Phoenix Island Steering Committee (PISC) in December 2007. The plan was the outcome of the consultations made with key stakeholders government ministries and other stakeholders including Non Government Organisations (NGOs).

With the adoption of the PIPA Regulations 2008, which significantly expanded the area to be conserved and formally constituted a multi government agency PIPA Management Committee together with clear goals of management the Management Plan, a revision of the 2007 plan was agreed. This updated plan was also formulated to be consistent with World Heritage Convention requirements for protected areas listed as natural sites. Kiribati submitted PIPA for World Heritage listing in January 2009.

With the adoption of the PIPA Regulations in February 2008, the PISC was renamed the PIPA Management Committee (PIPA-MC). The PIPA Management committee comprises representatives of:

- MELAD (the Principal Environment Officer, the Environment and Conservation Division, PIPA Office),
- Ministry representatives from Fisheries, the Phoenix Islands, Finance, Tourism, Foreign Affairs, Commerce,
- The Office of the Attorney General
- Kiribati Police Service
- Atoll Research Centre of the University of the South Pacific

The PIPA Management Plan 2010 - 2014 is the outcome of the PIPA Management Committee's meetings, workshops and consultations with the PIPA overseas partners and other stakeholders. This 5 year plan will be reviewed late in 2014 and learning and issues arising will be incorporated into an updated Plan from 2015.

List of acronyms

BEN	South Equatorial Current
BES	South equatorial branch of the South Equatorial Current
CBD	Convention on Biological Diversity
CEPF	Critical Ecosystem Partnership Fund
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of Parties
CRISP	Coral Reef InitiativeS in the Pacific
DSL	Deep Scattering Layer
DWFN	Distant Water Fishing Nation
ECD	Environment and Conservation Division (MELAD)
EEZ	Exclusive Economic Zone
EIC	Equatorial Intermediate Current
EN	Endangered IUCN Red List category
ENSO	El Niño-Southern Oscillation
FAD	Fish Aggregating Device
FFA	Forum Fisheries Agency
FSP	Foundation of the Peoples of South Pacific
GBRMPA	Great Barrier Reef Marine Park Authority
GCF	Global Conservation Fund of Conservation International
GEIC	Gilbert Ellice Island Colony
GEF	Global Environment Facility
GLISPA	Global Island Partnership
GoK	Government of Kiribati
IAS	Invasive alien species
IBA	Important Bird Area of Birdlife International
IFAW	International Fund for Animal Welfare
IUCN	International Union for the Conservation of Nature
KANGO	Kiribati Association of Non-Governmental Organisations
KBA	Key Biodiversity Area of Conservation International
MDG	Millennium Development Goals
MELAD	Ministry of Environment, Lands & Agricultural Development
MFMRD	Ministry of Fisheries, Marine Resource and Development
MIC	Micronesians in Island Conservation
MLPID	Ministry of Line and Phoenix Islands
MOU	Memorandum of Understanding
MPA	Marine Protected Area
NBSAP	National Biodiversity Strategy and Action Plan
NDS	National Development Strategy
NEAq	New England Aquarium
NGO	Non Government Organisation
NOAA	National Oceanic and Atmospheric Administration
NSCC	North Subsurface Countercurrent
NZ	New Zealand
NZ-DOC	New Zealand Department of Conservation
NZODA	New Zealand Overseas Development Agency

PA	Protected Area
PAS	Pacific Alliance for Sustainability
PCB	Polychlorinated Biphenyl
PIF	Project Identification Form
PII	Pacific Invasives Initiative
PIPA	Phoenix Islands Protected Area
PIPA-MC	Phoenix Islands Protected Area Management Committee
PISC	Phoenix Islands Steering Committee
POP	Persistent Organic Pollutants
RNHP	Regional Natural Heritage Programme of Australia
SAMTEC	The Space and Missile Test Center
SECC	South Subsurface Countercurrent
SOPAC	Secretariat of the Pacific Islands Applied Geoscience Commission
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
UK	United Kingdom
UNEP	United Nations Environment Programme
UNESCO	United Nations Education, Scientific and Cultural Organisation
UNFCC	United Nations Framework on Climate Change
USA	United States of America
USAF	United States Air Force
USP	University of the South Pacific
TBAP	Tuna and Billfish Assessment Programme
TIGHAR	The International Group for Historic Aircraft Recovery
UNDP	United Nations Development Programme
USFMT	US Fisheries Multilateral Treaty
VMS	Vessel Monitoring System
VU	Vulnerable IUCN Red List Category
WCO	Wildlife Conservation Ordinance
WCU	Wildlife Conservation Unit
WHC	World Heritage Convention
WSSD	World Summit on Sustainable Development
WWII	World War II
WWF	World Wide Fund For Nature
nm	nautical mile

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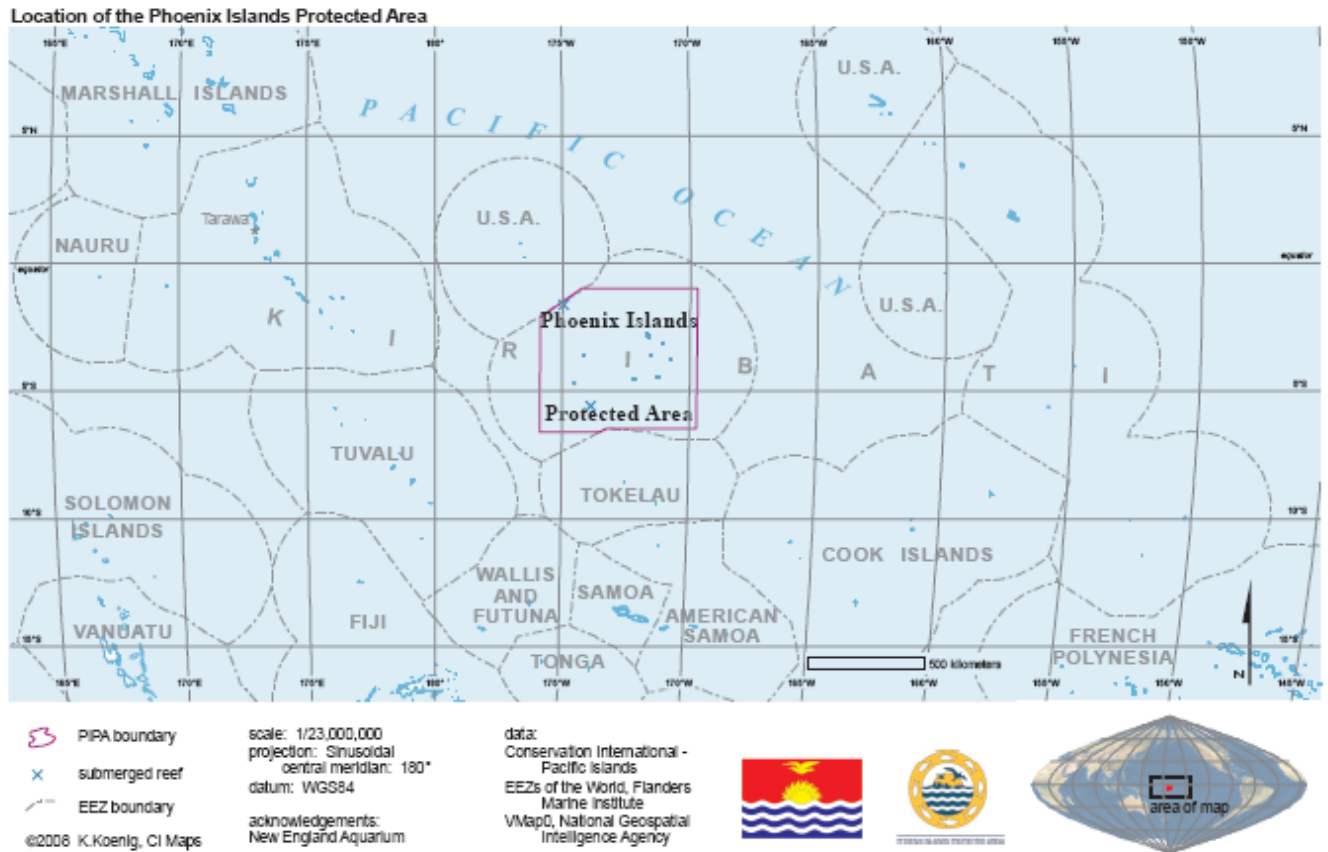
1. **Glossary of Terms**
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CHAPTER 1. THE PHOENIX ISLANDS PROTECTED AREA (PIPA)

1.1 The Phoenix Islands Protected Area (PIPA)

The Phoenix Islands Protected Area (PIPA) is centered on a group of islands, the Phoenix Islands, in the geographic center of the Republic of Kiribati in the Central Pacific Ocean (Figure 1). These islands are also known as the Rawaki Islands (Government of Kiribati, 1979).

Figure 1. The Phoenix Islands, Kiribati, Central Pacific.

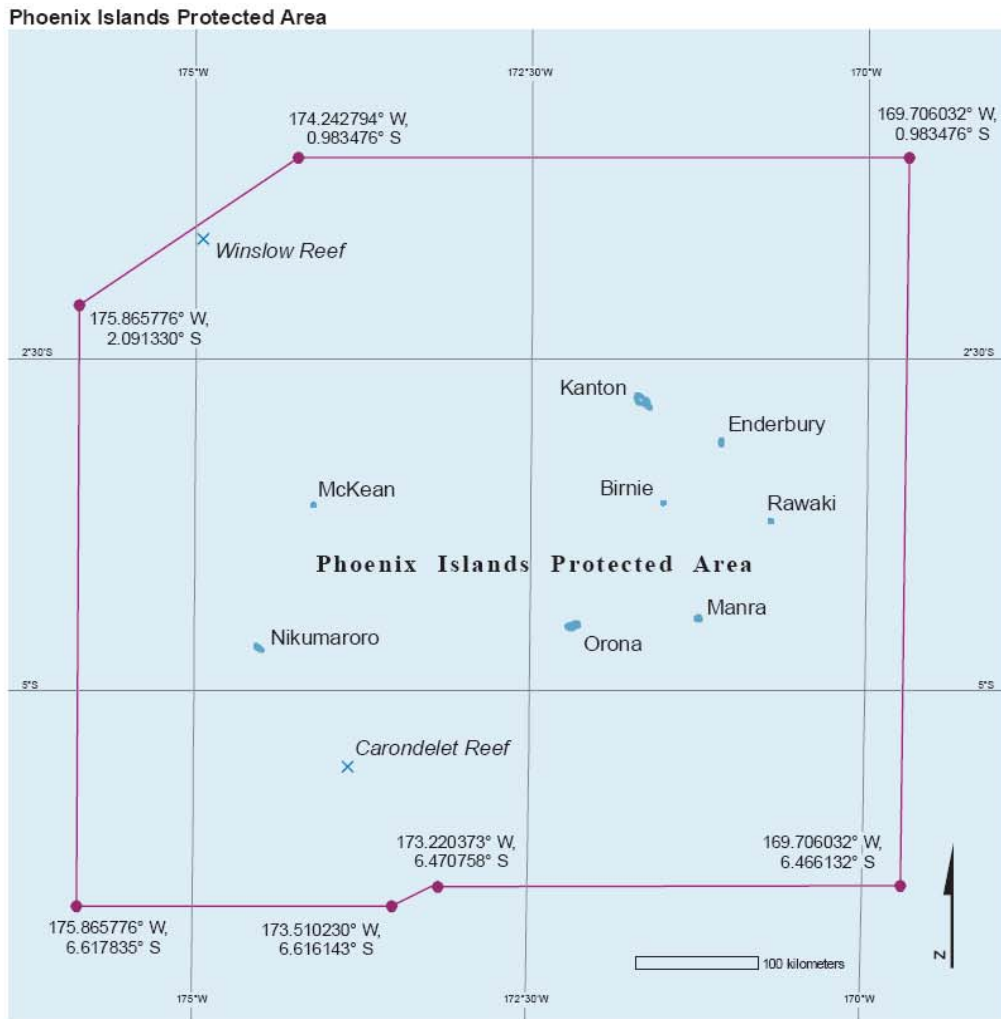






The Phoenix Island group is situated between the Gilbert Islands to the west and the Line Islands to the east, extending across the centre of Kiribati. Two of the Phoenix Islands, Howland and Baker, are low reef islands in the adjacent territory of the United States to the north of Kiribati.

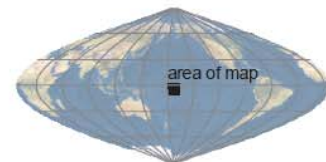
PIPA's boundaries consists of a heptangular (7 corner points) shaped area that encompass about 408,250 sq km including 8 atoll/reef islands, two submerged reefs and at least 14 identified seamounts and their surrounding mainly deep water marine area. PIPA constitutes 11.34% of Kiribati's Exclusive Economic Zone (EEZ) and is the largest Marine Protected Area (MPA) in the world, first declared by the Government of Kiribati in 2006 and extended in February 2008.

The islands within the boundary of PIPA are (see Figure 2): Kanton (Abariringa /Canton) Birnie, Enderbury, Manra (Sydney), McKean, Nikumaroro (Gardner), Orona (Hull), and Rawaki (Phoenix). Two submerged reefs, Winslow and Caroudelet, and at least 14 known seamounts together with open ocean and deep sea habitat are an integral part of PIPA (Figure 3). These atolls and low reef islands are surrounded by some of the most pristine coral reefs in the world. The waters are teeming with fish in quantities rarely seen elsewhere and tens of thousands of seabirds find refuge on the atolls.

Figure 2. Phoenix Islands Protected Area Boundary Map



-  PIPA boundary
-  PIPA coordinate
-  atoll
-  submerged reef



scale: 1/5,000,000
projection: Sinusoidal
central meridian: 180°
datum: WGS84

data:
Conservation International - Pacific Islands
VMap0, National Geospatial Intelligence Agency

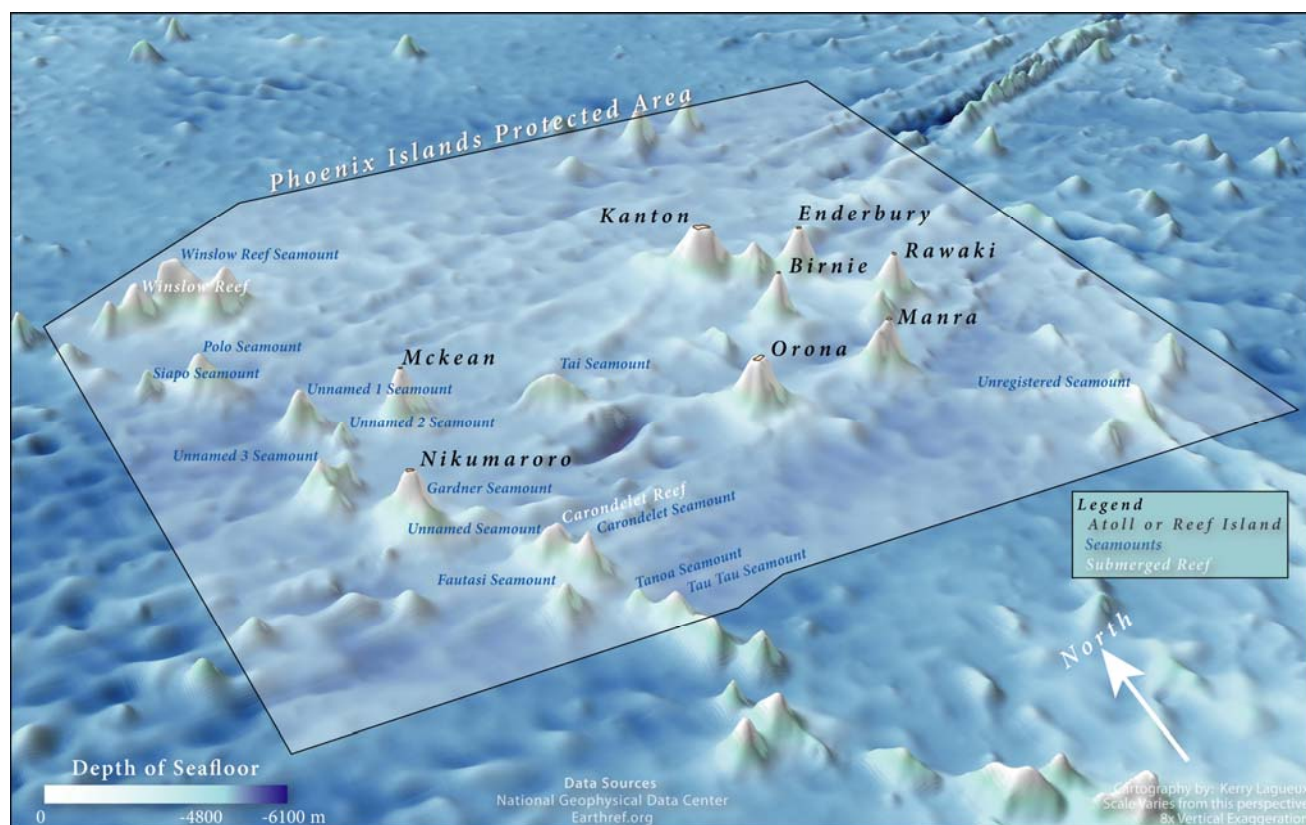
acknowledgements:
New England Aquarium

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PHOENIX ISLANDS PROTECTED AREA

Figure 3. Phoenix Islands Protected Area in 3D



The 8 atolls and low reef islands and the two submerged reefs of PIPA represent only the highest of numerous large and long-extinct volcanoes. An even larger number of large volcanoes do not reach to within 200 metres of the surface and are therefore technically classified as seamounts. Several of PIPA's seamount volcanoes have been studied bathymetrically and formally named and entered into the Seamount Catalogue, including the Carondelet and Winslow seamounts (near their namesake submerged reefs), the Fautasi, Siapo, Polo, Tai, Tanoa, Tau Tau, Gardner. There remain four unnamed seamounts.

Meteorology

PIPA is located in the Pacific equatorial dry zone that experiences droughts and periods of heavy rainfall. During El Niño periods the Phoenix Islands may experience high rainfall. However, overall the rainfall in the Phoenix Islands is among the lowest in the Central Pacific. Most of the Phoenix Islands receive less than 1,000 millimetres (mm) of rain annually with a dry period from March through June. The northern most islands in the Phoenix are the driest, i.e. Kanton and Enderbury. Birnie, Rawaki, Nikumaroro and McKean are wetter. Orona and Manra are the wettest.

Air temperature ranges from 21.7° to 36.7°C with an average 28.9°C. Relative humidity ranges from 57 to 85 percent.

The Phoenix Islands lie between the Intertropical Convergence Zone and the South Pacific Convergence Zone. The former remains relatively stationary during the year over the central Pacific Ocean; however, the South Pacific convergence zone moves north from January to July.

Between 5°N to 5°S particularly in the central Pacific Ocean (where the Phoenix Islands are located), there is persistent high pressure preventing the development of tropical cyclones (hurricanes).

The meteorological conditions have a significant influence on pelagic fish stocks in the region, including stocks in the Phoenix Islands. During El Niño - Southern Oscillation (ENSO) events this warm water pool shifts to the east and skipjack tuna populations also shift to the east extending to the Phoenix Islands. The Phoenix Islands region appears to be the centre of El Niño activities in the Pacific so may be ideal for studying the El Niño phenomenon and more generally in relation to climate change.

Geology

There has been little study of geology of the atolls and seamounts in PIPA but based on what is known from Howland and Baker, the US islands within the Phoenix Group, some extrapolations can be made for the origins and geological history of PIPA. The Line and Tokelau (PIPA is located across the Tokelau ridge) ridges lie within the Darwin Rise, on a magnetically “quiet” seafloor formed during the Cretaceous Normal Superchron (120–83 Ma). The seafloor underlying the northern part of the Tokelau ridge is dated between 120.4 and 131.9 Ma (Early Cretaceous).

Atoll and reef island development began when the volcanic foundations were still emergent islands in the Cretaceous to Eocene periods, followed by subsidence being offset by upward reef growth maintaining proximity to the sea surface over long time periods. Darwin has been reported to have used some of the Phoenix Islands as a basis for development of his theory of coral reef and atoll development.

Several bathymetric surveys have been completed in the Phoenix Islands. Seabed surface composition was primarily calcareous ooze, siliceous-calcareous clay, and brown clay. The substrate of the Phoenix Islands is almost entirely limestone with accumulated organic matter.

The Phoenix Islands reflect a geological sequence of globally significant mid-oceanic archipelagos, capturing a diversity of forms and developmental stages of ancient atolls, low reef islands, submerged reefs and seamounts, recording in their rock strata the formation of the world’s largest biogenic structures (atolls and reef islands) over the past 10 to 80 million years. These formations collectively contain one of the world’s most ancient and largest pristine atoll archipelagos, which in turn contribute essential habitat for coral communities, benthic algae communities, giant clam beds, intact atoll forests and intact atoll dry scrubs.

Bathymetry and Seamounts

PIPA has a huge bathymetric range with waters reaching to maximum of 6,147 meters depth but the main seafloor averages around 4,500 metres below the ocean surface. Additional to the ancient volcanoes that reach or approach the surface, bathymetry reveals a series of topographic features which are interpreted to also be volcanoes which technically qualify as ‘seamounts’ – ‘submerged mountains with a height of more than 1,000 metres above the sea floor but whose peak lies below the photic zone’.

Oceanography

Sea surface temperatures within PIPA are normally between 28-30°C. There is no significant thermocline down to 50 m depth. Sea level observations on Kanton show regular four-day oscillations related to equatorial waves. Oceanographic studies reveal that silicate and phosphate levels in the waters around the Phoenix Islands are elevated compared to adjacent waters. This may be a result of upwelling and have high importance for the pelagic food chain in the region.

The Phoenix Islands are adjacent to the equator and are predominantly influenced by the westward-flowing Equatorial Current (northern equatorial branch of the South Equatorial Current (BEN) and south equatorial branch of the South Equatorial Current (BES) (TBAP 1993). Offshore currents are generally westward. The strength of the currents varies with the wind. Usual current speed is 1.9 km per hour (1 knot), with a maximum of 3.7 km per hour (2 knots).

The Phoenix Islands are subject to the ENSO that occurs every two to seven years and lasts for 18 to 24 months. During ENSO events, the westward trade winds are reduced and the main water currents experience variations and even reversal. This deepens the eastern Pacific thermocline. More specifically, the Phoenix Islands are located within the region of the Central Pacific in which a warm pool of surface water develops at the onset of El Niño phases, and can experience persistent hotspots lasting 1 year or more, as occurred in 2002-3. This unique environment of high exposure to warm water pools may exert unusual selective pressures on marine organisms relevant to climate change adaptation, discussed further in later sections.

The Phoenix Islands are also in an area of unique subsurface water currents. This may have great significance for dispersing larvae originating from the Phoenix Islands.

Human Occupation

The Phoenix group islands have no permanent inhabitants, although most islands have a recent cultural history extending over the past 150 years. The one currently inhabited atoll, Kanton, has a non-permanent population of approximately 50 people comprising government employees and their families engaged in protection and management of Kiribati interests in the region.

1.2 PIPA Area Description

PIPA is the world's first large, truly deep water, mid-ocean marine protected area. Whilst the greater part by area of PIPA comprises mainly ocean floor with a water column averaging more than 4,000 metres, an important feature of the marine environment is the abundance of large extinct underwater volcanoes. These underwater mountains contribute to a huge diversity of marine habitat types - atoll, low reef island, submerged reef, seamount and deep seabed as well as open ocean habitats. It can also be described as an underwater 'mountain-scape' with the highest peaks of the volcanic mountains, some rising more than 5,000 metres above the adjacent seabed, the highest reaching almost to the surface forming atolls, reef islands and, just below the surface, shallow submerged reefs.

Total marine area: c. 408, 224.49 km²

Total land area: c. 25.51 km²

Total designated area: **408,250 km²**

Table 1. PIPA Island Areas & Geographic Coordinates

Island & Geographic Coordinates	Total area (ha)	Land area (ha)
Manra: 4°26.2'S to 4°28.0'S; 171°13.6'W to 171°15.9'W	-	c.500
Rawaki: 3°43.0'S to 3°43.6'S 170°42.5'W to 170°43.0'W	73.24	58.14
Enderbury: 3°6.3'S to 3°8.9'S; 171°4.7'W to 171°5.7'W	596.6	500+
Birnie: 3°34.8'S to 3°35.4'S; 171°30.7'W to 171°31.2'W	50.95	48.2
Kanton: 2°46.2'S to 2°52.2'S;	-	c.900

171°37.4'W to 171°43.4'W		
McKean: 3°35.5'S to 3°36.1'S; 174°7.2'W to 174°7.6'W	74.32	48.77
Orona: 4°29.0'S to 4°32.3'S; 172°8.1'W to 172°13.1'W	-	c.600
Nikumaroro: 4°39.2'S to 4°41.8'S; 174°29.8'W to 174°32.8'W	-	c.400

(From Pierce et al 2006)

Because the islands are small with large reef flat areas, they tend to change size depending on the weather and time, hence the approximate sizes. Areas of islands are still not formally surveyed and most recent hand-held GPS surveys by Ray Pierce et al in 2008 suggest smaller than above calculations in the table, i.e. Rawaki was calculated in 2008 to be 66 ha and McKean 32 ha incl. lagoons, the latter of which were 15.3 and 11.2 ha respectively. Birnie is probably also smaller than all the previous calculations suggest.

1.3 Legislative Authority and Purpose

PIPA is established under the Phoenix Islands Protected Area Regulations 2008 (Appendix 3), which were duly promulgated pursuant to sections 43(1) and 86(1) of the Environment Act (1999) as amended by the Environment (Amendment) Act 2007. PIPA is established with a total area 408,250 sq km (Figure 2), inclusive of all island and marine habitats therein.

The Phoenix Islands Protected Area is the Government of Kiribati's (GoK) conservation and sustainable use strategy for the Phoenix Islands and surrounding marine environment. The PIPA Management Plan is developed in accordance with its proposed World Heritage Listing and to further Kiribati's obligations to the World Heritage Convention. PIPA is managed as a Wilderness Area (International Union for the Conservation of Nature (IUCN) Category 1b).

Interim PIPA Management Measures have been agreed to by the PIPA Management Committee since PIPA was first declared in 2006. The PIPA Regulations 2008 require that "pending adoption of this [PIPA] management plan, no activity that takes place in or affects the PIPA or places at risk the ecological integrity of the PIPA shall be licensed, approved or undertaken by any public authority without the express written authorisation of the Minister." Section 6(5) of the PIPA Regulations 2008. Distant Water Fishing Nation (DWFN) tuna fishing fleets operating under valid licenses and agreements are not subject to the PIPA Regulation 2008 or the PIPA management plan with respect to their fishing activities, unless specifically decided otherwise by the Cabinet. Section 11 of the PIPA Regulation 2008.

1.4 Status of PIPA's Natural and Heritage Values

The marine environment of the PIPA is extremely diverse. It varies from the spectacular turquoise lagoons with huge coral heads and clams to pristine and colourful coral reefs that form and surround the atoll, low reef islands and submerged reefs down the slopes of the massive volcanoes to the ocean floor to over 6,000 meters deep. The marine environment of the PIPA is known to support a number of globally endangered and endemic species and hosts interesting and unique species assemblages not found elsewhere in the world.

From a marine science perspective the PIPA is extremely important because of the minimal human impacts and hence its nearly pristine state. In addition PIPA is uniquely situated biogeographically in

the centre of the equatorial Pacific. PIPA is believed to play a significant role in movements and dispersal of marine animals and larvae. Little is still known about the full effect of these islands on the surrounding pelagic marine species and systems, which in turn support internationally important seabird populations and numerous migratory birds.

A full description of habitats, species and ecosystems within PIPA is given in the PIPA World heritage Nomination Dossier (Government of Kiribati, 2009). In summary terms the condition of the PIPA's natural values, the following is provided.

- (1) Pristine coral reefs with natural populations of higher predators (sharks, large fish) – Coral reefs are near- pristine. In the early 2000s, legal and illegal shark fishing occurred in many of the Phoenix Islands. After the PIPA declaration in 2006, all shark fishing has been terminated. In 2006, one illegal shark fishing vessel was identified and caught. There is no inshore fishery in the Phoenix Islands since the termination of the Kakai scheme in the early 2000s, except for some subsistence fishing by the government caretakers and their families on Kanton (maximum 50 inhabitants). Coral reefs were impacted by bleaching events in 2002 and 2004. These bleaching events did not appear to impact fish populations or diversity. Since human impacts are basically nil in the Phoenix Islands, coral recovery appeared to be much quicker than in more stressed environments that are heavily influenced by anthropogenic factors.
- (2) Highest regional diversity of corals and fishes – Corals and fishes species are highly diverse. Coral reefs were impacted by bleaching events in 2002 and 2004, but are recovering.
- (3) Endemic species of corals and fish – Endemic species of corals and fish exist in the Phoenix Islands.
- (4) Spectacular lagoon coral and giant clam communities (Kanton and Orona) – Lagoon corals were impacted by bleaching events in 2002 and 2004, but are recovering. Spectacular lagoon giant clam communities exist.
- (5) Important marine turtle nesting beaches (Enderbury and Kanton) and breeding/feeding sites – The Phoenix Islands is an important nesting area for marine turtles. It has been speculated that the recently noted decline in sea turtle populations may be attributable to the illegal shark fishing operations in the early 2000s. With the 2006 capture of an illegal shark fishing vessel, the termination of all inshore commercial fishing projects, and the declaration of PIPA, sea turtle populations should recover.
- (6) Significant coconut crab populations on Nikumaroro – Coconut crabs exist on several of the Phoenix Islands, but are most abundant on Nikumaroro. In the past, coconut crabs have been harvested, but with the declaration of PIPA, harvest has been banned. This has resulted in coconut crab populations once again flourishing on Nikumaroro.
- (7) Traditional Kiribati medicinal plants now rare in the Gilbert Islands, still exist in the Phoenix Islands – There are several species of plants that are used for traditional Kiribati medicines. With population increases, land clearing, and urbanization of the Gilbert Islands, especially Tarawa, these plants are quickly disappearing. Several of these plants still exist in the Phoenix Islands. As such, PIPA can serve as the genetic depository for these important traditional medicinal plants.

- (8) Tuna spawning ground reported for skipjack tuna.
- (9) Important seabird colonies especially for greater/lesser frigate birds, terns, boobies, tropicbirds and petrels, including the threatened Phoenix petrel and white-throated storm-petrel. Rawaki has the greatest seabird diversity, but McKean and Enderbury are also very important and populations on these and the other islands will recover after pest removal. An initial assessment of harmful exotic species was completed in 2006 (see Pierce et al 2006). Plans have been approved for a phased approach to the removal of harmful exotic species in the Phoenix Islands. As harmful exotic species are removed and biosecurity strengthened, seabird colonies should recover. In addition, on Abariringa, harmful Persistent Organic Pollutants (POPs) were removed in 2006 which should also be beneficial to sea bird populations there especially in conjunction with pest removal. The islands are also important as non-breeding and transient areas for migratory shorebirds.
- (10) Population of Phoenix petrel (Endangered) and white-throated storm-petrel (Vulnerable) on Rawaki and potentially on Enderbury and McKean, and all islands are important non-breeding habitat for the bristle-thighed curlew (Vulnerable).
- (11) High isolation in the Central Pacific makes these islands unique and critical stepping-stone habitats for migratory, pelagic and planktonic species – There are no islands in close proximity to the Phoenix Islands. The oceanographic conditions are unique and the area is rich in plankton. This was the foundation for the sperm whale populations that were hunted in the early 1800s. It is also the foundation for economically important pelagic tuna fishery. At the same time, this isolation means that species in the PIPA are particularly vulnerable to overharvesting and that recovery of depressed populations will not likely benefit from in-migration of larvae and adults from elsewhere.
- (12) The Phoenix Islands include a large number of unexplored seamounts that form part of the Tokelau seamount chain which undoubtedly support unique marine communities – Seamounts are known to have a high level of endemism and often contain high percentages of species that are new to science. Seamount ecosystems are of very special interest for conservation. Several seamounts have been identified in the Phoenix Islands area. However, they have yet to be explored.
- (13) Unique cultural history reflecting ancient Polynesian and Micronesian exploration and settlement of the Pacific, 19th century whaling, guano discovery and extraction, aviation history, resettlement, role in WWII, the cold war, and space exploration – The history of the Phoenix Islands extremely diverse and spans centuries (see Chapter 2).

1.5 PIPA's Global Significance

PIPA is the world's first large, truly deep water, mid-ocean marine protected area. As a vast expanse of largely pristine mid-ocean environment, replete with a suite of largely intact uninhabited atolls, truly an oceanic wilderness, the PIPA, the largest marine protected area in the world (408,250 sq km), is globally exceptional and as such is a superlative natural phenomenon of global importance.

A feature of the marine environment of PIPA is an outstanding collection of large submerged volcanoes, presumed extinct, rising direct from the extensive deep seafloor with an average depth of more than 4,500

metres and a maximum depth of over 6,000 metres. Included in the collection of large volcanoes are no less than 14 recognised seamounts, submerged mountains that don't penetrate to the surface. The collection of atolls represents coral reef cappings on 8 other volcanic mountains that approach the surface.

These underwater mountains contribute a huge diversity of marine habitat types - atoll, low reef island, submerged reef, seamount and deep seabed as well as open ocean habitats. It can also be described as an underwater 'mountain-scape' with the highest peaks of the volcanic mountains, some rising more than 5,000 metres above the adjacent seabed, the highest reaching almost to the surface forming atolls, reef islands and, just below the surface, shallow submerged reefs.

The large bathymetric range of the submerged seamount landscape provides depth defined habitat types fully representative of the mid oceanic biota. The widely recognized local endemism and distinctive species assemblages associated with seamounts generally, specifically demonstrable in PIPA, is evidence of on-going *in situ* evolution of marine ecosystems and communities of plants and animals.

PIPA is of crucial scientific importance in identifying and monitoring the processes of sea level change, assessing growth rates and age of reefs and reef builders (both geologically and historically), and evaluating absolute and relative effects from climate change. The reef systems are so remote and exhibit such near pristine conditions that PIPA can serve as a benchmark for understanding and potentially restoring other degraded hard coral ecosystems in Kiribati and elsewhere in the Pacific. The islands are acknowledged as critical sites for ongoing study of global climate change and sea-level events in that they are located in a region less affected by other anthropogenic stresses. Because of the relative absence of anthropogenic influences these oceanic Central Pacific islands are also unique natural laboratories for understanding the growth of reefs, the evolutionary process of reef systems, biological behavioural studies, recruitment processes in isolation, size classes and population dynamics of marine organism groups and reef species diversity studies.

As a known breeding site for numerous nomadic, migratory and pelagic marine and terrestrial species, PIPA makes a significant contribution to the understanding of on-going ecological and biological processes in the evolution and development of global marine ecosystems and communities of plants and animals.

Due to its great isolation, PIPA occupies a unique position in the biogeography of the Pacific as a critical stepping stone habitat for migratory and pelagic/planktonic species and for ocean currents in the region. PIPA embraces a range of associated marine environments that display high levels of marine abundance as well as the full spectrum of age and size cohorts, increasingly rare in the tropics, and especially in the case of apex predator fish, sea turtles, sea birds, corals, giant clams, and coconut crabs, most which have been depleted elsewhere. The overall marine trophic dynamics for these island communities across this archipelago are better functioning (relatively intact) compared with other island systems where human habitation and exploitation has significantly altered the environment.

PIPA provides important natural habitats for in-situ conservation of globally important oceanic biological diversity, both marine and terrestrial. It is the most important secure habitat of the local endemic and now endangered Phoenix petrel and serves as crucial breeding and resting area for a number of migratory birds. PIPA collectively provides very important habitat for the continued existence of a number of globally endangered species (e.g. Napoleon wrasse, hawksbill turtle), vulnerable species (e.g. white-throated storm petrel, bristle-thighed curlew, green turtle, giant clam, bumblehead parrotfish) and numerous others globally depleted species, both marine and terrestrial, including for example apex predators such as

sharks. It also provides opportunities for biota to recolonise other central Pacific habitat as it becomes restored.

The remoteness of the area and absence of permanent human settlement provides a unique opportunity for a high standard of habitat protection for species and ecosystems of global importance to science and conservation, from atoll to deep sea.

1.6 Relevance to Kiribati Commitments under International Treaties and Conventions.

The PIPA represents an unprecedented commitment by a Small Island Developing State to meet many of its international commitments under the conventions listed below. Protecting the PIPA ecosystems and species from anthropogenic damage while managing them for sustainability provides an opportunity to show how conservation and sustainable development are mutually supportive and may be carried out in other places. Information on ecosystems, species and economic sustainability from PIPA, reported through these conventions, can be used as benchmarks for other countries in measuring and targeting commitments under the conventions.

World Heritage Convention (WHC). Kiribati became a party to the WHC in December 2000. PIPA was submitted to the WHC for listing as a natural site in January 2009.

Convention on Biological Diversity (CBD). Kiribati became party to the CBD in August 1994. The three objectives of the CBD, to conserve biodiversity, sustainable use, and ensure equitable access to its use are core principles of PIPA.

Ramsar Convention on Wetlands. The shallow coral reefs, lagoons and brackish wetland systems in the Phoenix Islands fall under the convention description of wetlands, and could be listed as a site under Ramsar.

United Nations Framework Convention on Climate Change (UNFCCC). Kiribati ratified the UNFCCC in February 1995, and is one of the most vulnerable of all countries to climate change impacts, as a result of sea level rise and impacts to freshwater and groundwater resources. As a Climate Change Research Laboratory, PIPA can help Kiribati understand climate change impacts to atolls, and research in PIPA can be of global significance/

World Summit on Sustainable Development (WSSD). Kiribati was party to drawing up the Millennium Development Goals (MDGs) under the WSSD. PIPA may help Kiribati in meeting the MDGs, particularly MDG 8, on environment and sustainability.

1.7 Summary of PIPA Management Planning

Phoenix Islands Management pre-2005

The only previous management plan for the Phoenix Islands was prepared by Garnett in 1983. It focused mainly on terrestrial resources and was never effectively implemented. Birnie, Kanton, Enderbury and Orona were identified as “prohibited areas” under the Prohibited Areas Ordinance 1957 (Cap 77), which had the effect of prohibiting entry but did not require or contemplate active management measures. Portions of Kanton were also declared protected under the Closed Districts Act 1990, although the principal objective of this declaration was to allow the orderly development of the atoll. Finally, Rawaki, Birnie and McKean were declared as wildlife sanctuaries under the Wildlife Conservation Ordinance (WCO) (Cap 100??). This statute protected wildlife from human interference but did not protect wildlife habitats. Various specified bird species and the green turtle were protected

under this statute on many of the Phoenix Islands, although again active management was not an element of the program.

PIPA Management 2005-2007

In August 2005, the GoK and partners New England Aquarium (NEAq) and Conservation International (CI) agreed a Memorandum of Understanding (MOU) to design and establish PIPA. This was based on results of two scientific expeditions and extensive consultations amongst the partners. GoK formally declared the PIPA in March 2006. Apart from DWFN activities, from 2006 until February 2008, all activities in PIPA were overseen and decided upon by the Phoenix Islands Steering Committee (PISC). While the focus of this Committee's effort was on the design and full establishment of PIPA, numerous management decisions and protective measures were also instigated during this time including:

- 2005 assessment of coral reef bleaching recovery and associated reef and atoll monitoring
- 2006 assessment of status of protected bird species
- 2006 assessment of impact of invasive species and feasibility of priority eradications, and
- 2006 prosecution of illegal shark finning

PIPA Management 2008- 2009

PIPA was legally created by the Phoenix Islands Protected Area Regulations 2008, which were promulgated pursuant to the terms of the Environment Act 1999, as amended by the Environment (Amendment) Act 2007. Management of PIPA is governed by the terms of the PIPA Regulation 2008 and the provisions of Division 2 of the Environment Act 1999, as amended, that prescribe management requirements for all protected areas created under the act.

Pursuant to the terms of the Environment Act 1999(as amended 2007) and the PIPA Regulation 2008, PIPA is administered by the Minister of the Ministry of Environment, Lands and Agriculture Development (MELAD),. Direct management of the PIPA is under the responsibility of the Secretary of MELAD, who serves as the Principal Environment Officer under the Environment Act 1999 (as amended 2007). Acting pursuant this Act and the PIPA Regulations 2008, the Minister of MELAD has constituted a PIPA Management Committee (PIPA-MC), comprised of representatives of all government agencies and other specified non-government entities with a responsibility for the Phoenix Islands (Appendix 3,). The PIPA-MC is chaired by the Secretary of MELAD and it meets regularly with meeting decisions and follow-up implementation documented and reported by the Director of the PIPA Office.

The PIPA Regulations 2008 specify that the PIPA-MC is responsible, among other duties and tasks, for development of the PIPA management plan within twelve months of the regulations coming into force.. This Management Plan is being developed in fulfilment of that obligation.

While this Management Plan has been under development, the PIPA-MC agreed and successfully implemented, with various partners, a range of interim management actions which implement PIPA Regulations (2008) and are aimed at increasing protection of PIPA. These include:

- Invasive Species Eradication Mission (New Zealand Overseas Development Agency (NZODA), New Zealand Department of Conservation (NZ-DOC), MELAD, Pacific Invasive Initiative (PII), and Pacific Expeditions) in 2008 (Pierce et al 2008)
- Visitor Permit system and associated Rules, and Fees
- Research Permit System and associated Rules and Fees
- Tourism Operator Permit system and associated Rules and Fees
- Completion of PIPA Resource Valuation, Endowment Strategy and Trust Fund legislation,

- PIPA World Heritage Nomination
- A range of enforcement and surveillance activities including successful prosecution of illegal vessel and response to a potentially serious vessel grounding on Kanton Atoll.

The PIPA Management Committee has developed and finalised this Management Plan with support from the PIPA Office and partners CI, NEAq and expertise provided by the Governments of Australia and New Zealand.

CHAPTER 2 HUMAN USES OF PIPA – ISSUES AND CHALLENGES

2.1 History, Development and Cultural Values

The Phoenix Islands were inhabited by Polynesian settlers between approximately AD 950 to 1500. They left stone building foundations that resembled marae from eastern Polynesia. In addition to building foundations, ancient stone weirs and fish traps were also discovered on some of the Phoenix Islands. It was speculated that the Phoenix Islands were abandoned because of droughts. Evidence was also found that suggested the Phoenix Islands were visited by Caroline Islanders (Micronesians). Most archaeological structures were found on Orona and Manra.

Western discovery of the Phoenix Islands began in earnest with the expansion of the American whale fleet into the Pacific in the early 1800s and focused on sperm whales. Many of the Phoenix Islands were ‘discovered’ by American or British whalers. It was not until the U.S. Exploring Expedition of 1838 to 1842, that the exact position of many of the Phoenix Islands was determined.

In the mid 1800s guano became an important agricultural commodity worldwide. The 1856 U.S. Guano Act allowed American citizens to claim previously unclaimed and uninhabited islands for guano extraction. Most of the Phoenix Islands were claimed and registered under this act. Guano was extracted from many of the Phoenix Islands. After major deposits had been depleted, effort focused on transforming the Phoenix Islands into coconut plantations. Coconut trees were planted, but many died due to drought conditions. Title to the Phoenix Islands was transferred between various companies in the early 1900s. With the Kingsford-Smith pioneering trans-Pacific flights in 1928 and 1934, the USA and UK began competing for a mid-Pacific refueling stop. Amelia Earhart was lost at sea in 1937 and may have landed on Nikumaroro. Later that year, a solar eclipse centered in the Phoenix Islands was studied by teams from the USA and NZ. In 1938, UK began resettlement of Manra, Nikumaroro, and Orona with people from the Gilbert Islands which were considered over-populated. In 1939, Kanton and Enderbury were placed under the joint administration of the UK and USA. This allowed for construction of airport facilities on Kanton that same year.

The outbreak of WWII resulted in isolation for the settlements in the Phoenix Islands. Kanton became a center of military activities, with the U.S. military development of three air strips, and one seaplane landing area within the lagoon. Kanton was a critical link to ferrying military equipment from the USA to NZ and Australia during WWII. Kanton was bombed by the Japanese on three occasions.

After WWII, Kanton airport facilities were turned over to U.S. civilian control. Up to four different airline companies used this facility until the late 1950s, when jet aircraft began flying non-stop between Hawaii and Fiji. Droughts hit the Phoenix Islands causing abandonment of the Manra colony in the mid-1950s. Inhabitants of Orona and Nikumaroro were resettled in the Solomon Islands in the early 1960s and the United States of America Airforce (USAF) set up a space vehicle tracking station on Kanton. This was later converted to a satellite tracking station, then to a Space And Missile Test Center (SAMTEC). SAMTEC closed in 1976 and in 1979 a Treaty of Friendship was signed between the USA and GoK in which the USA gave up its claims to Kanton and Enderbury.

After Kiribati independence in 1979, GoK declared a 200 nautical mile Exclusive Economic Zone (EEZ) around the Phoenix Islands. Various schemes were attempted to resettle the Phoenix Islands including the Kakai scheme on Orona in 2001. Key economic activities such as copra, bech-de-mer, and sharkfin harvest were undertaken. However, the scheme was not successful nor sustainable and was closed in 2004. In the 2000s, NEAq began periodic visits to the Phoenix Islands to document conditions on these islands. An outcome of the NEAq studies was the 2006 GoK declaration of PIPA.

Today, in 2009, 31 people live on Kanton as caretakers on behalf of the GoK, which also serves as a port of entry for Kiribati.

In summary, a number of identified cultural and historical values that PIPA has include:

- Archaeological evidence, including walled structures, is evidence of early colonization by both Micronesians and Polynesians, providing an important cultural link and an example of island voyaging over time and the limits to which human settlement can extend – even into modern times. The Phoenix Islands could be considered an overlap area of these two important Pacific Islands peoples.
- The island Nikumaroro was named by Gilbertese settlers in 1937 in honour of the island of Nikumaroro, in the south of the Gilbert Group, from which the famous Gilbertese ancestress Nei Manganibuka came, bringing with her the traditional lore of deep-sea navigation and the first *buka* tree.
- Nikumaroro is possibly the site of the crash landing of Amelia Earhardt on her failed trans-Pacific flight in 1937. Remains of a well-documented World War II crash also exist on the island of Manra.
- Several islands in the group hold archaeological remains of settlements, guano mining and whaling/transiting ships from the 19th and early 20th centuries.
- Archaeological remains of the 20th century world include British and United States military bases from the Second World War, the airfield markers and base for the Trans-Pacific Pan-Am Clipper seaplane flights of the mid 1940-50s, and the United States missile testing base SAMTEC.

2.2 Fisheries Development

Offshore Fisheries

Interest in offshore fisheries resources (tuna) around the Phoenix Islands began after WWII, stimulated by Hawaiian fishing interests. Fisheries research indicated that juvenile skipjack were available in the Phoenix Islands, indicating that this area was a skipjack spawning area. In the 1980s tuna tagging studies were initiated. Results indicated that these species migrate large distances during their lifetimes, including ranging through the waters of the Phoenix Islands.

The offshore fisheries (tuna) were active prior to Kiribati independence in 1979. GoK control over its waters was established in 1979 when the 200 nautical mile EEZ was declared. In 1987, the USA and certain Pacific Island states entered into a Multilateral Treaty on Fisheries. This allowed US purse seiners to operate in Kiribati waters (including the Phoenix Islands). Effort (days fishing) and landings data for longline, pole and line, and purse seine vessels for vessels fishing in the Kiribati EEZ (including the Phoenix Islands) has been published for each of the DWFN fleets. Data indicate that periodically during certain years the Kiribati EEZ around the Phoenix Islands is a significant source of tuna. Apparently during periods of El Niño, sea surface temperatures increase in the Phoenix Islands along with skipjack landings.

There is increasing concern on the sustainability of tuna fisheries in the Pacific Islands region. The Government of Kiribati, as party to the Nauru Agreement, has instituted measures to restrict effort in Kiribati waters, e.g., restrictions on the use of fish aggregation devices and purse seine exclusion zones. These measures apply to PIPA, contributing to PIPA's role as an MPA used to conserve tuna. There is evidence of tuna spawning grounds in PIPA and further research is needed to better understand the significance of these spawning grounds. Kiribati has also agreed to a 'reverse fishing license' concept whereby compensation will be paid to the government for lost DFWN revenues in return for increased conservation and protection of pelagic resources, submerged reefs, and sea

mounts in the PIPA, achieved through expanded DWFN area closures. This concept has been agreed to be phased in. The PIPA Management Plan proposes to use a zonation approach whereby certain areas are delineated within the PIPA boundary and will be specified with respect to permissible and prohibited uses or activities. The current or baseline zonation of PIPA with respect to full “no-take” areas amounts to 3.87% of the total PIPA marine area (Figure 4). During the next phases of implementing the PIPA Management Plan, Kiribati intends to zone an additional 25% of the MPA as a no-take zone as a measure to conserve tuna stocks.

Although there are no domestic commercial offshore fisheries currently operating in PIPA, any future development of domestic commercial fishing licenses will be conditioned to reflect the government’s decision to prevent further commercial exploitation of these resources.

Inshore Fisheries

The inshore fisheries on the Phoenix Islands have been limited by virtue of the isolation of the islands and their limited human populations. After WWII and prior to the collapse of commercial airline connection on Kanton in the late 1950s, there were up to three fishing companies exporting fish to Hawaii. They made use of the commercial airline connections through Kanton. Most recent fishing has been for subsistence needs only for the local Kanton community. In the early 2000s, shark fishing by a DWFN vessel on several Phoenix Islands and by Kakai scheme participants on Orona resulted in the massive depletion of sharks on several Phoenix Islands. There was speculation that these shark fishing efforts may have also reduced turtle populations there.

Surveys led by NEAq have determined that coral reefs and inshore fisheries are extremely robust and constitute spectacular examples of these globally important habitats and species. In this Plan’s Phase 1 or Baseline Zonation, seven of the atolls are designated as full “no take” zones out to 12 nautical miles around each reef system (Figure 4). On Kanton subsistence fishing is permitted to meet the needs of the local caretaker population. Although there are no domestic commercial inshore fisheries currently operating in PIPA, and future development of domestic commercial inshore fishing licenses will be conditioned to reflect the government’s decision to prevent further commercial exploitation of these resources.

2.3 Existing Uses

At this time, all of the Phoenix Islands are uninhabited except for Kanton. There are GoK employees on Kanton in a caretaker capacity with a total population is about 30.

The Phoenix Islands are periodically visited by ocean going yachts and by special boat charters for recreational divers and various researchers and ecologists. Immigration clearance is by the customs officer on Kanton. In addition, inter-island boats that service Tarawa and Kiritimati periodically re-supply the residents of Kanton and the GoK patrol vessel visits the Phoenix Islands at least annually.

As noted above, wildlife sanctuaries, closed areas, and prohibited areas have been previously established on a number of the PIPA islands, including Rawaki (Phoenix), McKean, and Birnie.

The Phoenix Islands Protected Area was declared in 2006, subsequently enlarged and legally gazetted by the GoK in early 2008. PIPA is the ‘current use’ of the Phoenix Islands and embodies Kiribati’s conservation and sustainable resource use aspirations of this component of its territory. The PIPA Regulations 2008 provide the full mandate for Kiribati to manage all uses and interests across all sectors for these islands.

2.4 PIPA Management Issues and Challenges

Detailed descriptions and documentation on environmental issues related to the Phoenix Islands are provided in Uwate and Teroroko (2007a) and in the PIPA World Heritage Convention (WHC) Nomination dossier (2009). Environmental issues and challenges include the following.

- Conservation of Natural Heritage and Biodiversity - The Phoenix Islands was identified as a key biodiversity area within the Polynesia/Micronesia Biodiversity Hotspot Program under CI's Critical Ecosystem Partnership Fund (CEPF) (Atherton, 2008). This designation reflects the diversity, abundance and in some cases threatened species status of seabirds found in these islands. Coral reef and associated biota have now been well documented and contain populations of globally important and threatened species and are superb examples of intact coral reef ecosystems. Maintenance, and in some cases restoration, of biodiversity values are a key challenge for PIPA's management.
- Recovery of Endangered and Threatened Species – Endangered species listings that relate to the Phoenix Islands include (1) the IUCN Red List of Threatened Species that lists endangered species is for Kiribati, and (2) the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) appendices for Kiribati. These lists are updated regularly by Environment and Conservation Division of MELAD (ECD) nationally, and the lists for the Phoenix Islands are integrated into these. The Red List and CITES lists for Kiribati are provided in the Appendices. Of particular interest is sperm whales. In the early 19th century the American whaling fleet flourished in the Pacific and many thousands of sperm whales were taken from Phoenix Islands waters. During more recent expeditions to the Phoenix Islands no sperm whales have been observed
- Atoll restoration, Biosecurity and Invasive Species Management – A number of species have been accidentally or deliberately introduced to the Phoenix Islands, some having caused significant environmental damage to the local flora and fauna. A significant ongoing challenge and investment for PIPA is in the eradications of invasive alien species and prevention of any new introductions. Feasibility studies and prioritizations have been carried out for invasive species management in PIPA and the first two highest priority eradications (the rabbit, *Oryctolagus cuniculus*, from Rawaki, and the Asian rat, *Rattus tanezumi*, from McKean) were carried out in 2008, but their long term success has yet to be confirmed. Priority actions for additional restoration in the Phoenix Islands (see Pierce et al 2006) include:
 - Eradicate the Pacific rat, *Rattus exulans*, from Birnie.
 - Eradicate the Pacific rat, *Rattus exulans*, from Enderbury.
 - Eradicate cats (and rodents if present) on Orona.
 - Complete biosecurity planning and ensure ongoing implementation.
- Illegal and Overfishing - Inshore fisheries of the Phoenix Islands are vulnerable to over fishing. In the early 2000s, a shark fishing vessel operated in several of the Phoenix Islands. After one illegal visit by one vessel, shark populations were fished in one atoll to near-zero levels. It was speculated that this one vessel also reduced turtle populations in the islands visited. Currently seven of the eight atoll/reef islands are no take zones and a sustainable resource use plan will be developed for the remaining atoll, Kanton. Surveillance and enforcement of these inshore areas together with offshore fishing is a significant ongoing challenge for PIPA.

- Illegal and Overfishing – Off shore fisheries of the Phoenix Islands are focused on tuna. GoK is party to a range of fisheries agreements but has limited capacity for surveillance, enforcement and management. Despite this the recent agreements under the 3rd Arrangement to the Nauru Agreement has important fisheries management decisions including a 3 month ban on Fish Aggregating Devices (FADs) and a mandatory 100% observer coverage. The Nauru Agreement is a fisheries agreement between eight Pacific Islands states, including Kiribati, that aims to empower their role in tuna fisheries in their EEZs. The recent signing of the Shipriders Agreement between USA and Kiribati also provides an additional mechanism for fisheries management. Under this agreement Kiribati's Officers can travel on the USA surveillance vessels and have full powers of investigation and arrest in Kiribati waters. Surveillance and enforcement of offshore fishing by DWFN, both legal and illegal, remains a significant challenge not only for PIPA but for GoK's entire EEZ.
- Climate Change, Coral Bleaching, Sea Level Rise and Ocean Acidification - In July to September 2002, there was a sea temperature hot-spot in the Phoenix Islands which caused mass bleaching and mortality of corals, most notably in the lagoon of Kanton and leeward reefs of Kanton and Nikumaroro. Long term monitoring pre and post bleaching indicates rapid recovery of PIPA's coral reefs, likely due to the fact that there are no other stressors present eg over fishing, pollution etc. All PIPA's atolls and reef islands are low lying and vulnerable to sea level rise. Terrestrial vegetation and seabird populations are vulnerable to salinization of groundwater due to sea level rise and inundation. There is also concern at the impacts of increasing ocean acidification on coral reefs and other species in PIPA. Due to the absence of other anthropogenic stressors PIPA has a potentially important role to play in researching and understanding impacts of coral bleaching, climate change and resilience of tropical reef systems.
- Cultural Heritage - archeological investigations have confirmed that Polynesians and Micronesians variously used the Phoenix Islands. However all attempts at settlement appear to have been unsuccessful in the long term likely due to limited freshwater resources and frequent droughts. Conservation of marae, fishing structures and sites from more recent human history with PIPA are planned. PIPA exemplifies the limit of Pacific peoples' migrations and attempted colonization.
- Ocean Dumping - An explosives dumping area was established southwestward of Kanton at the end of WWII. Coordinates for the dumping area were 3^o09'S to 3^o28'S, and 171^o53'W and 172^o13'W. Other areas of Kiribati eg Tarawa have been cleared of military waste due to the threat it poses to local fisherman in particular.
- Toxic Wastes – Various toxic materials were left by the US military on Kanton after WWII. Some of these materials leaked from their containers and had spilled onto the concrete floor. Asbestos strips were common at former military sites on Kanton. Polychlorinated Biphenyls (PCB's) were found in transformers and probably were also present in switches and other electronic equipment. Toxic wastes were inventoried in 2002. Most were removed in 2006 under a Secretariat of the Pacific Regional Environment Programme (SPREP)/ Kiribati/ Australian programme.
- Unregulated Visitors – Visitors to the Phoenix Islands largely arrive by recreational yachts or increasingly through tourist charters. Some may anchor and stay on one of

the Phoenix Islands for extended periods. Some probably do not clear Customs and Immigration on Kanton first and others from fishing boats and freighters have been known to land. There are environmental concerns with unregulated visitors. These include: disposal of sewage and wastes, illegal collection and harvest of terrestrial and marine resources, potential introduction of Invasive Alien Species (IAS) and disturbance of bird populations. The arrival of IAS on any of the islands could be disastrous and significantly undermine the restoration goals for the PIIPA.

- Vessel Groundings, potential Oil Spills and IAS arrival - The Phoenix Islands have had numerous vessel groundings over the years. One of the earliest recorded groundings was the whaleship *Canton* on Abariringa (Kanton) in 1854. Undoubtedly, there have been other groundings that were not permanent, did not result in vessel loss, or were not reported. Ships caused coral damage during grounding and break-up. More recently (c.2001) a Korean trawler grounded on McKean Island and is believed to have been the source of the introduction of Asian rats (Pierce et al 2008). It is now also becoming clear that rusting shipwrecks add iron to the water around them, and since iron is severely limiting in the Central Pacific, this results in significant shift of reef ecology to dominance by turf algae, and death of corals (Stone et al. 2009).
- Tourism –the declaration and publicity surrounding PIPA interest in tourism, particularly dive tourism, is increasing. Tourism is seen as a potential source of sustainable income for GoK and PIPA. A strategy to develop tourism in a safe, sensible and sustainable manner is a key action area within this management plan.
- Deep Sea - a significant component of PIPA is deep sea and open ocean habitat. Little is known about the submerged reefs or 14 or more seamounts within PIPA's boundaries. Research into these areas is planned as resources and opportunities allow.
- Transboundary Issues – the range of several species present in the Phoenix Islands extend beyond the limited of the Phoenix Islands. Many species of birds, fish, and turtles migrate to and from the Phoenix Islands. In order to protect these migrating species, habitat and conditions in other parts of a species range need to be considered.
- Overall Management, Surveillance Enforcement, Human Capacity and Resources - there remains limited capacity and resources within Kiribati to provide effective management for PIPA. Isolation can no longer be relied upon to protect the values of PIPA. This is a key action area under development and resourcing in this plan and is reflected in the partnerships GoK has fostered to implement the PIPA.

Critical cross cutting issues related to the above primary issues and challenges list are:

- Lack of information (data gaps) – resource surveys on birds, plants, insects, mammals, corals, and fish of the Phoenix Islands have increased in the last decade. Nevertheless, for many species and systems on the islands, information available may be several decades old. No resource surveys have been reported for either Winslow or Carondelet reefs, nor on the unnamed reef just northwest of Carondelet. Major data gaps are noted for turtles, reptiles, marine mammals, coconut crabs, and deepwater habitat and associated species.

- Lack of accessibility to available information – During this planning effort, perhaps 90 percent of the research reports found relating to the Phoenix Islands were not previously available in Kiribati. In many cases, despite local research permit requirements, no report was submitted to GoK, or the report was misplaced or lost. Without access to documentation on previous activities and research, planning for an activity or research is difficult.
- Non-standardized data collection and analyses – In the resource surveys in the Phoenix Islands survey methodology has varied almost as much as the number of researchers. Results from using different survey methodologies are difficult, if not impossible, to compare. In some cases, the methodology is not quantitative and resultant data cannot be compared. Survey results need to be quantifiable and comparable.
- Limited local, global, and visitor awareness – The Kiribati people are not completely familiar with the all the attributes of the PIPA and need to be educated and kept informed about the special features of the Phoenix Islands, and about progress in managing this resource. Local support for PIPA in Kiribati is essential for its success. In addition, the awareness of the global community needs to be improved regarding PIPA and its many unique features. Many know of the declaration of PIPA, but many more need to be made aware of the unique resources and features of the Phoenix Islands. Visitors to the Phoenix Islands need to be informed about PIPA. They can also be enlisted to assist in monitoring activities on the islands.
- Limited surveillance and enforcement of existing wildlife sanctuaries - Over the last several decades, there has been basically no surveillance and enforcement of the declared wildlife sanctuaries on some of the Phoenix Islands – their sheer isolation has been their saving grace. This situation needs to be addressed in the formulation of PIPA. Some activities can quickly reduce pristine populations to almost zero, as in the case of recent shark finning activities and the recent harvests of coconut crabs on Nikumaroro. Without surveillance and enforcement, the resources of the Phoenix Islands can quickly be exploited to the point of stock collapse.
- Limited biosecurity measures at the source areas (especially Tarawa, Kiritimati) for vessels travelling to and through the PIPA.
- Sustainable economic development – There are limited economic opportunities in Kiribati. With the development of PIPA, opportunities for tourism and fisheries development and employment may develop. Opportunities may include ecotourism and catch and release fishing by visiting tourists. Other potential opportunities for revenue generation for GoK need to be investigated. GoK also wishes to keep the option of ocean mining operations open. Any development activities should be sustainable and executed in an environmentally friendly manner consistent with the PIPA Regulations 2008.

Critical issues that relate to support for management and logistics include:

- Transportation limitations – There are several major problems that will be encountered by anyone planning to use Kanton. These include the isolation and consequent lack of regular transportation to and from the island. During the Kakai Scheme, the costs of servicing the island were too high to justify the volume of cargo shipped. The

diversion of an inter-island vessel was over AUD \$5,000 per trip. For any visit to the Phoenix Islands, transport costs can be very high.

- High operating costs of activity in the Phoenix Islands – There are extremely limited resources available on the Phoenix Islands. All supplies and construction materials, food and equipment must be imported. This makes establishing and operating any facility on the Phoenix Islands extremely expensive.
- Remoteness of each Phoenix Island relative to others – There are eight Phoenix Islands. Some of these islands are more than 200 nautical miles (nm) away from their neighbours. This distance cannot be covered safely in a small vessel with an outboard motor. It is costly and difficult to visit all of the islands of the Phoenix Group, even if based on Kanton. A sea-worthy vessel with at least 500 nm range would be required. Also, adequate fuel supplies for refuelling the vessel would be needed on Kanton.
- Costly communication - Communication is limited to radio and satellite phone. Internet is available to marine vessels so a similar system could be installed on the Phoenix Islands.
- Lack of safe anchorage and landing facilities – For most of the Phoenix Islands, except Kanton, landing facilities are non-existent. Changing weather and currents coupled with the limited size of suitable anchorage areas makes safe anchoring very difficult. During the guano period in the late 1800s, special permanent anchors and cables had to be set up for guano ships. Consideration is needed regarding permanent anchoring stations so that vessels can anchor safely and the fragile coral reef habitat is preserved.
- Developing effective biosecurity for the Phoenix Islands.
- Lack of potable water – There is limited freshwater in the Phoenix Islands. Some of the islands do have freshwater, but not enough to support large populations. Major considerations are needed for all activities involving placement of people on the Phoenix Islands, whether this is for short term (such as for research surveys) or long term (for management purposes).

CHAPTER 3. PIPA MANAGEMENT PLAN 2010 – 2014:

VISION, GUIDING PRINCIPLES, MANAGEMENT OBJECTIVES & STRATEGIC ACTION PLAN SUMMARY

3.1 PIPA's Vision:

“to conserve the natural and cultural heritage of the Phoenix Islands Protected Area for the sustained benefit of the peoples of the Republic of Kiribati and the world.”

3.2 PIPA's Mission

“to implement effective integrated and adaptive management that ensures the natural and cultural heritage values of PIPA are maintained, and where necessary restored, to achieve PIPA's Vision”

3.3 Guiding Principles

The Management of PIPA will be carried in accordance with the PIPA Regulations (2008) and in consistent manner with the agreed PIPA Vision and Mission using the following guiding principles (drawn from DOALOS 2007):

- “Intergenerational equity - Future generations are entitled to inherit marine resources and biodiversity in a state that is as good as, or better than, their current state”.
- “Ecological sustainability - Ecological sustainability is the foundation of both social and economic development. Key elements of management and planning for ecological sustainability include ecosystem-based management, conservation of ecological processes, protection of critical habitats, use not to exceed maximum sustainable yield or carrying capacity, conservation of biodiversity in general and conservation of rare and endangered species in particular”.
- “The precautionary principle - The absence of scientific certainty should not be a reason for postponing management of protected areas. If an activity is assessed as having a low risk of causing serious or irreversible damage or if there is insufficient information with which to assess fully and with certainty the magnitude and nature of impacts, decision making should proceed in a conservative and cautious manner”.
- “Integrated planning and management - Many of the activities that can potentially threaten Protected Areas (PAs) occur outside their borders, including terrestrial areas, and often come under the jurisdiction of other management agencies. Management of PAs should consider all potential sources of threats and develop a management protocol that addresses these threats. In order to achieve this, management of the PA will need to be integrated with management responsibilities of the other relevant agencies”.
- Adaptive management – PA management needs to be viewed as an adaptive process or experiment that is varied in response to changes in the character and intensity of threats, increased knowledge, and changes in the composition of the local community. Adaptive management requires the establishment of performance measures at the outset of management. The results of systematic monitoring of key indicators are evaluated against the agreed performance measures, and management adjusted (if necessary) to ensure that objectives and goals are being achieved”.

- Ecosystem Approach - A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (IUCN 2006). The application of the ecosystem approach will help to reach a balance of the three objectives of the CBD: conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.
- Resilience – “The ability to absorb or recover from disturbance and change, while maintaining ecosystem functions and services. Resilience relates to the concepts such as representation, replication, refugia, connectivity, and management”.
- “Stakeholder consultation and participation – protected areas are used by a range of stakeholders, many of whom derive their livelihoods from the PA and have no alternative sources of livelihood. They are likely to be affected by management of the PA and have the right to be consulted and to play an active part in the decision-making process. Many stakeholders also possess much knowledge and experience that can assist in planning and management’.
- “Capacity-building - A key element to the successful implementation of PA management is skilled and knowledgeable staff. Where skills and knowledge are limited, capacity building of staff is a critical element in the success of PAs. Capacity building is required both at headquarters level, focusing on skills for effective management, enforcement, communication and decision-making, and at field levels, focusing on surveillance, monitoring, pest and incident management, communication and education.
- Technology transfer - Considerable technology is available that facilitates decision-making and the evaluation of management actions. A modern and appropriate technology base is a central component of PA management. This includes computing and communication facilities, information resources, and geographic information systems. A sustainable long-term financing strategy is also important for the success of the PA”.
- Transparency of decision making – Decisions regarding the management of the protected area need to be made transparent to the public. Information on decision makers, their decisions, and the basis for their decisions should be readily available to the public.

3.4 PIPA Regulations (2008) - Management Objectives

The PIPA Regulations (2008) set the long term management objectives for this PIPA Management Plan:

1. To conserve and manage substantial examples of marine and terrestrial systems to ensure their long-term viability and to maintain genetic diversity;
2. To conserve depleted, threatened, rare or endangered species and populations and, in particular, to preserve habitats considered critical for the survival of such species;
3. To conserve and manage areas of significance to the lifecycles of economically important species such as tuna;
4. To prevent human activities from detrimentally affecting the PIPA;
5. To preserve, protect, and manage historical and cultural sites and natural aesthetic values;

6. To facilitate the interpretation of marine and terrestrial systems for the purposes of conservation, education and tourism;
7. To accommodate within appropriate management regimes a broad spectrum of multi-use human activities compatible with the primary goal of marine and terrestrial conservation and sustainable use, including appropriate fishing, ecologically-sound tourism, and sustainable economic development;
8. To provide for research and training, and for monitoring the environmental effects of human activities, including the direct and indirect effects of development activities; and
9. To ensure consistency between all activities taking place in the PIPA and any third-party conservation contracts into which the Minister may choose to enter with the advice and approval of the Cabinet for the conservation and long-term sustainable use of the PIPA.

3.5 Summary PIPA Strategic Action Plan (SAP) Framework 2010 -2014

To implement the long term PIPA Management Objectives the following Strategic Action Plan (SAP) Framework for 2010-2014 has been developed.

SAP 1. PIPA Core Management:

Decision making, Administration, Core Management and Resourcing

- **SAP 1.1 GoK MELAD Minister and Cabinet**
- **SAP 1.2 PIPA Management Committee**
- **SAP 1.3 PIPA Managerial Operation**
- **SAP 1.4 PIPA Regulations, Licenses and Permits and Penalties**
- **SAP 1.5 PIPA Zonation**
- **SAP 1.6 PIPA Surveillance and Enforcement**
- **SAP 1.7 PIPA World Heritage Listing**
- **SAP 1.8 PIPA Partnerships, Transboundary & International Collaboration**
- **SAP 1.9 PIPA Information Management, Education and Outreach**
- **SAP 1.10 PIPA Science and Research**
- **SAP 1.11 PIPA Tourism**
- **SAP 1.12 PIPA Kanton Atoll – Sustainable Resource Plan**
- **SAP 1.13 PIPA Monitoring and Evaluation**
- **SAP 1.14 PIPA Sustainable Financing, Resourcing and Business Planning**
- **SAP 1.15 PIPA Annual Operational Work Plan & Report**

SAP 2. PIPA ‘Issues to Results’

- **SAP 2.1 PIPA Atoll & Reef Islands Restoration & Biosecurity**
- **SAP 2.2 PIPA Coral Reefs and Coastal Management**
- **SAP 2.3 PIPA Endangered and Threatened Species**
- **SAP 2.4 PIPA Offshore Fisheries**
- **SAP 2.5 PIPA Cultural and Historical Heritage**
- **SAP 2.6 PIPA Seamount & Deep Sea Conservation**
- **SAP 2.7 PIPA Climate Change**

SAP 3. State of PIPA Report 2014

CHAPTER 4. PIPA STRATEGIC ACTION PLAN FRAMEWORK 2010-2014

The PIPA Strategic Action Plan provides the framework, actions and targets to implement PIPA's Management Objectives through the implementation of this Plan.

STRATEGIC ACTION PLAN 1. PIPA CORE MANAGEMENT

PIPA Core Management provides for the requisite decision making, administration, management, resourcing and operation of the PIPA. These activities are regarded as essential for the basic maintenance of the PIPA to allow meeting obligations under the relevant statute(s). These essential programme elements are summarized here:

- **SAP 1.1 GoK MELAD Minister and Cabinet**
- **SAP 1.2 PIPA Management Committee**
- **SAP 1.3 PIPA Managerial Operation**
- **SAP 1.4 PIPA Regulations, Licenses and Permits and Penalties**
- **SAP 1.5 PIPA Zonation**
- **SAP 1.6 PIPA Surveillance and Enforcement**
- **SAP 1.7 PIPA World Heritage Listing**
- **SAP 1.8 PIPA Partnerships, Transboundary & International Collaboration**
- **SAP 1.9 PIPA Information Management, Education and Outreach**
- **SAP 1.10 PIPA Science and Research**
- **SAP 1.11 PIPA Tourism**
- **SAP 1.12 PIPA Kanton Atoll – Sustainable Resource Plan**
- **SAP 1.13 PIPA Monitoring and Evaluation**
- **SAP 1.14 PIPA Sustainable Financing, Resourcing and Business Planning**
- **SAP 1.15 PIPA Annual Operational Work Plan & Report**

SAP1.1 GoK, Cabinet, MELAD Minister and PIPA Regulations (2008)

The Phoenix Islands, inclusive of the 200 nm EEZ and fully inclusive of PIPA, are owned by the Republic of Kiribati.

The initial authority for designating PIPA as a Protected Area was by decision of the GoK Cabinet in early 2006. This authorized the Minister of Environment, Lands and Agricultural Development, the Hon. Martin Puta Tofinga to declare the PIPA at the Biodiversity Convention 8th Conference of the Parties in March 2006 in Brazil.

The PIPA was legally established in early 2008 with the adoption by the GoK Cabinet of the Phoenix Islands Protected Area Regulations 2008, promulgated pursuant to the Environment Act (1999), as amended by the Environment (Amendment) Act 2007. At this time, the Cabinet approved extension of the PIPA area from the originally declared 187,600 sq. km. protected area to 408,250 sq. km. making PIPA the world's largest marine protected area. The PIPA Regulations 2008 are attached in Appendix 2.

PIPA is governed under the authority of the Minister of Environment, Lands and Agriculture Development. MELAD's primary law in this regard is the Environment Act (1999), as amended (2007), and the PIPA Regulation 2008. Specific guidance is provided in the Act's

Division 2 – Protected Areas (Sections 42 to 48) including protected areas that are listed for World Heritage (Section 48). PIPA is established under sections 43(1) and 86(1) of the Act.

The PIPA Regulations 2008 have three key objectives:

- (1) to prescribe a protected area for the terrestrial and marine resources of the Phoenix Islands,
- (2) to prescribe particular license and permits for regulating certain activities in the PIPA and to establish a schedule of penalties, and
- (3) to approve the nomination of PIPA to the World Heritage list.”

The PIPA Regulations 2008 came into force in February 14, 2008 and provide the commitment for PIPA to be nominated for World Heritage listing. The GoK submitted the PIPA nomination dossier in January 2009 and the decision of the World Heritage Committee is expected in June 2010.

The MELAD Minister provides regular reports to GoK’s Cabinet on PIPA’s management, progress and issues arising and has created a PIPA Office within the Ministry to administer various PIPA-related activities and responsibilities.

The PIPA Regulations also give specifications for PIPA’s Management Plan consistent with furthering the obligations of the World Heritage Convention. These regulations give protected area status to all 8 atoll/islands, their lagoons and internal waters, adjacent Kiribati territorial sea and the EEZ to the outer boundary specified. PIPA is considered to be Category Ib under IUCN protected areas categories: Wilderness Area: protected area managed mainly for wilderness protection.

The PIPA Regulations specify the following:

- (1) Requirements of the PIPA management plan;
- (2) The PIPA Management Committee;
- (3) General conservation and management measures;
- (4) PIPA permit, licence and penalty provisions;
- (4) The status of DWFN fishing access agreements; and
- (5) Reporting requirements for the state on PIPA.

It is important to note that in the preparation of the PIPA Regulations (2008), a review was done of relevant national legal instruments regarding coastal and marine resource conservation and international commitments to ensure harmonisation and consistency.

Related to the long term strategy for management of the PIPA is the passage into law of the Phoenix Islands Protected Area Conservation Trust Act 2009. This is a separate piece of legislation providing for the establishment and operation of a PIPA Conservation Trust Fund in Kiribati, which is intended to provide sustainable financing for PIPA management costs, trust fund administration and agreed compensation for lost DWFN license revenues for GoK that may be associated with the restriction of PIPA to DWFN activities in the future.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014) the PIPA Regulations will continue to be the primary instruction together with the high level decision making roles embodied in the MELAD Minister and GoK’s Cabinet.

SAP 1.2 PIPA Management Committee

The PIPA Management Committee is formally established by the Minister under the PIPA Regulations (2008). This committee was previously recognized as the PISC (PIPA Steering Committee) under the design phase of PIPA.

The PIPA-MC is chaired by the Secretary of the Ministry of Environment, Lands, and Agriculture Development (MELAD). The Management Committee meets regularly, monitoring and managing decisions ensuring these are well documented and reported by the PIPA Director who also acts as secretary to the Committee. The PIPA Management committee comprises representatives of:

- MELAD (the Principal Environment Officer, the Environment and Conservation Division, PIPA Office),
- Ministry representatives from Fisheries, the Phoenix Islands, Finance, Tourism, Foreign Affairs, Commerce,
- The Office of the Attorney General
- Kiribati Police Service
- Atoll Research Centre of the University of the South Pacific

In addition, local NGOs (e.g., Foundation of the People of the South Pacific) participate in an advisory capacity as do international NGO PIPA partners, such as CI and the NEAq.

The PIPA-MC, and its predecessor the PISC, have a successful track record in decision making and recommendations to the MELAD Minister and through to Cabinet as needed and appropriate.

As specified in the PIPA Regulation 2008, the primary responsibilities of the PIPA MC are:

- Preparation of draft PIPA Management Plan,
- Resolving any interagency differences and making recommendations to the Minister relating to actions for PIPA's management,
- Providing advice as required by the Minister, and
- Monitoring PIPA's management and making reports as required by the Minister to ensure compliance.

Further the PIPA MC has a key role to provide support for acquiring resources for implementing the PIPA management plan.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014) the PIPA Management Committee will continue in its primary role as the management and Ministerial advisory body, and government coordinating body for the PIPA and MELAD's Minister.

SAP 1.3 PIPA Managerial Operation

The PIPA Director and the PIPA Office is based at MELAD in Bikenibea (Tarawa). The PIPA Director is responsible for the day-to-day operation of the PIPA. The PIPA Office has utilized a range of consultants and staff during its first 4 years of operation. In this Plan the PIPA Office will be expanded and additional capacity and resources placed on Kanton Atoll.

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. This includes a close working relationship fostered with the MELAD Wildlife Unit and the Agriculture Division on Kiritimati in the Line Islands.

Resources for this expansion are expected from the United Nations Environment Program (UNEP) Global Environment Facility (GEF) Pacific Alliance for Sustainability (PAS) funding and associated co-financing to PIPA for the period 2010-2014. In the next PIPA Management Plan (2015 onwards), the ongoing cost of core PIPA staffing and operation is expected to be covered from the PIPA Trust Fund endowment income. GoK and its NGO partners have agreed a phased approach to management activities and additional restrictions of current DWFN activities in the PIPA so that endowment capital growth will produce adequate income to cover agreed PIPA management costs, trust fund costs and compensation for loss of license revenue from DWFNs.

- PIPA Office – MELAD Tarawa

Core staffing: - PIPA Director, Secretary, Education/Outreach/Communication Officer, PIPA Monitoring Officer, Finance Officer. Other short term staff and/or consultants may be used based on PIPA needs and resources.

Core role: day-to-day operation of PIPA and promotion of its mission and vision in collaboration with the Kanton PIPA office and the MELAD Wildlife Unit and the Agriculture Division on Kiritimati. This position also provides a secretarial role to the PIPA MC.

Infrastructure requirements: the PIPA Office is already established. Additional infrastructure will be limited to equipment for the office eg computers, desks, chairs and resources for its ongoing operation eg internet, phone etc.

- PIPA Office – Kanton Atoll

Core staffing: two PIPA officers and their families (if any).

Core role: Work with the existing roles of the caretaker staff on Kanton but also locally responsible for surveillance and enforcement, biosecurity, visitor education and management, monitoring and Kanton atoll resource utilization.

Infrastructure requirements: housing, office space, surveillance boat, satellite phones etc will be required. Priorities in this Plan will be a boat suitable for surveillance of Kanton Atoll and its surrounds and communication equipment suitable to work with Kiribati Fisheries, Maritime Police and the PIPA office to monitor the wider PIPA area and to work with surveillance and enforcement effort.

It is realized that this vessel alone is insufficient for the surveillance and enforcement requirements of PIPA. Options for a larger boat suitable for PIPA/Phoenix EEZ-wide surveillance and enforcement (and resource monitoring) will be investigated. This will be combined with efficient design, and operation, of remote surveillance capacity through Kiribati's Fisheries programme.

- MELAD Wildlife Unit and the Agricultural Quarantine Section– Kiritimati Atoll

In many respects Kiritimati Atoll is a gateway to the Phoenix Islands. In particular biosecurity measures should be planned and implemented in a complementary way for both

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the Phoenix and Line Islands. Resourcing and staffing requirements for an effective collaboration between the Wildlife Unit and PIPA will be investigated and implemented (as required).

- Multi-Agency responsibilities, PIPA-MC

It is recognized that as per the PIPA-MC membership and operation PIPA is a multi- agency undertaking. To be consistent with this arrangement, the MELAD PIPA Office and its Director (under the instruction of the PIPA-MC and with the Minister’s endorsement) will contract out specific responsibilities on an annual basis. Contracts will be based on the PIPA-MC endorsed work plan. Agreed services that are required to manage the PIPA effectively include:

Agency	Roles and responsibilities
Kiribati Ministry of Fisheries	<ul style="list-style-type: none"> • Management of fishing effort in allowed zones • Marine resource surveillance and enforcement • Coral reef and marine monitoring
Environment and Conservation Division	<ul style="list-style-type: none"> • Environmental monitoring and impact assessment • Environmental and other conventions • Terrestrial, birds and invasive species (through Wildlife Conservation Unit (WCU), Kirimati) • Coral reef and marine monitoring
Agriculture	<ul style="list-style-type: none"> • Biosecurity and IAS issues
Kiribati Maritime Police	<ul style="list-style-type: none"> • Surveillance and enforcement services
Kiribati Tourism	<ul style="list-style-type: none"> • Tourism promotion of PIPA, tourism planning and feasibility study • Tour operator/Visitor Management
Office of the Attorney General	<ul style="list-style-type: none"> • Legal services
Cross-cutting	<ul style="list-style-type: none"> • International conventions – hosted with the relevant government focal point/Department • Climate Change

Any other agencies and activities not specified above are to be specified by the PIPA-MC and/or Minister.

- Existing government services, Kanton

Existing government services on Kanton will play a role in management, surveillance and enforcement of PIPA regulations. These include a police and customs officer, nurse, school teacher, wireless operator and meteorology officer. Additional budget allocations for Phoenix Islands work include Maritime Police Surveillance by the patrol vessel (including Phoenix Islands EEZ) and shipping service to Kanton en route to and from Kiritimati Atoll.

During 2010 a description and costing will be completed for each of the above services. The source of funding will be specified, including those from PIPA financing and from existing

budget allocations from the national Treasury. Services that are to be contracted under this Management Plan, will be costed and agreed on an annual basis under the auspices of the MELAD Minister. Modalities for financing these costs will be outlined in each annual workplan (e.g. from endowment income, grants, penalties, permits, fines, allocation from other ministries/departments)

SUMMARY: For this Plan (PIPA Management Plan (2010-2014) the PIPA Office will be expanded and resourced, including on Kanton Atoll, and with effective collaboration maintained with MELAD's Wildlife Unit on Kiritimati Atoll (Line Islands). Agreed PIPA Services (e.g., tourism development, surveillance) will be contracted out to relevant agencies within and outside Kiribati under the direction of the PIPA Management Committee and managed by the PIPA Director.

SAP 1.4 PIPA Regulations, Permits, Licenses and Penalties

The PIPA Regulations (2008) provide explicit guidance to licenses, permits and penalties allowable under the PIPA. Importantly PIPA Regulations 6(5) specify "that pending adoption of the management plan no activity that takes place in or affects the PIPA or places at risk the ecological integrity of the PIPA shall be licensed, approved or undertaken by any public authority without the express written authorization of the Minister." The exception to this is the ongoing management of the DWFN licenses as provided for by GoK's Fisheries Ministry consistent with the current Phase 1 Zonation of PIPA.

The PIPA Regulations (2008) also provide for any approvals for permits or licenses issued by the Minister or designated authority shall be consistent with the provisions of the PIPA Management Plan and Regulations. Further the Principal Environment Officer has the primary responsibility and authority to commence civil, criminal, injunctive or other action against any person or corporation reasonably believed to be in violation of the Environment Act, PIPA Regulations and/or the PIPA Management Plan.

The Principal Environment Officer has the responsibility and authority to amend, suspend, revoke or withhold any license or other authorization issues to a person or corporation reasonably believed to be in violation of their terms of license or authorization.

Currently, Licenses and Permits in the PIPA, issued by the Principal Environment Officer, are required for the following activities:

Permits

- Science, cultural, management, or educational studies – submission of research proposal to PIPA Director, discussion and recommendation by PIPA-MC together with any other specific agency requirement. Subject to approval (or not) by the Principal Environment Officer, the PIPA Director has authorization to issue a research permit (see Appendix 7) with an associated requirement of a research permit fee.
- Specimen collection – special permission is required from the Principal Environment Officer and is considered as part of the Research Permit process as outlined above, with final approval from the Principal Environment Officer and payment of specimen collection fee.

Draft dated:

- Tourism Operators – A submission of a tourism operator proposal to the PIPA Director is required. This will be followed by discussion and decision by PIPA-MC together with any other specific agency. Subject to the approval (or not) of the Principal Environment Officer, the PIPA Director has authorization to issue a tourism operation permit and collect the associated permit fee. (Appendix 7).
- Visitor/Tourist Permit – if not covered by the Tourism Operator permit, then approval of a visitor permit can be made by the PIPA Director and/or applied for when the visitor reaches Kanton Atoll (see Appendix 7). Furthermore, if bone or catch and release fishing will be conducted in the PIPA, a permit and its associated fee will be required.
- Special Permit – any special permission must be obtained from the Principal Environment Officer prior to the start of any activity. Again a proposal must be submitted. The evaluation of such proposals is under the management of the PIPA Director with input from the PIPA-MC, with final approval given by the Principal Environment Officer.

Licenses

- DWFN Fishing – Kiribati's Fisheries Ministry is responsible for all fishing licenses issued in the PIPA and the Phoenix Islands EEZ. License fees are subject to negotiation between the DWFN and GoK's Fisheries Ministry. All DWFN are conditioned to prevent fishing inside 12 nm of the Phoenix Islands and to prohibit purse seining within 60 nm of Kanton.
- Domestic Commercial Fishing Licenses – all Kiribati vessels larger than 7 meters must be licensed. Kiribati intends to maintain the status quo with respect to the fact that there are no domestic commercial fisheries in PIPA by attaching conditions to annual domestic permits prohibiting commercial fishing in the PIPA. Through the Kanton Island Sustainable Use plan, impacts by subsistence fishing and/or by vessels under the size limit for permits will be maintained within the goals of PIPA.

Additional special conditions may be specified on each issued permit or license at the discretion of the government.

Penalties

A schedule of penalties, consistent with the Environment Act 1999, as amended, and the PIPA Regulations (2008) will be developed by the PIPA Director for the PIPA-MC review and endorsement to the Principal Environment Officer and MELAD Minister for approval no later than 30 June 2010. Fines will not exceed \$100,000 AUD and/or terms of imprisonment not to exceed 5 years.

It is important to note that the Environment (Amendment) Act 2007 gives special recognition and protection to listed World Heritage sites (Section 48) with a fine provision of up to \$100,000AUD and a maximum of 5 years in prison for an offence relating to a listed Kiribati World Heritage site (Section 28). Should PIPA become WHC listed, then this penalty will be applied.

Reporting

On a six monthly basis the PIPA Director under the approval of the Principal Environment Officer shall provide a summary report on permits issued, any management issues arising or

anticipated, and any recommendation for the Principal Environment Officer and Minister to consider in this regard. License and permit fees will be reviewed on an annual basis.

SUMMARY: For the PIPA Management Plan (2010-2014) the permit and license regime, as outlined above, will continue to operate, be reviewed on a six month basis and management refined and improved accordingly. By June 2010 a Schedule of Penalties and Fees shall be developed and endorsed by the Principal Environment Officer consistent with the Environment Act 1999, as amended and the PIPA Regulations (2008). It is expected that the Penalty and Fee Schedules will be attached to this Plan (Appendix 7) and be implemented upon its approval to all new permits and licenses made post 1 July 2010. Until such time the existing fee regime and PIPA Regulations 2008 (in particular Sections 6(5), 10 and 11) shall continue to apply.

SAP 1.5 PIPA Zonation

The use of zonation is a core tool of PIPA Management, including a phased zonation approach to core protection measures as resources and capacity allow. In this Plan (2010-2014) two phases of PIPA zonation are proposed: the current or Phase 1 Zonation and an increase of 25% in the no take zone coverage once the PIPA Trust Fund income reaches an adequate capitalization level to compensate for any losses in DWFN license fees associated with such limitations.

Four levels of protection are incorporated into the Management Plan:

1. No-Take Zones – total ban of all extractive activities, and strict control of all activities to ensure no impact to marine and terrestrial species or habitats. This is the strictest level of protection and all activities must be explicitly assessed and permitted by PIPA-MC.
2. Restricted Use – sustainable and subsistence use of resources are allowed in this zone, allowing some “take” of specified allowable species, and construction/habitat alteration that has the purpose of enhancing the management and use of PIPA, but is assessed to have non-significant impacts on species and habitats. Currently, this designation applies solely to Kanton Island, and all activities are managed under a Kanton Sustainable Use Plan (SAP 1.12). Marine and Terrestrial. Permits to be assessed and provided by PIPA-MC.
3. Fisheries Exclusion zone – commercial extraction by purse seines is prohibited, but longlines are allowed. Based on Fisheries Regulation, this applies to a belt from 12-60 nm around an atoll. In PIPA, this designation applies solely to Kanton Island. Marine. Permits to be assessed and provided by the Ministry of Fisheries and Resource Development.
4. Ocean buffer zone – The remainder of PIPA excluding zones 1, 2 and 3 above. Fishing activities are allowed under permits as per the current rules and regulations governing fishing in Kiribati. All other activities in the sea or on/under the seafloor must be assessed and permitted by the PIPA-MC. All activities in this zone should be commensurate with the objectives of PIPA.

Current Phase 1 PIPA Zonation

The current PIPA Zonation (Phase 1) is given in Figure 4. The objective of Phase 1 Zonation is to secure the protection of the 8 PIPA islands, lagoons, reefs and nearshore habitats. This series of island-based no take zones amount to just over 15,000 sq km or 3.7% of the PIPA area. Current (Phase 1) PIPA Zonation is summarized below and in Table 2:

- a) No-Take Zones around 7 PIPA islands (2.6%, excluding Kanton). All activities in these areas must be non-extractive and all require individual permits obtained from PIPA.
 - a. Land area - 3 islands protected by Wildlife Sanctuary Ordinances and by PIPA legislation (Rawaki, McKean, Birnie)
 - b. Land area - 4 islands not designated as Sanctuaries, but access is restricted by prior legislation as well as by PIPA regulations (Enderbury, Orona, Nikumaroro, Manra). This includes any freshwater/brackish ponds, such as on Manra, Enderbury.
 - c. Marine area – the lagoons of Nikumaroro and Orona
 - d. Marine area – a 12 nm territorial zone strip around each island
- b) Restricted Use zones at Kanton (0.3%) – with an administrative population of about 30 people, extensive historical use, and good anchorage and airstrip. Designated for multiple use for purposes of PIPA management and sustainable development, and ongoing national presence;
 - a. Land area – a sustainable Kanton plan is envisaged, to be developed under SAP 1.2 in which all activities, people and uses are permitted individually.
 - b. Marine area – subsistence fishing - the lagoon and 12 nm territorial limits around Kanton designated for subsistence use by people resident on Kanton. Currently 30 people, but will expand with development and visitors. Permitting system required to manage impacts and limit numbers and fishery types. Bone fishing (catch and release) also to be allowed in the lagoon.
- c) Fisheries Exclusion zone (9.5%) - Marine area, Kanton from 12 nm to 60 nm, exclusion for purse seiners but longliners allowed. All permits provided by MFMRD. No other fishing permits are to be given. PIPA regulations should mention no others permits to be given without consultation between MFMRD and PIPA-MC.
- d) Ocean Buffer zone (87.7%). Buffer zone for the restricted zones of the MPA. No current uses other than those licensed by MFMRD (purse seine, longline, pole and line) and none can be initiated without permitting from MFMRD and PIPA. Future zones to be considered for protection in this zone include:
 - a. Submerged reefs – Winslow and Carondelet
 - b. Seamounts - Tai, Polo, Siapo, Gardner, Tanoa, Fautasi, Tau Tau and others.
 - c. Sea floor
 - d. Pelagic zones

Table 2. PIPA Zonation Summary

		1) No-Take Zone			2) Restricted Use zone		3) Pelagic Fishery zone	4) Ocean Buffer zone	Total PIPA
		PIPA			PIPA		Fisheries	PIPA	
		Wildlife Ord	Land/permit	12nm	multiple use	subsistence	60nm	open	
		Land	Land	Marine	Land	Marine	Marine	Marine	
Islands	Rawaki	0.58							
	McKean	0.49							
	Birnie	0.48							
	Enderbury		5						
	Orona		6						
	Nikumaroro		4						
	Manra		5						
	Reef/shallow closure (7 PIPA islands, 12 nm)			12,714					
Kanton	Kanton (multiple use)				9				
	Kanton subsistence zone (12 nm around perimeter of 50 km .					2,486			
	Kanton purse seine exclusion (less Birnie, Enderbury)						37,197		
Ocean	Open ocean buffer zone							355,822	
	Totals	1.6	20	12,714	9	2,486	37,197	355,822	408,250
	Total restricted areas (protection types)			12,736		2,495	37,197	355,822	
	% total PIPA area			3.1%		0.6%	9.1%	87.2%	
	Total restricted areas (overall)						52,428	355,822	408,250
	% total PIPA area						12.8%	87.2%	

Phase 2 PIPA Zonation

Phase 2 PIPA Zonation has the core objective of increasing the no take zone coverage by an additional 25% of the total area of PIPA. Phase 2 Zonation will be implemented once the PIPA Trust fund is capitalized to a level sufficient to compensate GoK for any lost DWFN license fee income associated with the increase in the no take zone coverage. Agreed priorities in the increase of the no-take zone coverage are:

- 12 nautical mile no-take zone around Winslow and Carondelet Reefs.
- Increased no-take zone around 7 of the PIPA islands, excluding Kanton.
- Filling the gap between the two groupings of the PIPA islands with no-take zone.
- Maximizing underrepresented habitat in the no-take zone coverage, particularly seamounts.
- Ensure a more easily navigable and enforceable overall no-take zone boundary.
- Areas outside the above zones will still be allowable for fishing, consisting of DWFN or Kiribati boat access for tuna, as per the current rules and regulations governing fishing in Kiribati.

In addition it is expected that a more detailed zonation for Kanton Atoll will be completed during the Plan's implementation that is based on subsistence resource needs of the local caretaker community and possibly tourism needs.

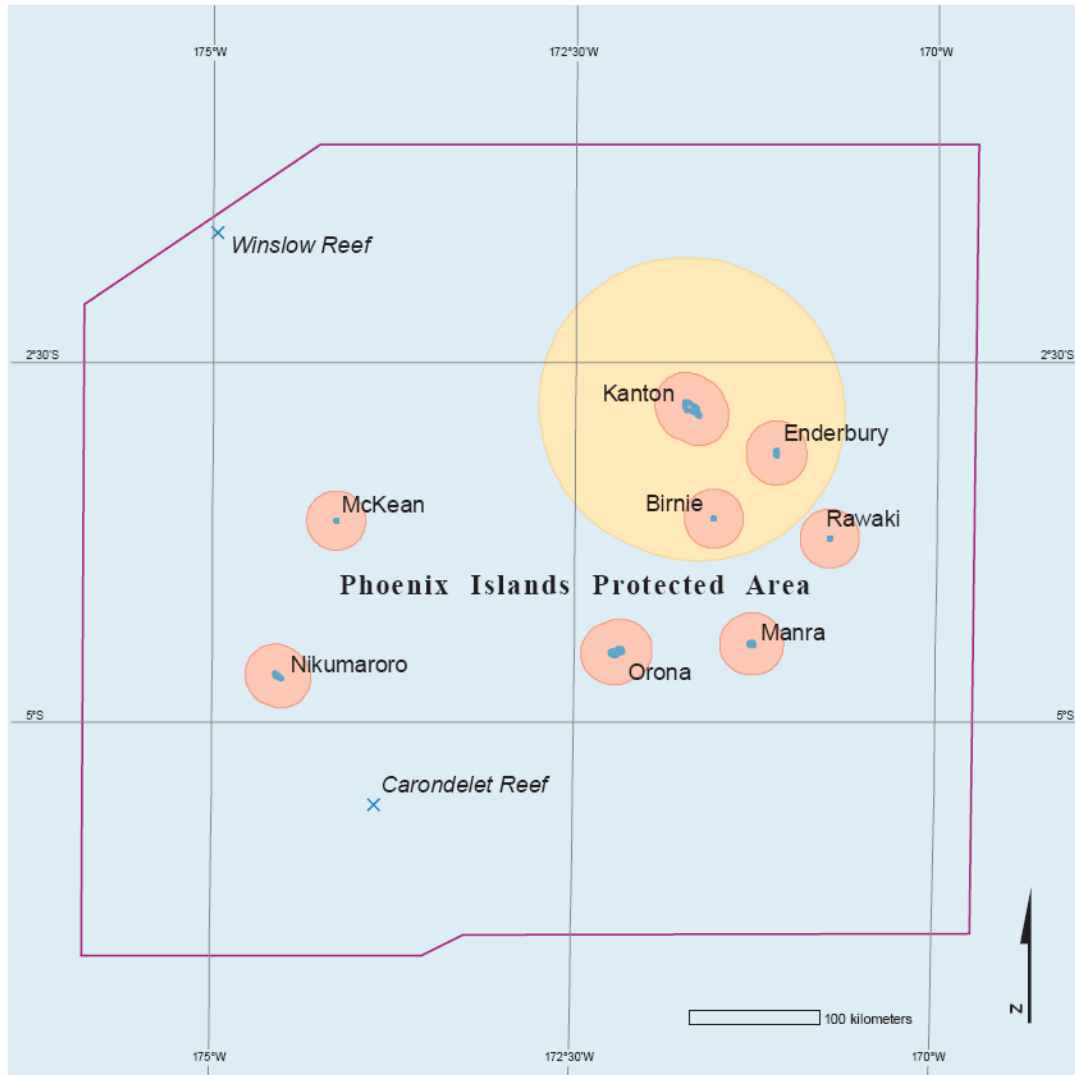
Exact boundaries for Phase 2 PIPA Zonation will be finalized, based on the above, during this Plan's implementation.






Both Phase 1 and Phase 2 PIPA Zonations are seen as a simple zonation system with the primary objective of prioritized protection of these systems. It is envisaged that a more sophisticated zonation system will take into account possible tourism development. This will be discussed and implemented in either Phase 2 or Phase 3 Zonation of the next PIPA Management Plan cycle.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014) both PIPA Phase 1 and Phase 2 Zonation are expected to be successfully implemented by December 2014.

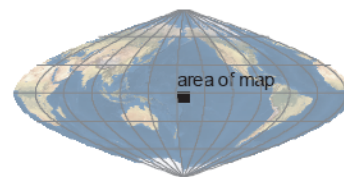
Figure 4. PIPA Zonation

PIPA Phase 1 (current) Zonation



- 
no take zone
The area within 12 nm of any of the eight Phoenix Islands are no fishing zones and also ban discharge of ballast, sewage or rubbish. Vessels that are solely transiting the PIPA area are to avoid these areas. Permits are required to land on all atolls, except Kanton.
note: Kanton Atoll terrestrial and coastal marine resources are available for subsistence use by the Government of Kiribati caretakers and their families
total area: 15,020 km², or 3.7% of PIPA
- 
purse seine exclusion zone
No purse seine tuna fishery is allowed within 60 nautical miles around Kanton.
total area: 42,800 km², or 10.5% of PIPA
- 
PIPA boundary
total area: 408,250 km²
- 
atoll
note: All atolls (terrestrial habitat) are no take zones and prioritized for atoll restoration.
- 
submerged reef

scale: 1/5,000,000
 projection: Sinusoidal
 central meridian: 180°
 datum: WGS84



data:
 Conservation International - Pacific Islands
 VMap0, National Geospatial Intelligence Agency

acknowledgement:
 New England Aquarium
 © 2008 K.Koenig, CI Maps

SAP 1.6 PIPA Surveillance and Enforcement

It is recognized that effective surveillance and enforcement of PIPA is a significant challenge in terms of technology, capacity and resources.

Minimization of illegal activities is key to the success of any MPA. This can be achieved through the application of several tools. In the case of PIPA, there are major constraints to surveillance. PIPA is extremely remote, inaccessible, and covers a very large area. Surveillance tools that could be applied include:

- Aerial surveillance (by aircraft and satellite);
- At sea surveillance (by boat); and
- Land-based surveillance.

MELAD PIPA Office & Director

Under the auspices of the MELAD Minister, Principal Environment Officer and guidance of the PIPA-MC, the PIPA Director is responsible for the definition, coordination, costing and management of surveillance and enforcement services for PIPA, which are sourced to relevant agencies within and outside of Kiribati. This will focus on building capacity within existing surveillance and enforcement programmes such as fisheries, and invasive species management. The MELAD PIPA Office and Director will also focus on issues faced in surveillance and enforcement of a large, remote MPA namely;

- Fishing (legal, illegal and related activities)
- Other Boat and Visitor Management
- Kanton Atoll Subsistence Resource Use
- Protected islands and bird populations

Fisheries Surveillance and Enforcement (Ministry of Fisheries and Maritime Police)

Kiribati's Ministry of Fisheries and Kiribati's Maritime Police have developed a Kiribati-EEZ wide surveillance and enforcement programme largely targeted at preventing illegal fishing and monitoring of licensed vessels. This programme is in cooperation with other Forum members states under the Forum Fisheries Agency (FFA) and under a range of bilateral and individual agreements including those provisions made with DWFN vessels. Provisions include:

- Vessel Monitoring System (VMS) all licensed boats must carry VMS system to identify vessel and location in real time, this can be matched to the operation by FFA of a geo-fence with alerts when vessels are known to enter a particular area.
- Fisheries Observer Scheme – currently DWFN carry trained Kiribati Fisheries Observers (ca. 20% coverage). Under the third arrangement to the Nauru Agreement Kiribati has committed to requiring all DWFN boats to carry an observer (100% observer coverage) by January 2010.
- Aerial surveillance provided by New Zealand (NZ) and Australia Air Forces (Orions) coordinated with regular and special surveillance operations run by the FFA.
- Operation of Kiribati Patrol Boat- regular patrol runs (currently only 1-2 per year to Phoenix Islands) and only called out when assistance required e.g. when there is a ship grounding.
- USA Kiribati Shipriders Agreement (2008) whereby Kiribati Maritime and Fisheries Officers are able to travel on USA Coastguard Ships and have the full power of arrest of vessel and other related powers under Kiribati Law. This initiative has already

proven highly successful with the impoundment and prosecution of a vessel caught illegally bunkering off Nikumaroro Atoll in PIPA (\$4.7 AUD million fine).

The current effort and resourcing of surveillance and enforcement is a significant achievement for Kiribati, in being a small island developing state spread over a large area of ocean comprising three separate EEZ areas (relating to the Gilbert, Line and Phoenix Islands).

The key to a successful Fisheries-based surveillance and enforcement for PIPA requires the current foundation, outlined above, to be built upon noting:

- Vessels do not generally transit through the Phoenix Islands en route to anywhere else, rather it is a deliberate purposeful decision to be in the Phoenix Islands area.
- Additional requirements for surveillance and enforcement could be costed services for PIPA's management developed through the PIPA Trust Fund. This could include receiving vessel alerts by establishing a geo-fence based on the outer boundary of PIPA and on core zonation.
- Cost efficiencies, program design, and additional resources for PIPA surveillance can be developed further in partnership with the United States through the 2009 sister agreement.
- Additional support for the operation of the Kiribati Patrol Boat would enable more surveillance runs of PIPA. Primary support would include assisting in fuel and crew costs.
- PIPA Training Module for Fisheries Observers – Kiribati Fisheries have indicated strong interest in incorporating a PIPA Training Module for their Observers and this is expected to be developed and trialed before the end of 2009.

It is expected with additional PIPA resources for Fisheries Surveillance and Enforcement coupled with GoK's requirement for VMS, FFA geo-fencing capacity and 100% observer coverage that the surveillance of legally licensed vessels is manageable. The VMS licensed vessels are also expected to play a key role in reporting any unlicensed vessel in PIPA's waters, as indeed it is in their interest to do so. Illegal fishing remains a significant concern for the PIPA, other parts of Kiribati's EEZ and indeed other Pacific Island states.

PIPA vessels - IAS surveillance – each approved vessel to have an on-board system for detecting and eliminating IAS - trained observer to undertake inspection of vessel's biosecurity procedures and their effectiveness before approval is given to enter GoK/PIPA waters.

Terrestrial Surveillance and Enforcement

The islands, seabirds and turtle nesting beaches of the Phoenix Islands are highly vulnerable to general use and invasive species. The Wildlife Conservation Unit on Kiritimati Atoll has established procedures and staff for managing such resources, as well as for guiding and managing tourists and visitors.

Procedures for the application of these surveillance and enforcement tasks, updated with the ongoing PIPA Invasive Species Eradication Programme, will be key tools for managing PIPA.

Surveillance of Kanton Atoll

With planned increased human resources and infrastructure (including an atoll based boat) for Kanton atoll, there is a commensurate role for increased effort in surveillance and enforcement for Kanton. This will include monitoring the compliance of visitors and local resident caretaker population on Kanton for adherence to the proposed Kanton Atoll Sustainable Resource Use Plan.

Additional

In order to assist in the detection of illegal activities, visitors and residents are required to comply with the following.

- All individuals, and/or the vessel they are on, must report during their stay in the PIPA; sightings of all other individuals or vessels; any suspicious activities; any out of the ordinary conditions. This includes all of the Phoenix Islands, (except on the island of Kanton) and all of the waters within the PIPA area.
- Sightings must be reported on the day observed. Reports will be sent to the MFMRD Fisheries Licensing and Enforcement Unit, the Kiribati Maritime Police Service (KPS) and the PIPA Office (MELAD). The reporting format is as follows: individual name / vessel name / vessel number / time in GMT / suspicious activity (short description, GPS Co-ordinates).
- For any suspicious activity or out of the ordinary condition, if possible photographic documentation should be made and submitted to the PIPA Authority. Images can be sent as attached files to emails.
- It is not the responsibility of any visitor (individual or vessel) to the PIPA area to apprehend any person or vessel acting contrary to these rules. However, reporting is a requirement.
- Biosecurity measures at Kanton must follow the pending Biosecurity Act and its associated regulations. Note that guidelines are currently being developed to help with this process and enhancing PIPA biosecurity generally.

Enforcement must be closely linked with surveillance. Surveillance is integral in identifying possible illegal activities. Information from surveillance activities shall be conveyed to the enforcement section as soon as possible. GoK will continue to rely on existing measures for enforcement based on fisheries regulations and allowable permits and conditions therein. Further surveillance and enforcement measures will be reviewed in light of finalising the PIPA penalty schedule.

Capacity building for surveillance officers, observers and guides require development. The focus will be to combine the strengths of Fisheries observer programmes, Wildlife Conservation Unit (WCU) programmes and the particular requirements of remote-island guiding and tourism (e.g. the Galapagos Islands).

SUMMARY: For this Plan (PIPA Management Plan (2010-2014) GoK and its partners for PIPA will base surveillance and enforcement on existing measures (eg fisheries, immigration and customs) and supplement these on a costed service-provider basis for

the additional needs of PIPA with the aim of fostering a mutually supportive programme for Kiribati's tourism, fisheries development and management that is consistent with PIPA's Vision. A surveillance and enforcement programme design will be finalised in the same timeframe (July 2010) as the completion of a PIPA Penalty Schedule.

SAP 1.7 PIPA World Heritage Programme

GoK has submitted its nomination dossier for PIPA to the United Nations Education, Scientific and Cultural Organisation (UNESCO) World Heritage Centre in January 2009 and it is under evaluation as a natural site for listing by UNESCO, IUCN and the WHC Committee with the decision due at the WHC Committee meeting scheduled for June 2010.

For the PIPA Management Plan 2010-2014 the objectives for the WHC are to secure a successful nomination of PIPA on the WHC list. The PIPA Management Plan embodies Kiribati's first commitment to fulfilling the obligations of the WHC. GoK and partners are cooperating with UNESCO, IUCN and highlighting the PIPA nomination and its importance with other Parties. Importantly this Plan has been harmonized with the PIPA WHC nomination dossier.

GoK and partners intend to continue to promote PIPA's WHC listing and a strong delegation from GoK and partners CI and NEAq is expected to attend the UNESCO WHC meeting in June 2010.

Should the nomination prove unsuccessful in June 2010 GoK and its partners will discuss the next course of action following the set decision making procedures for PIPA outlined above (PIPA-MC, Minister, Cabinet).

It is important to note that the Environment (Amendment) Act 2007 gives special recognition and protection to listed World Heritage sites (Section 48) with a fine provision of up to \$100,000AUD and a maximum of 5 years in prison for an offence relating to a listed Kiribati World Heritage site (Section 28). Should PIPA become WHC listed then this penalty will be applied.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014)) GoK and its partners for PIPA will ensure as far as possible the successful listing of PIPA as a World Heritage Site.

SAP 1.8 PIPA Partnerships, Transboundary and International Collaboration

GoK fosters and leads a partnership strategy for the implementation of the PIPA, to offset the limited resources and capacity in Kiribati to manage this large, remote site. PIPA has been designed and established by GoK in a core partnership with CI and NEAq under an agreed MOU and extension to support the design, establishment and ongoing operation of PIPA. CI and NEAq remain committed to this partnership for the period of this Plan and have signaled their intentions to continue supporting the PIPA in the longer term.

GoK, CI and NEAq will continue to foster partnership and resourcing for PIPA throughout this Plan. Partnerships and support for PIPA have been developed with the Governments of Australia, New Zealand, Save Your World Company, UNEP and the GEF Pacific Alliance

for Sustainability. Kiribati's membership of regional agencies such as SPREP, Secretariat of the Pacific Community (SPC), Secretariat of the Pacific Islands Applied Geoscience Commission (SOPAC), FFA and the Western and Central Pacific Tuna Commission all have programmes relevant to PIPA that Kiribati can both benefit from and contribute to their implementation. Examples include SPREP's Regional Marine Species Conservation Programme (e.g., for turtles, whales, dolphins), FFA's VMS programme.

The proposed listing of PIPA as Kiribati's first listed World Heritage Site is Kiribati's priority commitment for international collaboration included in the PIPA Management Plan (refer SAP 1.7). PIPA is also managed as an IUCN Protected Area Wilderness Site (1b). PIPA is Kiribati's primary protected areas commitment to implementing the CBD and is committed as part of the Global Islands Partnership (GLISPA).

A priority partnership for this Plan is with UNEP under the GEF Pacific Alliance for Sustainability. Under the PAS, the GEF have committed \$1 Million USD to PIPA focused on the implementation of this Plan. UNEP is the designated Implementing Agency.

Additional priority transboundary and international collaboration measures include:

- Development of a proposed "sister-site" agreement with USA's Papahānāmokuākea National Monument.
- Development of a Pacific Oceanscape under the Pacific Forum. In August 2009 the Pacific Leaders Forum endorsed a Pacific Oceanscape concept tabled by Kiribati together with its companion Pacific Ocean Arc initiative aimed at fostering increased investment in protected areas and needed transboundary and international cooperation. The Pacific Forum Secretariat will develop this initiative in 2009/10 as part of the Pacific Plan's implementation. Networking and learning with other protected area initiatives e.g. the Coral Triangle Initiative and the Micronesia Challenge is envisaged under the Pacific Oceanscape.
- Development of a Phoenix Ocean Arc based on cooperation with the USA's Pacific Marine National Monument programme with the aim of whole-archipelago management. As part of the Pacific Oceanscape, Kiribati announced its intention to foster a Phoenix Ocean Arc with PIPA as its first contribution and invited the USA (Howland and Baker Islands) to join Kiribati in this effort. Kiribati further announced its intention to develop a Line Islands Ocean Arc in a similar manner to the Phoenix Arc.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014)) GoK will continue to foster its core partnership, transboundary and international programme for PIPA's implementation. Kiribati will assist the development of the Pacific Oceanscape and in particular the Pacific Ocean Arc initiative with the first arc under development being the Phoenix Ocean Arc.

SAP 1.9 PIPA Information Management, Education and Outreach

The PIPA Office (MELAD, Tarawa) is the primary caretaker of all information, files and records pertaining to PIPA. These are backed up by records kept by both NEAq and CI and material deposited with the SPREP Library and Resource Centre in Apia, Samoa. To date more than 700 references have been sourced, digitized and organized in a searchable database for PIPA. This database will be added to as the PIPA work progresses and it is

envisaged that most PIPA information sources will be made available online in an updated PIPA website.

Education, Outreach and the promotion of the values of PIPA and the work undertaken under Kiribati's leadership are an important priority for PIPA. A PIPA Education and Information Officer will be recruited by the MELAD PIPA Office under this Plan. Targets for this programme include:

- Review of Kiribati's Education Curriculum for opportunities to use PIPA information as part of core learning programmes in Kiribati.
- Design and implementation of a Kiribati PIPA Awareness programme, including domestic, regional and international media work for news of PIPA
- Update and expansion of PIPA website to include "Friends of PIPA", regularly news postings, archival information and resources.
- Review and participation in regional and international initiatives relevant to the promotion and to further understanding of PIPA and Kiribati.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014) the MELAD PIPA Office (under the guidance of the PIPA Management committee and in partnership with CI and NEAq) will develop as part of the PIPA Operational Work Plan an education and outreach initiative for PIPA. It will also maintain and build the information management systems already established (e.g., PIPA website, literature database).

SAP 1.10 PIPA Science and Research

PIPA's management practice is based on the best available scientific and technical knowledge and in accordance with the Guiding Principles list above. Priorities for PIPA Science and Research will be those initiatives that provide insight and answers needed for practical management.

Science and research is seen as a cross cutting tool applicable to aspects of SAP 1, 2 and 3 and will be built into these Strategic Action Plans. Relevant activities will be reflected in the PIPA Annual Operational Work Plan rather than a standalone initiative to ensure that effort for science and research meets management needs. Operationally all science and research undertaken within PIPA will be operated on a permit basis (ref SAP1.4).

Fundamentally the Science and Research programme will focus on information needs for PIPA monitoring and evaluation and the information needed for the State of the PIPA report (SAP3). As far as possible inter disciplinary planning and multi targets for science and research will be undertaken due to the high expedition costs to PIPA.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014)) science and research are seen as critical tools across many of the PIPA Strategic Action Programme initiatives. As part of the PIPA Annual Operational Work Plan, science and research will be designed and targeted to meet priority management needs.

SAP 1.11 PIPA Tourism

The development of environmentally-friendly, high-end tourism is a high priority for GoK. It is regarded as part of the sustainable management of the PIPA, contributing to Kiribati's development, employment and income generation.

Despite the high international profile of PIPA and related interest, tourism is very limited in the Phoenix Islands largely due to access issues. Tourism is limited to private yacht visits, tourism/research operated charters and the passage of occasional cruise ships. All visitors to the Phoenix Islands are required to clear customs and immigration on Kanton Atoll and must have a permit (ref SAP1.4) to visit. The PIPA Office vets all such permits under a standard operating system.

In 2009 GoK is expected to pass a new National Tourism Strategy, inclusive of a vision for the development of tourism in PIPA. Already significant domestic and offshore private sector interest in developing tourism associated with PIPA is evident. Measures being discussed and promoted include reopening the Kanton Airport, developing high-end land based tourism facilities on Kanton, possible joint venture initiatives (e.g., for boats) and tighter controls and improved facilities on boat-based tourism.

The PIPA Management Committee and PIPA Office fully recognize that if World Heritage listing is successful for PIPA in June 2010 that the profile and attractiveness for tourists to visit PIPA will increase significantly, if not exponentially. It is further recognized that much could be learnt from environmentally sound tourism development in other remote and large protected areas such as the Great Barrier Reef. It is considered that there is now a window of opportunity to sensibly plan and develop tourism in PIPA in a phased approach consistent with PIPA's Vision and the new Kiribati National Tourism Strategy. Resources are being secured to affect this. In the interim the existing visitor and tourism operator permit and fee system and associated monitoring will continue.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014)) planning for tourism development in PIPA, consistent with PIPA's Vision and with the new Kiribati National Tourism Strategy is seen as a high priority for implementation. Given the potential World Heritage listing in 2010, the PIPA Office will work with the Kiribati Tourism Bureau to plan and develop a plan for tourism development, associated resources and partnerships required. This PIPA tourism plan will be reviewed by the PIPA Management Committee and implemented in a multi-agency approach as part of the overall PIPA Management Plan 2010-2014.

SAP 1.12 Kanton Atoll – Sustainable Resource Plan

Kanton Atoll is the only PIPA island currently inhabited. The population consists of a small government caretaker and administrative population of approximately 30 people. Government officers on Kanton have the responsibility for immigration, customs, fisheries and all government interests and roles in the Phoenix Islands. People on Kanton by necessity rely on both marine and terrestrial resources for subsistence needs.

In the baseline or Phase 1 Zonation Kanton has a 60 nm purse seine exclusion zone declared under the Fisheries Act. It also has a 12 nm no take zone except for harvest of resources for the Kanton community's subsistence needs.

It is recognized that Kanton is the gateway to the PIPA and being the only inhabited island needs special consideration in the PIPA Management Plan. The Kanton community, and proposed new government staff dedicated to PIPA work, are key in the development of PIPA and associated infrastructure including provision of adequate communication and access (e.g. wharf, air strip, anchorage). Development of land-based tourism is also seen as a priority to provide an income return to GoK and employment as part of PIPA's management.

With this array of actual and potential uses, Kanton Atoll is prioritized for a Sustainable Resource Use Plan on an island-wide basis out to the zonation of 12 nautical miles. In this Plan, all activities, and all individuals engaged in those activities should be explicitly named and defined, and annual permits given specifying their name, type of use, area of use and any limits required to keep activities and impacts within the objectives of PIPA Management Plan.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014)) a Kanton Atoll Sustainable Resource Use Plan will be developed by December 2010 and implemented as resources and priorities allow as part of PIPA Core Management.

SAP 1. 13 PIPA Monitoring and Evaluation

Section 45(1)(f) and 48(4)(d)(for World Heritage areas) of the Environmental Act 1999, as amended, requires scientific and research studies to support protected areas. These provisions have been implemented through Section 6(2)(d) of the PIPA Regulations 2008, requiring that the PIPA Management Committee monitor the management of PIPA. Section 6(6) of the PIPA Regulations 2008 further requires that a monitoring programme be implemented in accordance with the Environment Act, PIPA Regulations and Management Plan.

The PIPA Regulations (2008) require monitoring of the following environmental and management indicators:

- i. bird population trends;
- ii. ecosystem/vegetation monitoring;
- iii. live coral cover trends;
- iv. selected reef fish population trends;
- v. reef shark population trends;
- vi. turtle population trends;
- vii. pelagic conditions within the PIPA, including fisheries landing trends;
- viii. annual visitor number trends; and
- ix. such other matters as the PIPA MC shall choose to report

There are two basic components for Monitoring and Evaluation of PIPA under this Plan:

- Scientific research and monitoring to detect trends in core and important PIPA values and issues (e.g., seabird populations, visitors numbers)
- Management Plan Implementation Monitoring - task and process monitoring and evaluation of the management system used by PIPA to ensure improvement in a cost effective and efficient manner, and to implement adaptive management (including addressing new issues and threats as they may arise).

Scientific Monitoring

Existing monitoring since the establishment of PIPA has included: water temperature loggers and monitoring of pre and post coral bleaching, assessment and follow up monitoring of key seabird and invasive species populations (as part of the atoll restoration programme), marine

and terrestrial surveys and observations as part of boat visits to PIPA, and ongoing fisheries surveillance of Kiribati's EEZ (inclusive of PIPA). Information and effort cost from existing monitoring efforts are being factored into an integrated monitoring programme under this Plan. All records will be located within the MELAD PIPA Office.

Tables 3.1 and 3.2 below summarise monitoring effort and proposed parameters. A full Monitoring and Evaluation Plan will be developed and agreed by the PIPA Management Committee not later than June 2010 and requirements will be reflected in the PIPA Annual Operational Plan. At this time a PIPA Baseline report will be completed to provide a frame of reference for these monitoring programmes and a baseline for the preparation of the 2014 State of the PIPA Report (ref SAP 3). Parameter measurements conducted at a four yearly periodicity is considered a minimum. Many other parameters will be measured more frequently and also measured opportunistically as part of research, other surveys, and visitor programmes to the site.

Table 3.1 Marine Ecosystem Monitoring Summary

Indicator	Parameter	Periodicity	Location of Record
Coral Reef Health	Coral cover, benthic cover	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
	Coral Diversity and Health (Disease, Bleaching)	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
	Water temperatures	Continuous water temperature loggers since 2000, satellite data, continuous since 1990s.	PIPA Office, MELAD NEAq, CI
Selected indicator Reef Fish and threatened species eg clams	Diversity, Abundance, Size class structure, Endemism	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
Sharks	Diversity Abundance Lagoon nursery populations	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
Turtles	Diversity Abundance – nesting surveys	Previous (2000,2002,2005) @ 4 years	PIPA Office, MELAD NEAq, CI
Tuna/Offshore Fishing	Effort Catch Bycatch	Continuous by GoK Fisheries as part of DWFN management, note 100% observer coverage is now mandatory in Kiribati waters.	Fisheries, SPC/FFA, PIPA Office, MELAD
Submerged Reefs/Seamounts	Baseline surveys Species diversity And abundance	2002 (partial survey down to 900 m) Effort will be based on resources available – deep sea mission planned for mid 2009.	NEAq, PIPA Office, MELAD

Table 3.2 Terrestrial Ecosystem Monitoring Summary

Indicator	Parameter	Periodicity	Location of Record
Seabirds	Species Diversity and relative abundance using pelagic transects and fly-on surveys of key indicator species Population Surveys by prescribed counts of colonies and nesting pairs	Previous (1960s, 2006, 2008), Future - species diversity opportunistically Population counts at least every 3-5 years	Pierce 2006, 2008 (PIPA Office, MELAD NEAq, EcoOceania, CI)
Terrestrial biota	Vegetation – photo-points, plant lists Vertebrate fauna (lizards, land-birds, shorebirds) - relative abundance, counts	Previously 1960s, 2006, 2008 Future – at least every 3-5 years	Pierce 2006, 2008 (PIPA, MELAD, EcoOceania)
Invasive species	Species presence and abundance Eradication monitoring Monitoring key indicator species amongst seabirds (above)	Previous (2000,2002,2006, 2008) Future annually as part of atoll restoration until at least 2012 then every 3-5 years where possible using existing charters and biosecurity patrols.	Pierce 2006, 2008 (PIPA Office, MELAD, NEAq, EcoOceania, CI)

Actual field work will be contracted out and/or completed in collaboration with local and other agencies under the direction of the PIPA Management Committee and PIPA Director. All opportunities for local capacity building in these surveys will be taken to benefit Kiribati more widely. For bird and invasive species surveys, the Government of Kiribati Wildlife Unit under MELAD is on Kiritimati Island. The WCU already participates in bird or wildlife surveys for PIPA via CEPF and NZAID funding and there are plans to extend this relationship. Regional organizations, such as the University of the South Pacific (with the Atoll Research Unit in Tarawa, and main campus in Suva, Fiji), are willing to assist in field work. PIPA partners NEAq and CI will continue to assist in expertise and resources for surveys and monitoring. The PIPA office is seen as a catalyst or coordinating body, rather than a large organization doing all the research and monitoring surveys itself. Reports and the raw data will be housed within the PIPA office. Ultimately, it is the responsibility of the PIPA Director to ensure that all field data and survey reports are provided to the PIPA Management Committee (as part of any research permit).

Several terrestrial and marine surveys have been conducted over the past decades in the Phoenix Islands. Results for many of these surveys are available. However, since the methodologies used by researchers were different, it is difficult to compare results over time to measure changes to these resources. Another difficulty in past surveys is that many were not quantitative. With this Plan the objective is to standardize quantitative methods for each key species or group of organisms so that results can be comparable over time. This standardization process will draw heavily from existing methodology used by PIPA MC agencies eg Pacific Expeditions/Eco Oceania Ltd, Fisheries and consistent with those promoted by regional agencies eg SPC Fisheries.

Management Plan Implementation Monitoring

Based on the PIPA Annual Operational Work Plan the implementation of the Management Plan will be monitored by the PIPA Office and the results will be annually reported and evaluated under the PIPA Annual Operational Work Plan requirements.

3. Management Plan Implementation Monitoring

Indicator	Parameter	Periodicity	Location of Record
PIPA Management Committee Function	No of meetings Stakeholder review of decisions implemented	Continuous	PIPA Office, MELAD
Visitor Number Trends & Permit Monitoring	Permit Monitoring (tourism, research)	Continuous	Kanton Immigration, PIPA Office MELAD, CI
Surveillance & Enforcement and Penalties	Fisheries S & E report Infraction Report (at least annual)	Annual	PIPA Office, MELAD Fisheries, Kiribati Maritime Police
Financial Management	Annual audit of funds secured and spent on PIPA.	Annual	PIPA Office, MELAD

SUMMARY: For this Plan (PIPA Management Plan (2010-2014)) a Monitoring and Evaluation programme design will be completed no later than June 2010 that addresses the twin needs of monitoring and evaluation as required under the PIPA Regulations (2008) and the need to provide targeted information to monitor and evaluate the implementation of this Plan. It is envisaged that this information collection and analysis will also be used as the primary data source for donor reporting requirements.

SAP 1.14 PIPA Sustainable Financing, Resourcing and Business Plan

PIPA is currently financed by GoK, CI and NEAq with additional partnership and resources obtained from a variety of government, multilateral and private agencies.

A key component of PIPA's sustainable financing was the establishment under Kiribati law of the PIPA Conservation Trust Fund 2009. GoK passed legislation for the PIPA Trust Fund in May 2009 and the Board is expected to be constituted before the end of 2009. The PIPA Trust Board is expected to enter into a Conservation Contract with MELAD with income from the Trust Fund prioritized to cover PIPA management costs and any lost DWFN revenues associated with the future closure of areas of the PIPA EEZ to tuna fishing. The PIPA Trust Fund income is also required to cover the operational costs of the Trust.

Due to significant resourcing requirements associated with fully capitalizing the trust at a level that will immediately cover all associated costs of PIPA, a phased approach to building the endowment and covering the above mentioned costs has been agreed to by the founding members of the Trust: the Government of Kiribati, CI, and NEAq. For this Management Plan, the founding members are committed to initially capitalizing the Trust at \$13.5M USD before the end of 2014. This would allow the Trust to cover potential lost DWFN fees (exclusive of fishing pursued under the Pacific Islands Treaty which is in force until 2013)

from closing additional 25% of the PIPA EEZ as a no take zone and would be implemented through the development of a Phase 2 Zonation plan. At this Trust Fund level, it is also anticipated that the Trust could support core PIPA management costs at approximately \$300,000 USD per annum.

For this Plan it is also fully expected that additional resources will need to be secured, on a prioritized basis of supporting firstly PIPA core management followed by targeted activities under the issues and results programme (SAP2). In this regard the following partnerships and resources are secured or being fostered:

- CI/NEAq – ongoing support from the Global Conservation Fund of Conservation International (GCF) and other sources estimated at \$500,000/5 years
- Save Your World – corporate sponsorship targeted at surveillance and enforcement costs estimated at \$750,000/5 years
- UNEP GEF PAS PIPA project \$1M USD commitment
- CEPF – targeted at the atoll restoration and trust fund design, approximately \$500,000
- Government of Australia – support to PIPA World Heritage Nomination \$50,000AUD.
- Endowment contribution from CI's GCF (subject to matching finance) \$2.5 M USD.
- Endowment contribution from Kiribati Reserve Fund

Discussions are also underway with a range of potential donors and partners including the Governments of Australia, New Zealand, USA, European Union and others.

Against the framework of this PIPA Management Plan, a PIPA Business Plan will be developed led by the PIPA Director under the guidance of the PIPA MC, and under the approval of the Principal Environment Officer and MELAD Minister. This will aim to effectively manage fund raising and resourcing of PIPA's Management Plan implementation and will be developed as a companion to this Plan. Its yearly priorities will be reflected in the PIPA Annual Operational Work Plan and reported on in the same manner (ref 4.1.13).

SUMMARY: For this Plan (PIPA Management Plan (2010-2014)) the PIPA Annual Operational Work Plan and associated budget will reflect the resourcing needs on an annual basis. For the longer term a companion PIPA Business Plan to this Plan will be developed no later than October 2010 that will fully address the needs and issues arising for the effective resource operation of the PIPA.

SAP 1.15 PIPA Annual Operational Work Plan and Report

On an annual basis the PIPA Director under the guidance of the PIPA MC and under the approval of the Principal Environment Officer will prepare a PIPA Operational Work Plan that clearly identifies PIPA work to be carried out in that year in relation to the PIPA Management Plan.

These work plans will identify specific activities, budgets, secured/unsecured resources and partnerships for undertaking the PIPA Core Management Programme (SAP1) and activities and desired targets identified under the PIPA "Issues and Results" Action Programme (SAP2).

In the last year of the Plan and based on an agreed framework under the PIPA Monitoring and Evaluation programme the PIPA Annual Operational Work Plan will include a significant focus on completion of the five yearly “State of the PIPA” report (SAP3).

Prior to the development of subsequent years PIPA Annual Operational Work Plans, the PIPA Director will prepare a report on implementation progress of the current plan emphasizing achievements, targets completed, costs and issues arising for the next work plan.

Importantly each PIPA Annual Operational Work Plan and subsequent implementation report will clearly identify performance indicators consistent with achieving on an annual basis the requirements of the Conservation Contract and thus through the PIPA Trust Board’s review the flow or endowment derived income dedicated to the management costs of PIPA.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014)) the PIPA Director under the guidance of the PIPA MC and approval of the Principal Environment Officer will produce an annual PIPA Operational Work Plan. At the end of each year an Annual Report of its implementation will be produced by the PIPA Director prior to the development and agreement by the PIPA MC and Principal Environment Officer of subsequent years plans.

SAP 2. PIPA ‘ISSUES TO RESULTS’

In addition to the core management requirements outlined above a number of key prioritized issues for PIPA requiring targeted action are identified for this PIPA Management Plan. For each ‘issues to results’ a summary end desired target state is identified for this Plan, the baseline status of the issue summarised as at January 2010, and a series of actions outlined. It is envisaged that significant fund raising effort will be used to package these ‘issues to results’ initiatives to secure additional project grant funding, resources and expertise to their implementation in addition to core resources secured for the PIPA Core Management outlined above. For each of these ‘issues to results’ programs detailed work plans and budgets will developed as part of the PIPA Annual Operational Work Plan. Implementation progress in each will be reviewed as part of the core PIPA Monitoring and Evaluation and implementation subject to adequate resourcing. Design and implementation of these initiatives will be synergistic across the PIPA effort combining resources, accessing expertise, and maximizing efficient and coordinated effort and use of funds available. Importantly work undertaken in the programmes below will contribute to SAP 3 – State of the PIPA Report. Identified PIPA ‘issues to results’ programmes are:

- **SAP 2.1 PIPA Atoll& Reef Islands Restoration & Biosecurity**
- **SAP 2.2 PIPA Coral Reefs and Coastal Management**
- **SAP 2.3 PIPA Endangered and Threatened Species**
- **SAP 2.4 PIPA Offshore Fisheries**
- **SAP 2.5 PIPA Cultural and Historical Heritage**
- **SAP 2.6 PIPA Seamount & Deep Seas**
- **SAP 2.7 PIPA Climate Change**

SAP 2.1 PIPA Atoll & Reef Islands Restoration & Biosecurity

Target: by the end of 2014 a PIPA Atoll and Reef Islands Restoration programme will be implemented that ensures the continued recovery of native island biota, e.g seabirds through targeted invasive species eradications and follow up monitoring. Further a PIPA Biosecurity Programme will be designed with the primary aim of preventing any further introductions of alien species and the implementation will be integrated into the PIPA Core Management programme.

Baseline:

Terrestrial threats to the PIPA are dominated by the impacts of invasive alien species (pest plants and pest animals). Of the pests, the invasive mammals are currently the most impacting as they can change entire ecosystems and eliminate many species of vertebrates, particularly birds, in the PIPA. The presence of mammalian species on all of the islands in recent decades has resulted in greatly depleted flora and fauna, including to the threatened and sensitive seabirds such as Phoenix petrels (Endangered IUCN Red List category (EN)), white-throated storm-petrels (Vulnerable IUCN Red List category (VU)) and blue noddies. Their declines, together with those of more common seabirds, have led to degraded ecological processes that formerly linked the terrestrial and marine ecosystems. For example, the nutrient levels feeding the coral reef and ocean systems are now greatly reduced because of the extensive declines in the size of seabird colonies. Other more complex interactions are likely to include the failure of colonies of frigatebirds (two parasitic species locally) due to pest-induced failures of colonies of other seabird species on which they depend. Meanwhile, browsing rabbits and rats have caused the loss of nesting cover for petrels, storm-petrels, noddies, shearwaters, terns etc.

The potential for restoration of these islands is however very high as they each support only 1-3 pest mammal species and few other pests. All except one of the islands are uninhabited and most are difficult to land on from boats. These features mean that there is little likelihood of new invasive species arriving and high efficacy to a well-designed biosecurity programme. Recovery of species is likely to occur at high rates compared with other inhabited islands in Kiribati and the Pacific generally.

The SAP PIPA Atoll Restoration initiative has the primary purpose to restore the entire terrestrial ecosystem of the PIPA islands through the removal of pest mammals. An important companion initiative is implementation of the PIPA Biosecurity programme which aims to ensure these islands are maintained in a pest-free state following the eradications. PIPA Biosecurity planning and implementation will address all of the potential invasive species that could arrive, including mammals, ants and other invertebrates, reptiles, mynas and pest plants.

Pests and indigenous biota were documented during a CI CEPF-funded terrestrial conservation survey of the PIPA in 2006. Pest findings are summarized in Table 4 below. Although some pests appear to have died out or been removed (e.g., cats on Enderbury and Pacific rats on Orona), mammalian pests were still present on each of the 8 atolls in 2006 (Pierce et al 2006).

Table 4. Known pest mammal status in PIPA 2006

Island	Pest status 2006	Comments
Rawaki	Rabbits (targeted 2008)	Eradication success to be confirmed late 2009/10
Birnie	Pacific rat	

McKean	Asian rat (targeted 2008)	Eradication success to be confirmed late 2009/10
Enderbury	Pacific rat	Cats also previously reported but have died out
Orona	Cat	Pacific rat were once present but may have been eradicated early 2000s with brodifacoum used by coconut growers (status needs confirmation); no dogs, pigs in 2006
Nikumaroro	Pacific rat	No cats detected 2006
Manra	?	Not surveyed 2006; cats, rats and pigs previously reported.
Abariringa	Cat, <i>Rattus</i> spp.	Not surveyed 2006; possibly Pacific rat and larger rat species present

Prioritization of island pest eradications is based on a combination of several factors including:

- urgency - securing the most threatened seabird species from current threats,
- ecosystem values – extent and intactness of natural ecosystems
- potential for ecosystem recovery and recolonisation by indigenous species, etc
- cost-effectiveness/feasibility
- defence/biosecurity

On this basis, two small islands (Rawaki and McKean) were rated urgent for pest eradication, because they supported a high diversity of seabird species (including threatened species) that were at risk from rabbits (Rawaki) and the recently invading Asian rat (McKean). Three other islands (Birnie, Enderbury and Orona) were also rated high in 2006 due to high ecosystem values and/or potential for ecosystem and species recovery). Manra was not able to be visited. Subsequently a NZAID-funded eradication programme attempted to eradicate pests on Rawaki (rabbits), McKean (Asian rats) and Birnie (Pacific rats) in 2008. The Birnie eradication was aborted, however, and confirmation of eradications on Rawaki and McKean will not be known until at least late 2009.

Important habitats and seabird features of the island as well as an eradication timetable are displayed in the following tables 5 and 6.

Table 5. Key habitat and seabird features of the islands (Pierce et al 2006).

Island (pest)	Land area (ha)	Risk of pests invading ¹	Main vegetation types	Seabirds
1. Pest targeted 2008				
Rawaki (ex-rabbits?)	<50	Low	Grass, low scrub, recovering veg 2008	Most diverse in PIPA – 17-18 spp.
McKean (ex-Asian rat?)	c.20	Low	Grass, low scrub	Moderate diversity – declines since 20 th C
2. Other highest priority islands for restoration/pest removal				
Enderbury (Pacific rat)	500+	Moderate	Mainly grass and low scrub, trees, few coconuts	Diverse seabirds and recovering since cats died out; near Rawaki
Birnie	<50	Low	Grass, low scrub	Depleted birds, but

(Pacific rat)				close to Rawaki
Orona (cats)	c.600	High	Forest, scrub, coconut plantation	Good habitat for tree- nesters, also lizards, invertebrates
3. Priority islands for detailed ecological survey				
Manra (cats? rat spp.?)	c.500	Low	Forest, scrub, coconut plantation	Needs survey – few birds on fly-on counts
Kanton (cats, Pacific rats, large rat?)	c.900	High	Forest, scrub, coconut plantations	Depleted, but some tube-noses in SE (needs survey)
4.Others				
Nikumaroro (Pacific rats)	c.400	High	Forest, scrub, coconut plantation	Good habitat for tree- nesters, lizards etc

Note 1: this is simply a reflection of ease of landing (some of it illegally) and transporting pest mammals/ants etc ashore. Landing is difficult to achieve at the small islands. Coconut plantations may attract illegal landing at the three large southern islands and Kanton.

Table 6: Programme for eradication implementation by the biosecurity programme

Action/Task	Where	Timing	Who
Fisheries biosecurity	Source ports	Ongoing	PIPA/Fisheries
Port biosecurity	Tarawa	By 2010	Quarantine/Ag
Port biosecurity	Kiritimati	By 2010	Quarantine/Ag
Port biosecurity	Kanton	By 2011	?
Signage	7 islands	By 2012	PIPA
Coconut removal	Enderbury	By 2011	PIPA/delegate
Rodent surveillance and biota response	7 islands	Ongoing	PIPA/Ag/WCU?
Ant surveillance	7 islands	Every 5 years	PIPA/Ag/WCU?
Pest removal			
2008 success	Rawaki, McKean	2009-2010	PE/PIPA
Feasibility pest removal	Enderbury/Birnie	2009-2010	PIPA delegate/PE
Cat removal	Orona	By 2010	PE

2010 – 2014 Actions:

- *Rawaki – monitor outcome of rabbit removal which aims to secure and make more productive this site which is currently the sole viable breeding location for a million or more birds of 17-18 seabird species in PIPA – includes the threatened or sensitive species Phoenix petrel, white-throated storm-petrel, blue noddy, three shearwater species and grey-backed tern and other terns, frigatebirds, etc.*
- *McKean – monitor outcome of Asian rat removal which aims to reverse the previously crashing populations of nearly all seabirds on this island and will see the rapid return and increased breeding success of all local tern and noddy species, including blue noddy, and the gradual increase in numbers of storm-petrels, Audubon’s shearwater and other shearwaters. The more successful nesting of frigatebirds should follow due to the threatened birds becoming more common.*

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- *Enderbury – eradicate Pacific rats from this large atoll which is one of the gems of the PIPA with a large, little- modified grassland-shrubland ecosystem, but with depleted birds. The removal of rats will see the vegetation recover and a return of all of the seabird species currently breeding on neighbouring Rawaki, including Phoenix petrel, storm-petrels, shearwaters, grey-backed terns and brown noddies and blue noddies (all visit, but with little or no successful breeding), lizard and invertebrate communities recover.*
- *Birnie – eradicate Pacific rats from this small atoll. It is also located near Rawaki and most of the seabird species present there will also colonise Birnie.*
- *PIPA Biosecurity programme - fully integrated and ongoing implementation of biosecurity measures with the primary aim of preventing IAS species introductions. This addresses particularly the key potential source areas, including Tarawa and Kiriritimati, and many international ports in the Pacific region, and measures to minimise the transport of IAS on vessels. It also addresses pest surveillance and contingency measures at the PIPA, including e.g. no landing signage and removal of coconut trees (which may attract illegal landing) at Enderbury. See table above for biosecurity workplan.*

SAP 2.2 PIPA Coral Reefs and Coastal Management (out to 12 nautical miles).

Target: by the end of 2014 PIPA's coral reefs and coastal habitats around 7 of the 8 PIPA Atoll and Reef Islands will have been effectively fully protected for the 5 year period through complete protection and their recovery from past unsustainable practices, e.g., shark finning, and meteorological impacts, e.g., coral bleaching will be better understood via work undertaken in the PIPA Monitoring and Evaluation programme. For Kanton Atoll, a Sustainable Resource Use plan will be developed and implemented inclusive of addressing coral reef and coastal management needs. Further climate change adaptation measures as recommended by SAP2.7 Climate Change programme will be assessed and implemented as resources allow.

Baseline:

The coral reefs of PIPA are among the least disturbed coral reefs in the world. Currently more than 200 coral species have been recorded in the PIPA but undoubtedly many more deep water coral species associated to seamounts remain unidentified within PIPA. The reef system is so remote and untouched by human activities that it can serve as a benchmark for understanding and potentially providing guidance for restoring other degraded hard coral ecosystems. The Phoenix Island reefs provide a model of what atoll reefs in this part of the Pacific Ocean are like with minimal human disturbance. The PIPA coral reefs offer a unique opportunity for coral reef research and conservation which is important on an international scale.

Most coral species have been listed as threatened or near-threatened as a result of global warming. PIPA, lying in the equatorial Pacific where ENSO cycles are generated, provides a unique geographic location for acclimatization and evolution of resistance to warming temperatures in corals. The widespread survival of corals in PIPA during the unprecedented warming in 2002-3 suggests this region may hold a key role in the long term adaptation and survival of coral species. Their ability to regenerate is much better than reefs in more populated areas due to the general lack of other environmental stresses on the reefs. This

provides an important and likely unsurpassed opportunity to research and understand climate change impacts on coral reef systems in the virtual absence of other anthropogenic factors.

PIPA also contains nationally, regionally and internationally important assemblages of species associated with coral reef and lagoon systems. Of note are clams, fish and sharks, which are summarised below.

The Kanton and Orona lagoons host spectacular giant clam (*Tridacna maxima* and *T. squamosa*) communities in sizes rarely seen elsewhere in the world. The density of these giant clams in Orona lagoon is an outstanding feature of PIPA and augurs well for the long term conservation of this increasingly threatened species.

Currently 518 shallow reef fish species are recorded from PIPA while several remain unidentified. A formula for predicting the total reef fish fauna based on the number of species in six key indicator families (Allen, unpublished data) indicates that at least 576 species, over 50 more than currently listed, can be expected to occur in the coastal reef ecosystem of PIPA. Fish diversity of seamounts is unknown but expected to have high levels of endemism. PIPA is not only outstanding in its reef fish biodiversity but is outstanding for the extraordinary abundance and size of fish, indicative of the high habitat quality and level of protection.

Many fish species in PIPA are seen in exceptional sizes and occur in much higher densities than occur in many other localities in the Indo-Pacific region, noteworthy species including surgeonfishes (Holocentridae), *Eviota* (Gobiidae), and *Trimma* (Gobiidae) (*Acanthurus guttatus*, *A. nigricans*, *A. triostegus*, *A. xanthopterus*, *Naso literatus*, and *Zebrasoma veliferum*) and parrotfishes (*Hipposcarus longiceps* and *Scarus ghobban*) further testimony to their general lack of exploitation and habitat quality occasioned by remoteness and formal protection. All of these species can be readily sighted in extraordinarily large aggregations in PIPA. Especially noteworthy are the huge spawning aggregations of longnose parrotfish (*Hipposcarus longiceps*) found at Kanton and large shoals (>200) of the threatened Bumphead Parrotfish (*Bulbometopon muricatum*) (VU) seen on most dives at Orona, both in the lagoon and on outer reefs (Allen and Bailey). The lagoon at Orona is also notable for its population of juvenile Napoleon Wrasse (*Cheilinus undulatus*) (EN) thus providing a safe breeding area for this globally endangered species. Overall, the Phoenix Islands population of Napoleon Wrasse (*Cheilinus undulatus*), usually a good indicator of absence of local fishing pressure, is exceptional compared to other internationally recognized marine hotspots recently surveyed in the Indo-Pacific region by CI.

PIPA hosts a large proportion of regional (Central Pacific) and local endemic species, species new to science (Allen and Bailey), and unusual species assemblages. Spectacular mass spawnings by parrotfish and wrasse species have been observed and documented within PIPA. PIPA may also host spawning grounds for the commercially important skipjack tuna. The near-pristine coral reefs provide important protected habitat for populations of higher predators such as sharks.

Recent observations show that PIPA reefs are highly vulnerable to iron enrichment from shipwrecks, which can cause widespread mortality of corals and conversion to an algae-dominated state. Better understanding of this risk will be useful for managing impacts locally.

Currently, the only domestic reef fisheries are associated with subsistence fishing on Kanton Atoll in connection with the administrative settlement on Kanton. This level of harvests is

minimal and will be analyzed further and managed through the Kanton Sustainable Resource Use Plan [cite]. There are no other domestic commercial fisheries on PIPA reef resources, although there are currently no license limitations on such fisheries in current domestic commercial licenses. License conditions prohibiting commercial fishing in the PIPA will be developed and added to commercial licenses as they are re-newed.

2010-2014 Actions:

- *Full protection of coral reefs and coastal habitats and associated species will continue to be implemented around 7 of the 8 PIPA Atoll and Reef Islands out to 12 nautical miles.*
- *The Kanton Atoll Sustainable Livelihoods/Conservation and Sustainable Resource Use plan will be take into consideration in its development and implementation maximizing effective conservation of Kanton's coral reefs, coastal habitats and associated species out to 12 nautical miles whilst ensuring that the subsistence needs of the local Kanton Atoll caretaker population are met.*
- *Recovery from previous unsustainable practices, e.g., shark finning, and meteorological impacts, e.g., coral bleaching, will be monitored and related recommendations for improving management from other SAPs eg Climate Change, Endangered and Threatened Species programmes will be made.*
- *License conditions prohibiting domestic commercial fishing on the PIPA coral reefs will be developed and included in all domestic commercial fishing licenses.*

SAP 2.3 PIPA Endangered and Threatened Species

Target: by the end of 2014, effective PIPA Endangered and Threatened Species conservation will be fully integrated into the management of PIPA. Further the PIPA Monitoring and Evaluation Programme will enable detection of trends in these species and the threats facing them in order to improve management interventions designed to improve their conservation status.

Baseline situation:

Protected Species have been prescribed by the Wildlife Conservation Ordinance 1975. The current situation with regard to species protection in the Phoenix Islands is presented below drawn from existing laws and regulations and measures agreed in PIPA's interim management. The current IUCN Red List for Kiribati/PIPA is given in Appendix 6.

Birds -. In Schedule 1 of the Wildlife Conservation Ordinance, fully protected birds are listed below:

Local Name	English Name	Scientific Name
1. Te Eitei, Katafa	Great Frigatebird	<i>Fregata minor</i>
2. Te Eitei	Lesser Frigatebird	<i>Fregata ariel</i>
3. Te Taake	Red-tailed Tropicbird	<i>Phaethon rubricauda</i>
4. Te Ngutu	White-tailed Tropicbird	<i>Phaethon lepturus</i>
5. Te Mouakena	Masked or Blue-faced Booby	<i>Sula dactylatra</i>
6. Te Kibui	Brown Booby	<i>Sula leucogaster</i>
7. Te Kota, Makitaba	Red-footed Booby	<i>Sula sula</i>
8. Te Korobaro	Wedge-tailed Shearwater	<i>Puffinua pacificus</i>
9. Te Tinebu	Christmas Island Shearwater	<i>Puffinus nativitatis</i>

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10. Te Nna	Audubon's Shearwater	<i>Puffinus lherminieri</i>
11. Te Tangiuoua, Ruru	Phoenix Petrel	<i>Pterodroma alba</i>
12. -	Bulwer's Petrel	<i>Bulweria bulwerii</i>
13. Te Bwebwe ni marawa	White-throated Storm-Petrel	<i>Nesofregata albigularis.</i>
14. Te Tiriwenei	Pintail Duck	<i>Anas acuta</i>
15. Te Kaai	Reef Heron	<i>Demigretta sacra</i>
16. Te Mangkiri, Takiri	Black or White-capped Noddy	<i>Anous tenuirostris</i>
17. Te Kunei, Io	Brown or Common Noddy	<i>Anous stolidus</i>
18. Te Raurau	Blue-grey Noddy	<i>Procelsterna caerulea</i>
19. Te Tarariki, Kereekere	Sooty Tern	<i>Sterna fuscata</i>
20. Te Tarangongo	Grey-backed Tern	<i>Sterna lunata</i>
21. Te Kiakia	Black-naped Tern	<i>Sterna sumatrana</i>
22. Te Karakara	Crested Tern	<i>Thalasseus bergii</i>
23. Te Matawa	White or Fairy Tern	<i>Gygis alba</i>
24. Te Kun	Pacific Golden Plover	<i>Pluvialis fulva</i>
25. Te Kitiba, Kolili	Rudy Turnstone	<i>Arenaria interpres</i>
26. Te Kewe	Bristle-thighed Curlew	<i>Numenius tahitiensis</i>
27. Te Kiriri	Wandering Tattler	<i>Heteroscelus incanus</i>
28. Te Kaka	Bar-tailed Godwit	<i>Limosa lapponica</i>

Corals – over 1/3 of scleractinian corals are listed as Threatened on the IUCN Red List, and all species are vulnerable to climate change due to rising temperatures and acidification. Actions under SAP 2.2 will include species-related measures to maximize their protection.

Turtles – Previously under the Wildlife Conservation Ordinance, green turtles - their eggs and nests, were protected in most of the Phoenix Islands, excluding Kanton and Enderbury. According to Pulea and Farrier (1993), the green turtle was fully protected in the following designated areas: Birnie, Nikumaroro (Gardner), Orona (Orana, Hull), McKean, Rawaki (Phoenix), and Manra (Sydney). Prohibited acts included: (1) hunting, killing or capturing, (2) possession of any part, (3) searching for, taking, or wilfully destroying or damaging eggs and nests, and (4) possession, acquiring, selling or giving eggs or nests. Pulea and Farrier (1993) note that green turtles were protected on certain Phoenix Islands, but were not protected at sea. Other marine turtles were protected on land by Section 7 of the Wildlife Conservation Ordinance (Pulea and Farrier 1993). Hunting, capture, and killing other marine turtles while on land were prohibited without a permit. However, like the green turtle, they were not protected at sea.

Under this Plan all turtle species are fully protected throughout PIPA except for current take for subsistence purposes by the local Kanton caretaker population for turtle harvest from Kanton Atoll only. As part of the development of the Kanton Atoll Sustainable Resource Use Plan the sustainability of this take will be assessed and measures taken accordingly.

Tuna – Under Kiribati's Fisheries law a 60 nautical mile purse seine exclusion zone applies around Kanton Atoll. Additionally all DWFN effort is banned in a 12 nautical mile zone around each of the Phoenix Islands atolls. Further under recent subregional arrangements (Nauru Agreement) Kiribati has agreed to ban the use of FADs for fishing for 3 months (July to September) for all DWFN and instituted a mandatory 100% observer coverage. These and related measures are now in force under the 3rd Arrangement under the Nauru Agreement and are being progressively phased in as DWFN licenses (largely annual except for USA purse seiners) expire and are re-issued.

Under this Plan the above measures for tuna conservation management will be extended through the proposed additional 25% no take zone coverage consistent with the capitalization of the PIPA Conservation Trust and compensation for lost revenues. This no-take zone will apply to all DWFN fleets except the USA fleet until the US Fisheries Multilateral Treaty (USFMT) expires in 2013.

Bonefish – Under the Fisheries Ordinance, the catching of bone fish in the PIPA was strictly regulated in 2005, restrictions include method (gear type) and amount of catch, catch and release and fees for tourism fishing.

Other terrestrial and marine biota – it is important to recognise that under the current or baseline PIPA Zonation all biota, terrestrial and marine, is fully protected in and out to 12 nautical miles for seven of the eight PIPA atolls/ reef islands. This is a key measure for terrestrial and coastal biota and immediate offshore areas due to the paucity of status information for most endangered and threatened species, including locally important and endemic species, in PIPA and indeed in Kiribati. For Kanton Atoll the conservation needs of endangered and threatened species will be a key consideration in the proposed Kanton Atoll Conservation and Sustainable Resource Use Plan.

One key gap identified in protected species coverage is the conservation needs of cetaceans, and several migrant seabirds travelling through the area (Pierce et al 2008)..

2010-2014 Actions:

- *Drawing from the current protected species measures, gaps identified in protected species coverage from the IUCN Red List for PIPA and species identified as locally important, e.g., native medicinal plants and endemics, a revised Protected Species List for PIPA will be developed and appended to this Plan by the end of 2010.*
- *This current Protected Species List and its further development outlined above will be used to inform the development PIPA Monitoring and Evaluation Plan to ensure its usefulness to assess information needs eg threat and species status trends for improved management of endangered and threatened species protected in PIPA.*
- *The contribution of PIPA to maintaining populations of the above species and how this may help protecting/restoring and where appropriate using these species in the Gilbert and Lines island groups will be identified and built into national programmes for protecting and using threatened species.*

SAP 2.4 PIPA Offshore Fisheries

Target: by the end of 2014 PIPA's Offshore (tuna) Fishing effort will be reduced by 25% on an area closure basis through increased no take zonation commensurate with compensation from the PIPA Conservation Trust, as set forth in the PIPA Conservation Contract. Impacts of this decision will be monitored and understood through monitoring of landing catch and fishing effort data. Currently this excludes fishing effort and revenues from the USFMT as the current treaty arrangements do not expire until end 2013. Research will be identified to further clarify tuna spawning hot spots and special management zones within the PIPA.

Baseline Situation:

Offshore fishing by DWFN is currently allowed under license except in the 60 nautical mile purse seine exclusion zone surrounding Kanton Atoll and in the 12 nautical mile no take

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zones surrounding the eight PIPA islands. PIPA is the world's first MPA to be used in part as a contribution to tuna conservation management and it's compatible with wider regional tuna and DWFN operational decisions that Kiribati is part of, e.g., 3rd Arrangement of the Parties to the Nauru Agreement. Additionally the basis of lost DWFN license fees is a principal component of the PIPA Conservation Trust construct. It is thus important over time to understand more fully the nature of the fishing currently allowed in PIPA, the impact of no-take or exclusion zones and the contribution of area-based closures to tuna conservation management.

In endowment discussions with GoK, catch and revenue estimations have had to rely on a relatively short time-series of data. Consequently, analysis of fishery license revenues hinges on a number of assumptions that cannot be verified or disproved without additional, more precise data. For instance, an important assumption in calculating potential reductions in DWFN revenues associated with the establishment of a tuna "no-take" zone within the PIPA relates to the spatial distribution of the annual DWFN catch and the harvest implications of spatially constraining the DWFN fleet in PIPA waters. Uwate et al. (2008) assumed that catch is evenly distributed throughout the Phoenix Islands EEZ. However, it is not clear to what degree foregoing harvests in all or part of PIPA will affect total DWFN landings in the Phoenix Islands EEZ. In addition, it is not clear whether a reduction in catch from the PIPA area results in an equivalent reduction in total catch (from open areas in the Phoenix Islands EEZ as well as DWFN operations in the rest of the Kiribati EEZ), because some or all of the catch and fishing effort that historically took place in potentially closed areas of the PIPA would be displaced to different areas. Indeed, the net effect of some MPAs has been to increase catches in adjacent areas, in what has been termed the "spillover effect." Skipjack tuna juveniles have been collected in the Phoenix Islands area, suggesting that skipjack tuna may spawn in that area. If the Phoenix Islands are a major tuna spawning area, then there may be positive spillover effects in adjacent waters of PIPA, actually enhancing catches in the EEZ areas that remain open to fishing. This dynamic could have significant implications for the impact of the PIPA zonation scheme on net DWFN revenues, and thus on the scope of the no-take zone that could be supported at any set level of the PIPA Conservation Trust..

Apart from tuna fisheries (long line and purse seine), no other offshore fisheries are operating in PIPA waters. Measures to sustainably manage and protect other offshore resources of PIPA must be developed and integrated with programmes for fisheries development and negotiations with DWFN. In particular, fishing methods that destroy habitat must be excluded. See SAP 2.6 on Seamounts.

2010-2014 Actions:

- *Early agreement by GoK and partners as part of the PIPA monitoring programme on which parameters are to be measured to understand fishing effort (catch landings, license revenues) and their relationship to PIPA management and no take fishing zonation. Implementation of this part of the monitoring programme is a high priority to inform the further development and use of the Conservation Contract with the PIPA Conservation Trust.*
- *Expanded tuna no-take zones will be identified and implemented through limitations on annual DWFN fleet licenses as necessary to comply with the terms of the Conservation Contract executed between the GoK and the PIPA Conservation Trust.*

- *Early discussions with the U.S. will be undertaken in advance of the re-negotiation of the U.S. MFT to access the potential impacts of various PIPA zonation approaches on potential U.S. MFT revenues.*

SAP 2.5 PIPA Cultural and Historical Heritage

Target: by the end of 2014 a conservation and information programme for PIPA's cultural and historical heritage programme will be designed and implemented under the direction of the Kiribati Museum and Cultural Centre in partnership with the MELAD PIPA Office.

Baseline Situation:

The Phoenix Islands have a rich and diverse cultural and historical record with the common element of human occupation reaching its limits. PIPA cultural and historical values identified include:

- Archaeological artifacts, including walled structures, are evidence of early colonization by both Micronesians and Polynesians, providing an important cultural link and an example of island voyaging over time and the limits to which human settlement can extend – even into modern times. The Phoenix Islands could be considered an overlap area of these two important Pacific Islands peoples.
- The island Nikumaroro was named by Gilbertese settlers in 1937 in honour of the island of Nikumaroro, in the south of the Gilbert Group, from which the famous Gilbertese ancestress Nei Manganibuka came, bringing with her the traditional lore of deep-sea navigation and the first *buka* tree.
- Nikumaroro is possibly the site of the crash landing of Amelia Earhardt on her failed trans-Pacific flight in 1938. Remains of a well-documented World War II aircraft crash exist on the island of Manra.
- Several islands in the group hold archaeological remains of settlements, guano mining and whaling/transiting ships from the 19th and early 20th centuries.
- Archaeological remains of the 20th century world beyond the Phoenix Islands and Kiribati borders include British and United States military bases from the Second World War, the airfield markers and base for the Trans-Pacific Pan-Am Clipper seaplane flights of the mid 1940-50s, and the United States missile testing base SAMTEC.

The only active regular historical investigation in the PIPA is the ongoing investigation of the Earhardt crash by the US-based NGO, The International Group for Historic Aircraft Recovery (TIGHAR). TIGHAR operates under a PIPA Research Permit and has provided all reports to the PIPA Office.

2010-2014 Actions:

- *Development and implementation of a Cultural and Historical Heritage Conservation Programme for PIPA under the auspices of the Kiribati Museum and Cultural Centre.*
- *Development of an information programme on the cultural and historical heritage of the Phoenix Islands, including information useful for tourism development.*
- *Ongoing TIGHAR investigation into the Earhardt disappearance under a PIPA permit and with TIGHAR resources, noting that if clear evidence was found this would be of international importance.*

SAP 2.6 PIPA Seamount & Deep Seas

Target: by the end of 2014, increased understanding and conservation of PIPA seamount and deep sea habitat will be fostered through targeted research, a proposed seamount naming campaign and increased representative habitat protection in the Phase 2 Zonation no-take zones.

Baseline Situation:

A globally unique aspect of the PIPA is the ocean-scape scale of the management area. PIPA has a huge bathymetric range with waters reaching to maximum of 6,147 meters depth but the main seafloor averages around 4,500 metres below the ocean surface. Additional to the ancient volcanoes that reach or approach the surface, bathymetry reveals a series of topographic features which are interpreted to also be volcanoes and which technically qualify as ‘seamounts’ – ‘submerged mountains with a height of more than 1,000 metres above the sea floor but whose peak lies below the photic zone’. To date, some 14 seamounts have been identified within PIPA, thirteen of which have been formally registered but only nine of those have yet been named: Tai, Polo, Siapo, Gardner, Tanoa, Fautasi, Tau Tau, Carondelet and Winslow Reef (see Annex 3 for Seamount Summary Descriptions).

Seamounts are known to have a high level of endemism and often contain high numbers of species that are new to science. Seamount ecosystems are of very special interest for conservation. Seamounts are particularly vulnerable to serious impact and local extinctions as a consequence of concentrated commercial fishing. It is estimated that as much as 25% of the world’s seamount ecosystems have already been degraded by deep sea fishing. Kiribati has recognised threats to seamounts and deep sea habitat in its signature of the *Declaration on Deep-Sea Bottom Trawling to Protect Biodiversity in the High Seas (Nadi Communiqué, Pacific Islands Forum, October 2006)*. This agreement commits the members of the Pacific Islands Forum to urgently take actions consistent with international law to prevent destructive fishing practices on seamounts in the Western Tropical Pacific Islands Area. Protection of seamounts and deep sea habitat within PIPA is a complementary domestic measure to conserve these habitats within Kiribati’s EEZ.

PIPA is fortunate in being so remote and its seamounts are so deep that the PIPA seamounts have escaped deep sea trawling to date. Consequently, their biota is believed to be intact and so, with continued protection, remain a valuable conservation asset. PIPA is one of the very few large marine protected areas in the world that contains numerous seamounts, and the only one in the tropics. The 2000 deep-sea surveys by NEAq recorded the first distribution records of sixgill (*Hexanchus griseus*) and Pacific sleeper (*Somniosus pacificus*) sharks for this part of the Pacific from 900 meters depth near Kanton. It is probable that the seamounts of PIPA have great importance for pelagic and commercially important fishery such as tuna and skipjack. With 25% of the world’s seamounts already degraded, the pristine seamounts of PIPA provide critically important protection for these fragile ecosystems and associated species, representing a conservation resource of global significance.

PIPA’s seamounts and deep sea habitats are seen as an important yet little understood component of PIPA. Targeted action during this plan seeks to address their effective protection and increase research effort and understanding as resources allow.

2010-2014 Actions:

- *Maximise and incorporate protection of the Winslow and Carondelet Reef Seamount systems in PIPA Phase 2 Zonation.*

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- *Adjustments to the PIPA zoning plan of the open ocean/buffer zone to specify protection levels for seamounts.*
- *Investigation into naming rights of seamounts with the view to renaming with I-Kiribati names those named already and ‘auctioning’ naming rights as part of the PIPA awareness and fund raising programme.*
- *Develop and support a seamount and deep sea research programme within PIPA with the following aims:*
 - *To describe the biodiversity and habitats of the deeper areas of the PIPA;*
 - *To explore potential links between deep and shallow habitats of the PIPA;*
 - *To use this biological data from the deep areas of the PIPA to inform the PIPA Management Planning process.*
 - *To document lessons learnt in the PIPA development as the first MMA model in the Pacific Islands region and the first for a Small Island Developing State (SID) that is inclusive of deep sea habitat.*

SAP 2.7 PIPA Climate Change

Target: by the end of 2014, best practice measures for climate change adaptation in tropical marine protected areas will be investigated and implemented, as resources allow for PIPA Further a PIPA Climate Change Research Programme will be designed and promoted using PIPA as a globally important sentinel site in understanding the impacts of climate change on tropical marine and island atoll systems in the virtual absence of other anthropogenic factors.

Baseline situation:

Climate change is considered the most significant environmental risk to Kiribati as a nation and this includes significant potential risk to the development and integrity of the PIPA. Kiribati and associated partners and donors have invested significantly into understanding and planning for climate change and this is reflected in the World Bank Kiribati Adaptation Programme 2nd phase (KAP2).

In 2002-3, the Phoenix Islands experienced a bleaching event as a result of increased sea surface temperatures that reached 21 Degree Heating Weeks and persisted for several years. Inside the lagoon of Kanton the luxuriant community of *Acropora spp.* corals suffered near 100% mortality and there was an estimated 60% mortality of corals throughout the island group, as measured in 2004 and 2005. Fish populations were not noticeably affected. By 2009 the Phoenix coral reefs have shown spectacular and rapid signs of recovery, regaining 50% of the area lost, and nearly 100% recovery in the best sites

The Phoenix Islands’ example of mortality from a global event then recovery in the absence of significant local human impacts is significant as a reference case globally. With good water quality and intact fish herbivore populations, the initial colonization by algae following the coral mortality followed a succession from turf algae to coralline algae, and a progressive recovery of corals which are promoted by coralline algal cover. Also, the deep atoll slopes allowed deeper water corals to survive the bleaching event, species of fish remained robust, and there were signs of regeneration on even the most badly hit reefs shortly after the bleaching occurred. That is taken to be a positive sign and suggests both the resilience of the Phoenix Islands reefs to global climate change and the value of these remote island reefs as global benchmarks. Impacts of the warming in 2002-3 to other components of the Phoenix

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Islands flora and fauna were not studied, but their remoteness will make them as valuable examples as global benchmarks for these systems as well.

The effects of global climate change and global warming are expected to be experienced even in the remote areas such as PIPA. In fact PIPA is located in the part of the Central Pacific from which warm surface waters that drive the El Niño phenomenon originate. There have been various meteorological studies that suggested that the Phoenix Islands region is ideally placed for monitoring changes in weather patterns, especially ENSO activities in the central Pacific. The impacts of these changes could be amplified in the frail and unique ecosystems of the Phoenix Islands. Rising sea levels could submerge these atolls (though individual islands may be rising tectonically) and warming sea surface temperatures can result in coral bleaching.

The meteorological conditions also have a big influence on fish stocks in the region. Lehodey et al (1997) examined the ENSO in relationship to the western equatorial Pacific warm pool. During ENSO events this warm water pool shifts to the east and skipjack tuna populations also shift to the east extending significant catches to the Phoenix Islands. The Phoenix Islands region appears to be the centre of El Niño activities in the Pacific so may be ideal for studying the El Niño phenomenon and more generally in relation to climate change.

Even though coral reefs of the Phoenix Islands are not isolated from the effects of global warming such as bleaching, their ability to regenerate appears much better than reefs in more populated areas in part because of lack of other threats and stresses to the reefs and possibly because they have adapted to the variations in water temperature caused by ENSO phenomena over a long period of time. This provides an important and likely unsurpassed opportunity to research and understand climate change impacts on coral reef systems in the virtual absence of other anthropogenic factors.

With respect to the direct PIPA management implications of climate change, there is an increasing body of literature and best practice advice for both marine and terrestrial protected area design, planning and implementation to best adapt to impacts of climate change. Drawing on this information a PIPA Climate Change Vulnerability Assessment was resourced with CI funding in 2009 and results will be incorporated into this Plan's implementation. It is noted that to date the most successful basic management strategy is to remove all other anthropogenic stressors to the PIPA environment, e.g., reduce fishing effort, avoid pollution, and eradicate invasive species, on the basis that PIPA would then have the best chance to cope with impacts of climate change.

In summary, PIPA will be managed in accordance with best practice advice and information for adaptation to climate change in marine and island protected areas. PIPA, as a very remote, intact, protected oceanic environment, is of scientific importance as a global benchmark for identifying and monitoring the processes of sea level change, growth rates and age of reefs and reef builders, both geologically and historically, and in evaluating effects from climate change and coral bleaching events without the confounding factors of pollution or resource extraction. The reef system is so remote from industrial activities that it can serve as a critical benchmark for coral ecosystem understanding and potential guide the restoration of other degraded hard coral ecosystems. The atolls and associated reef systems are acknowledged as critical sites for ongoing study of:

- global climate change, ocean acidification and sea-level events in that they are located in a region less affected by other anthropogenic stresses;

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- growth of reefs, evolution of reef systems, biological behavioural studies, recruitment processes in isolation, size classes and population dynamics of all marine organism groups and reef species diversity studies.

As such, the PIPA has exceptional value as a natural laboratory for the study and understanding of the significant ongoing ecological and biological processes in the evolution and development of marine ecosystems of the Pacific, the world's largest ocean, indeed all oceans.

2010-2014 Actions:

- *By March 2010 a PIPA Climate Change Scoping Study will be completed and based on this specific advice and input to this Plan (via annual Operational and Business Plans) on climate change issues will be made to ensure that PIPA management is consistent with best practice for climate change resilience and adaptation for protected areas.*
- *By March 2010 linkages between PIPA and the Kiribati National Adaptation Strategy under the National Adaptation Steering Committee in the Office of Te Beretitenti the Kiribati Adaptation Programme (KAP2) and the Climate Change Unit of the ECD will be established for reporting, policy linkages and implementation of this Plan and its Operational and Business Plans.*
- *By March 2011 assessment and development of PIPA as a 'natural climate change resource laboratory' will be made based on PIPA's attributes as being a large, remote, all marine habitat inclusive MPA that has limited other anthropogenic impacts and as such clearly articulates national, regional and global potential benefits. As part of this PIPA will explore and outline potential partnerships eg through its sister agreement with the North-west Hawaiian Marine National Monument (USA) and with international reef protection organizations, to better understand and capitalize on PIPA's apparent climate resilience (e.g., rapid recovery from bleaching events caused by increases in sea surface temperature). This is seen as a key investment strategy for PIPA to help with needed research, monitoring and management costs.*

SAP 3. State of PIPA Report 2014

Under the auspices of the MELAD Minister and the Principal Environment Officer the PIPA Office will produce, not later than 1 July 2014, a "State of the PIPA" report as required by the PIPA Regulations (2008). This report will assess PIPA status and trends including:

- Bird population trends
- vegetation/ecosystem responses
- Live coral cover trends
- Selected reef fish population trends
- Reef shark population trends
- Turtle population trends
- Pelagic conditions within the PIPA, including fisheries landings trends
- Annual visitor number trends and
- Such other matters as the PIPA MC shall chose to report

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The design of the PIPA Monitoring and Evaluation Programme will be completed by the end of June 2010 to ensure consistent and standard methodology to monitor the parameters listed above. At that time a PIPA Baseline Report for these parameters based on existing information will be compiled to be used as a reference base for the evaluation of trends for the 2014 report.

This report will be used as a basis for evaluation of the effectiveness of PIPA Management to date, issues arising and will provide input to a new PIPA Management Plan to be effective from 1 January 2015.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014)) the PIPA Office will lead the development and completion for the Principal Environment Officer and MELAD Minister approval of a “State of the PIPA “ report to be completed not later than 1 July 2014.

APPENDICES

- 9. Glossary of Terms**
- 10. PIPA Regulations (2008)**
- 11. PIPA Seamount Summaries**
- 12. PIPA Island Summaries**
- 13. IUCN Red List – Kiribati/PIPA**
- 14. PIPA Permits**
- 15. PIPA Species List**

REFERENCES CITED

- Allain, V. 2006. Seamounts and pelagic fisheries interactions under study. SPC fisheries newsletter #116 – January/March 2006. Pp. 33-35.
- Atherton, J. 2006 CEPF Ecosystem Profile for the Polynesia/Micronesia Hotspot
- Division of Ocean Affairs and the Law of the Sea Office of Legal Affairs (DOALOS). 2007. Development, implementation and management of marine protected areas training manual (draft). Train-Sea-Coast Workshop, Honiara, Solomon Islands. 15-20 January 2007. United Nations, New York.
- Chapman, L. 2004. Nearshore domestic fisheries development in Pacific island countries and territories. 4th SPC Heads of Fisheries Meeting, 30 August-3 September 2004, Noumea, New Caledonia. Information Paper 8.
- Conservation International. 2006. Technologies for tracking & combating illegal fishing. Power point presentation prepared by the Regional Analysis Program, Center for Applied Biodiversity Science, Conservation International. 20 slides.
- Garnett, M.C. 1983a. A management plan for nature conservation in the Line and Phoenix Islands. Part 1. Description. Unpublished report prepared for the Ministry of Line and Phoenix Islands, Kiritimati Island, Kiribati. 318 pp.
- Garnett, M.C. 1983b. A management plan for nature conservation in the Line and Phoenix Islands. Part 2. Policy. Unpublished report prepared for the Ministry of Line and Phoenix Islands, Kiritimati Island, Kiribati.
- Garnett, M.C. 1983c. Part 3. Recommendations. Unpublished report prepared for the Ministry of Line and Phoenix Islands, Kiritimati Island, Kiribati. 125 pp.
- Government of Kiribati/MELAD 2009 . Phoenix Islands Protected Area. Nomination Dossier to the UNESCO World Heritage Convention.
- Hampton, J., T. Lawson, P. Williams, and J. Sibert. 1995. Interaction between small-scale fisheries in Kiribati and the industrial purse seine fishery in the western and central Pacific Ocean. In: R.S. Shomura, J. Majkowski, and R. Harman (eds). Proceedings of the Second FAO Expert Consultation on Interactions of Pacific Tuna Fisheries. Shimizu, Japan. 23 to 31 January 1995. FAO Fisheries Technical Paper T365.
- IUCN. 1994. Guidelines for protected area management categories. IUCN Commission on National Parks and Protected Areas with assistance of WCMC. IUCN, Gland, Switzerland and Cambridge, UK.
- IUCN. 2006. The ecosystem approach: demystifying the concept and its application in the Marine Environment. 7th meeting of the United Nations. Open-ended Informal Consultative Process on Oceans and the Law of the Sea, New York, New York, June 12-16, 2006.

Draft dated:

IUCN Protected Areas Programme. Draft. Management planning for World Heritage properties, a resource manual for practitioners. World Commission on Protected Areas, World Heritage, and UNESCO. [draft report 2007].

Langley, A. 2003. Kiribati national tuna fishery status report no. 2. Oceanic Fisheries Programme, Secretariat of the Pacific Community.

Kelleher, G. (ed.). 1999. Guidelines for marine protected areas. World Commission on Protected Areas of IUCN. Best Practice Protected Area Guidelines Series No. 3. IUCN – The World Conservation Union.

New England Aquarium. 2006. Pacific islands paradise protected. News release, Newswide, March 28, 2006.

Pierce, R.J., T. Etei, V. Kerr, E. Saul, A. Teatata, M. Thorsen, and G. Wragg. 2006. Phoenix Islands conservation survey and assessment of restoration feasibility: Kiribati. Report prepared for: Conservation International, Samoa and Pacific Islands Initiative, Auckland University, Auckland.

Pollution Control Unit. 2006. Report on Kanton chemical cleanup mission (19/5/06 - /05/06). Environment and Conservation Division.

Salafsky, N., R. Margoluis, and K. Redford. Undated. Adaptive management: a tool for conservation practitioners. Washington, D.C.: Biodiversity Support Program.

Stone, GS, Obura, DO & Rotjan, RD. 2009. Phoenix Islands Protected Area Expedition 2009 – Assessment Report. New England Aquarium, PIPA, Conservation International

Uwate, K.R. and T. Teroroko. 2007a. Compilation of reports related to the Phoenix Islands. Phoenix Islands Protected Area, Ministry of Environment, Lands and Agricultural Development, Government of Kiribati, Bikenibeu, Tarawa, Republic of Kiribati. PIPA Technical Report No. 1.

Uwate, K.R. and T. Teroroko. 2007b. Phoenix Islands Protected Area – Stakeholder opinions. Phoenix Islands Protected Area, Ministry of Environment, Lands and Agricultural Development, Government of Kiribati, Bikenibeu, Tarawa, Republic of Kiribati. PIPA Technical Report No. 2.

Uwate, K.R., W. FitzGerald, and T. Teroroko. 2007. Valuation of Phoenix Islands marine and fisheries resources. Phoenix Islands Protected Area, Ministry of Environment, Lands and Agricultural Development, Government of Kiribati, Bikenibeu, Tarawa, Republic of Kiribati. PIPA Technical Report No. 3.

World Heritage Centre (WHC). 2005. Operational Guidelines for the implementation of the World Heritage Convention. United Nations Educational, Scientific and Cultural Organisation, Intergovernmental Committee for the Protection of the World Cultural and Natural Heritage. WHC 05/2, 2 February 2005.



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09 January 2010

IUCN Evaluation of “Phoenix Islands Protected Area” (Kiribati) – Nominated for inclusion on the World Heritage List

Dear Minister,

The IUCN World Heritage evaluation mission to **Phoenix Islands Protected Area** undertaken by **Mr. Bernard O’ Callaghan** and **Dr. Ameer Abdulla** from 28 September – 06 October 2009. The evaluators greatly appreciated the excellent support and co-operation provided by you and your colleagues in the preparation and implementation of the mission, and the kind welcome of the State Party throughout the mission. Please convey our sincere thanks to all of the officials, scientists and contributors that assisted the evaluators in undertaking the mission.

The IUCN World Heritage Panel met in Gland, Switzerland, in December 2009 to examine World Heritage nominations for natural and mixed properties and cultural landscapes. The IUCN Panel examined in detail each nomination dossier and any supplementary information from the State Party, reports and reviews of field evaluators and external reviewers, and other references regarding the nominated properties.

IUCN seeks to develop and maintain a dialogue with States Parties during the evaluation process. Following the discussions of the IUCN World Heritage Panel we would thus like to kindly ask for clarification of the points listed hereafter:

1. IUCN would be grateful for clarification of the status and development of fisheries and no-take zones in the nominated property in the view of a possible extension of the no-take zones within the nominated property.
2. Both the evaluators and the Panel expressed concern about the limited existing management capacity, including funding, monitoring and enforcement to ensure effective protection of the nominated property, including patrolling. IUCN would therefore be grateful to receive a timeline and list of activities anticipated to establish effective management of the nominated property. We would be grateful for particular clarification of the anticipated establishment of the mentioned Trust Fund in this regard.

We would appreciate your response to the above points as soon as possible, in order to facilitate the evaluation process, but **no later than the 28 February 2010**, as per paragraph 148 of the Operational Guidelines. Please note that any information submitted after this date will not be considered by IUCN in its evaluation for the World Heritage Committee. It should be noted, however, that while IUCN will carefully consider any supplementary information submitted, it cannot properly evaluate a completely revised nomination or large amounts of new information submitted at the last minute. So we request to keep your response concise and respond only to the above requests.

Supplementary information should be submitted officially in three copies to the UNESCO World Heritage Centre in order for it to be registered as part of the nomination. An electronic copy of any supplementary information to both the UNESCO World Heritage Centre and IUCN Headquarters would also be helpful.

Taking into account your response, IUCN will formulate its final recommendation to the World Heritage Committee which will meet from 25 July to 03 August 2010 in Brasilia, Brazil.

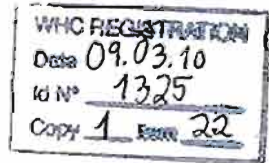
Should you have any questions concerning these matters, please do not hesitate to contact Mr Tilman Jaeger, World Heritage Project Management Officer (Tel: +41 22 999 0158; Fax: +41 22 999 0025; Email: tilman.jaeger@iucn.org). Thank you once again for your kind collaboration.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'T. Badman', with a long horizontal flourish extending to the right.

Tim Badman
Head, World Heritage

Cc. Kiribati National Commission for UNESCO, Mr. Tebania Tebakabo, Secretary-General UNESCO World Heritage Centre, Mr. Giovanni Boccardi and Mr. Alessandro Balsamo IUCN Regional Office for Oceania, Mr. Taholo Kami, Regional Director



MINISTRY OF ENVIRONMENT, LANDS & AGRICULTURAL DEVELOPMENT

P.O Box 234, Bikenibeu Tarawa

Telephone Number: (686) 28211, or 29762, Fax Number (686) 28334 or 29762

File ref:

Date: 25 February 2010

Mr. Tim Badman
Head, World Heritage
IUCN
Rue Maurverney 28
1196 Gland
Switzerland
Fax: 41 22 999 002
Email:

Dear Mr. Badman,

Thank you for your letter of 9 January 2010. Please note we did not receive this letter until forwarded by the UNESCO-Apia Office on 23 February 2010 and have responded as quickly as we could below.

Further please note that correspondence on the PIPA World Heritage nomination should be sent to those contacts given in the nomination document. I am attaching these at the end of this correspondence. Rest assured that the Government of Kiribati is ready, willing and able to do anything needed within our power to ensure success of the PIPA World Heritage listing. In that regard please do not hesitate to contact me at ambnikora@yahoo.com or to fax number 686-28334 and to copy our official contacts at anytime regarding the nomination and the answers to your queries below.

Below are specific responses to your queries. I would also like to take this opportunity to briefly update you on key PIPA progress which is highly relevant to our nomination. Specifically:

- Kiribati's Cabinet has approved the PIPA Management Plan 2010-2014 and this represents the highest level of support for PIPA's ongoing management. We are currently updating maps and publishing this plan but I would be happy to provide you with the full approved text.
- We have signed with the USA a sister site agreement with the Papahānaumokuākea Marine National Monument (PMNM), as you know this PMNM is also being considered this year for WH status. The sister site agreement is innovative and creates

a mechanism for much needed collaboration between large MPAs, including on World Heritage matters. It remains our firm view that the listing of both sites this year is key to management of the Pacific Ocean basin.

- The first two PIPA island restoration projects have been highly successful for eradication of invasive species (rabbits and rats) and globally important seabird populations and island habitats are showing great signs of recovery.
- We have successfully undertaken our fourth major multi disciplinary scientific expedition to PIPA with partners CI and NEAq. Research here is contributing to globally important matters on coral reefs and climate change. We have scoped climate change issues for PIPA and the important role research in PIPA has for understanding the impact of global change on coral reef systems.

I would be happy to provide more detail on any of the above which further adds to the integrity of our PIPA site nomination. Now to your two questions:

IUCN QUESTION 1:

1. IUCN would be grateful for clarification of the status and development of fisheries and no-take zones in the nominated property in the view of a possible extension of the no-take zones within the nominated property.

Since submitting our PIPA WHC Nomination Document we have finalized the PIPA 2010-2014 Management Plan which was approved by Cabinet in October 2009. Below is Strategic Action Programme 1.5 which covers zonation and I hope clarifies your query.

In considering the below information you would note that the existing baseline zonation for PIPA includes full protection (no take zone) more than 83% of the priority critical coastal habitats (terrestrial and marine, including coral reefs, out to 12 nm) in its first zonation. The remaining 17% comprises Kanton Atoll which has only subsistence resource use allowed.

PIPA Management 2010-2014 Plan Strategic Action Programme 5: Zonation:

"SAP 1.5 PIPA Zonation

The use of zonation is a core tool of PIPA Management, including a phased zonation approach to core protection measures as resources and capacity allow. In this Plan (2010-2014) two phases of PIPA zonation are proposed: the current or Phase I Zonation and an increase of 25% in the no take zone coverage once the PIPA Trust Fund income reaches an adequate capitalization level to compensate for any losses in DWFN license fees associated with such limitations.

Four levels of protection are incorporated into the Management Plan:

1. No-Take Zones – total exclusion of all extractive activities, and strict control of all activities to ensure no impact to species or habitats. Marine and Terrestrial. This is the strictest level of protection and all activities must be explicitly assessed and permitted by PIPA-MC.
2. Restricted Use – sustainable and subsistence use of resources are allowed in this zone, allowing some off-take of allowed species, and construction/habitat alteration that has the purpose of enhancing the management and use of PIPA, but is assessed to have non-significant impacts on species and habitats. Currently, this designation applies solely to Kanton Island, and all activities

are managed under a Kanton Sustainable Use Plan (SAP 1.12). Marine and Terrestrial. Permits to be assessed and provided by PIPA-MC.

3. Fisheries Exclusion zone – commercial extraction by purse seines is prohibited, but longlines are allowed. Based on Fisheries Regulation, this applies to a belt from 12-60 nm around an atoll. In PIPA, this designation applies solely to Kanton Island. Marine. Permits to be assessed and provided by the Ministry of Fisheries and Resource Development.
4. Ocean buffer zone – The remainder of PIPA excluding zones 1, 2 and 3 above. Fishing activities are allowed under permits as per the current rules and regulations governing fishing in Kiribati. All other activities in the sea or on or under the seafloor must be assessed and permitted by the PIPA-MC, and all activities in this zone should be commensurate with the objectives of PIPA.

Current Phase 1 PIPA Zonation

The current PIPA Zonation (Phase 1) is given in Figure 4. The objective of Phase 1 Zonation is to secure the protection of the 8 PIPA islands, lagoons, reefs and nearshore habitats. This series of island-based no take zones amount to just over 15,000 sq km or 3.7% of the PIPA area. Current (Phase 1) PIPA Zonation is summarized as:

- a) No-Take Zones around 7 PIPA islands (2.6%, excluding Kanton). All activities in these areas must be non-extractive and all needed individual permits obtained from PIPA.
 - a. Land area - 3 islands protected by Wildlife Sanctuary Ordinances and by PIPA legislation (Rawaki, McKean, Birnie)
 - b. Land area - 4 islands not designated as Sanctuaries, but access is restricted by prior legislation as well as by PIPA regulations (Enderbury, Orona, Nikumaroro, Manra). This includes any freshwater/brackish ponds, such as on Manra, Enderbury.
 - c. Marine area – the lagoons of Nikumaroro and Orona
 - d. Marine area – a 12 nm territorial zone strip around each island
- b) Restricted Use zones at Kanton (0.3%) – with an administrative population of about 30 people, extensive historical use, and good anchorage and airstrip. Designated for multiple use for purposes of PIPA management and sustainable development, and ongoing national presence;
 - a. Land area – a sustainable Kanton plan is envisaged, to be developed under SAP 1.12 in which all activities, people and uses are permitted individually.
 - b. Marine area – subsistence fishing - the lagoon and 12 nm territorial limits around Kanton designated for subsistence use by people resident on Kanton. Currently 30 people, but will expand with development and visitors. Permitting system required to manage impacts and limit numbers and fishery types. Bone fishing (catch and release) also to be allowed in the lagoon.
- c) Fisheries Exclusion zone (9.5%) - Marine area, Kanton from 12 nm to 60 nm, exclusion for purse seiners but longliners allowed. All permits provided by MFMRD. No other fishing permits are given, and PIPA regulations should mention no others should be given without consultation between MFMRD and PIPA MC.
- d) Ocean Buffer zone (87.7%). Buffer zone for the restricted zones of the MPA. No current uses other than those licensed by MFMRD (purse seine, longline, pole and line) and non can be initiated without permitting from MFMRD and PIPA. Future zones to be considered for protection in this zone include:
 - a. Submerged reefs – Winslow and Carondelet
 - b. Seamounts - Tai, Polo, Siapo, Gardner, Tanoa, Fautasi, Tau Tau and others.
 - c. Sea floor
 - d. Pelagic zones

		Protection level 1) No-Take Zone			2) Restricted Use zone		3) Pelagic Fishery zone	4) Ocean Buffer zone	Total PIPA
		Permitting authority			PIPA		60nm Fisheries	PIPA	
		Protection type			multiple use	subsistence			
Land/Marine		Wildlife Ord	Land/permit	12nm	Land	Marine	Marine	Marine	
Islands	Rawaki	0.58							
	McKean	0.49							
	Bimiti	0.48							
	Enderbury			5					
	Orona			6					
	Nikumaroro			4					
	Manna			5					
Reef/shallow closure (7 PIPA islands, 12 nm)								12,714	
Kanton	Kanton (multiple use)				9				
	Kanton subsistence zone (12 nm around perimeter of 50 km)					2,486			
	Kanton purse seine exclusion (less Bimiti, Enderbury)						37,197		
Ocean	Open ocean buffer zone							355,822	
Totals	Totals	1.6	20	12,714	9	2,486	37,197	355,822	408,250
	Total restricted areas (protection types)			12,736		2,495	37,197	355,822	
	% total PIPA area			3.1%		0.6%	9.1%	87.2%	
	Total restricted areas (overall)						52,428	355,822	408,250
	% total PIPA area					12.8%	87.2%		

Phase 2 PIPA Zonation

Phase 2 PIPA Zonation has the core objective of increasing the no take zone coverage by an additional 25% of the total area of PIPA. Phase 2 Zonation will be implemented once the PIPA Trust fund is capitalized to a level sufficient to compensate GOK for any lost DWFN license fee income associated with the increase in the no take zone coverage. Priorities agreed for coverage of the increase in no-take zone coverage are:

- 12 nautical mile no-take zone around Winslow and Carondelet Reefs.
- Increased no-take zone around 7 of the PIPA islands, excluding Kanton.
- Filling the gap between the two groupings of the PIPA islands with no-take zone.
- Maximizing underrepresented habitat in the no-take zone coverage, particularly seamounts
- Ensure a more easily navigable and enforceable overall no-take zone boundary.
- Areas outside the above zones will still be allowable for fishing, consisting of DWFN or Kiribati boat access for tuna, as per the current rules and regulations governing fishing in Kiribati.

In addition it is expected that a more detailed zonation for Kanton Atoll will be completed during the Plan's implementation that is based on subsistence resource needs of the local caretaker community and possibly tourism needs.

Exact boundaries for Phase 2 PIPA Zonation will be finalized, based on the above, during this Plan's implementation.

Both Phase 1 and Phase 2 PIPA Zonations are seen as a simple zonation system with the primary objective of prioritized protection of these systems. It is envisaged that a more sophisticated zonation system to take into account possible tourism development will be discussed and implemented in the Phase 2 or in Phase 3 Zonation in the next PIPA Management Plan cycle.

SUMMARY: For this Plan (PIPA Management Plan (2010-2014) both PIPA Phase 1 and Phase 2 Zonation are expected to be successfully implemented by December 2014."

PIPA Management Plan 2010-2014, Government of Kiribati.

Further to the zonation information it is noted that we now require 100% observer coverage for DWFN, mandatory VMS, and vessel obligations to report on suspected illegal fishing and positions of vessels. These arrangements are implemented on a national and regional basis in partnership with regional fisheries agencies and partners

including the USA Coastguard/Kiribati Shiprider's Agreement, Australia and NZ bilateral assistance (aerial surveillance).

2. Both the evaluators and the Panel expressed concern about the limited existing management capacity, including funding, monitoring and enforcement to ensure effective protection of the nominated property, including patrolling. IUCN would therefore be grateful to receive a timeline and list of activities anticipated to establish effective management of the nominated property. We would be grateful for particular clarification of the anticipated establishment of the mentioned Trust Fund in this regard.

Kiribati recognizes that we have limited but growing management capacity and we have active measures, including with partners, to increase this capacity which is consistent with the phased approach agreed for PIPA. We hope that IUCN appreciates this phased approach and emphasize the following:

- PIPA is a 'whole of government' approach. Whilst the PIPA office is small the PIPA Management Committee established by law and fully operational has clear roles that are being filled well. This is exemplified by Fisheries role in patrolling the PIPA area, extra VMS based geo-fencing measures being put in place.
- PIPA Management Plan 2010-2014 has been endorsed by our Cabinet giving it the highest level of support in Kiribati and is under active implementation.
- Additional management measures through partnerships are well underway. Recent examples include the successful eradications of invasive species from two PIPA islands which are already securing the recovery of more than 18 globally important seabird species.
- We have also leveraged capacity for monitoring and enforcement through existing partnerships for both aerial and boat surveillance with the Governments of Australia and NZ, with the USA Kiribati Shipriders Agreement which empowers our Fisheries officers on USA Coastguard vessels to arrest and detain those thought to be operating illegal fishing. We recently caught and prosecuted a vessel and the company concerned netting a near \$5M AUD fine successfully for this operation.
- PIPA's isolation still affords it a degree of effective protection, vessels only go there with a purpose and are increasingly easier to detect (see above measures). This isolation has served the Phoenix Islands well in the past although now not against global climate change impacts.
- Overall we have a well resourced and active PIPA management team within Kiribati and supplemented well with long term bi and multilateral partnerships and resources, and with our two founding NGO partners CI and NEAq.

Regarding a time line and list of activities for increasing PIPA's effective management:

- This is guided by the PIPA Management Plan 2010-2014.
- Below gives a summary of secured initiatives and funding. We have a larger list of prospects and proposals underway in addition to these. Please note we are

rationalising all investments with the UNEP GEF investment of \$1M USD for PIPA's first Management Plan implementation. As you know we have had very limited time to respond to the IUCN queries due to wrong contacts used. I would be happy to update you on this in the coming 2-3 months as we finalise the UNEP GEF PIPA project document and related financing and resources.

- Total EXISTING investment to date by Kiribati and partners is more than \$3 M USD since 2000. Total current SECURED resources by Kiribati and partners is \$5.61 M USD for the period of 2010-2014 and is expected to significantly grow with further fund raising for the endowment and operation of PIPA.

PIPA Investment and Resources Summary

Time period	Key Initiative	Existing/current investment	Kiribati's Partners	Aim
2004-ongoing	Kiribati govt support/PIPA Steering Committee/PIPA Management Committee	Estimated value >\$800 K AUD from inception until end 2009. Estimated annual value now at more than \$250 K AUD per annum.	All PIPA Management Committee Agencies. PIPA MELAD office.	Core multi disciplinary GoK agency and staff commitment to PIPA operation.
2005-ongoing	PIPA design, establishment, operation	Grant value at more than >\$1.1 M USD to end of 2009 with >\$350 ongoing.	CI, Global Conservation Fund, NEAq, Oak Foundation, Moore Foundation, Government of Australia	Core support to the design, establishment and operation of PIPA.
2010-2014	UNEP GEF PIPA Project	\$1M USD	UNEP, GEF, CI, NEAq	Key project funding for Management Plan implementation. Key aspects funded are: core operational management base
2009-2010	PIPA research	Existing investment (4 research trips) valued at >\$550 K USD. Current climate change vulnerability assessment \$18 K USD	CI, NEAq, IUCN Coral Reef and Climate Change Group	Long term coral reef, deep sea and island research.
2008 -2010	PIPA Atoll Restoration Programme	Existing investment >\$350 K USD. Current investment	NZAID, CI, CEPF	Invasive species eradications, monitoring and biosecurity.

		available \$ 307 K USD. Pending proposal of > \$220 K NZD linked with Line Islands.		
2008-ongoing	PIPA WHC listing	>\$45 K USD existing with a confirmed further \$50,000 Aud pending	CI, UNESCO WHC, Australia	Support to PIPA WH listing process.
2010-ongoing	Enforcement	>\$70 K USD >\$150 K USD existing > 120 K AUD given, long term commitment ongoing	CI/NEAq support to patrol vessel. Save our Seas sponsorship Kiribati Fisheries Patrol Vessel	Dedicated enforcement capacity, will supplement GEF investment.
2009-ongoing	PIPA Trust Fund and Board initial operation	\$85 K USD	CI, GCF, CEPF, NEAq	PIPA design and operation
	Endowment	\$2.5 M USD	CI-GCF	endowment

Regarding the PIPA Trust Fund please note the following:

- Here in Kiribati we have a long and successful track record of managing trust funds which heralds back to the guano mining days in the Gilbert Islands. We have passed the PIPA Trust Fund legislation in April 2009 (copy of law available).
- PIPA Board members have been confirmed by the three founding partners (GoK, CI, NEAq).
- The PIPA Trust Board meets for the first time in mid March 2010 and is expected to adopt all operational protocols and manuals (drafts available).
- CI has confirmed its \$2.5 M USD contribution and we are actively fund raising, including consideration of the amount to be contributed by GoK.
- We expect the Trust Fund establishment imminent subject to securing the match donor for the CI contribution.
- In the short and medium term the UNEP GEF PIPA project and related grants eg CEPF are well placed to cover PIPA operation.

I sincerely hope that the information answers your queries and demonstrates the building momentum and significant success in establishing and operating the Phoenix Islands Protected Area and Kiribati's commitment including for PIPA's World Heritage listing. Please do not hesitate to contact me or my staff for any further clarification.

Finally, although Kiribati might be a Small Island Developing State (SID) in the world's eyes we consider ourselves a LOD + Large Ocean Developing State. We take seriously our ocean steward role and PIPA is a significant national contribution to the management of the Pacific Ocean and one that we believe is globally important and of outstanding universal value that warrants World Heritage listing.

Yours sincerely,



Hon. Amberoti Nikora

Minister of Environment, Lands and Agricultural Development

- cc. Taholo Kami, IUCN
- cc. Jan Steffan, UNESCO Apia Office
- cc. Greg Stone, CI
- cc. Bud Ris, NEAq
- cc. Tarsu Murdoch, MELAD Secretary
- cc. Tukabu Terroko, PIPA MELAD Director
- cc. Sue Miller Taei, CI Pacific Islands



SECTION 8 CONTACT INFORMATION OF RESPONSIBLE AUTHORITIES

8. a) Preparer

Name: Tukabu Teroroko
Title: Director of PIPA
Address: P.O Box 234
City, Province/State, Country: Bikenibeu, Tarawa
Republic of Kiribati
E-mail: tteroroko@phoenixislands.org (or tukabutavel@yahoo.com)

Assistance was provided by a group of international experts and the Kiribati PIPA Management Committee.

8. b) Official Local Institution/Agency

Mrs. Tarsu Murdoch
Secretary
Ministry of Environment Lands and Agricultural Development
P.O. Box 234
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Republic of Kiribati
Telephone: (686) 28211 and 686-29762
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Mr. Tukabu Teroroko
PIPA Director
Phoenix Islands Protected Area (PIPA) Office
Ministry of Environment Lands and Agricultural Development
P.O. Box 234
Bikenibeu, Tarawa
Republic of Kiribati
Telephone: (686) 28211 and 686-29762
Fax: (686) 28334
Email: tteroroko@phoenixislands.org (or tukabutavel@yahoo.com)

8. c) Other Local Institutions

Visitor Centre (Tourism Office):
Mr. Tarataake Teonaki
Tel: 686 26003
Fax: 686 26193
e-mail: sto@mict.gov.ki

Museum (Cultural Centre):
Mr. Tekautu Ioane
Tel: 686 28283
Fax: 686 29267 (CDSD)
e-mail: tekautun@yahoo.com

8. d) *Official Web address*

http:// <http://www.phoenixislands.org>

Contact name: Tukabu Teroroko

E-mail: tukabutravel@yahoo.com



United Nations
Educational, Scientific and
Cultural Organization

Organisation
des Nations Unies
pour l'éducation,
la science et la culture

Organización
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para la Educación,
la Ciencia y la Cultura

Организация
Объединенных Наций по
вопросам образования,
науки и культуры

منظمة الأمم المتحدة
للتربية والعلم والثقافة

联合国教育、
科学及文化组织

The Culture Sector

Hon. Toakai Koririntetaake
Chairperson, Kiribati National
Commission for UNESCO
Ministry of Education, Youth and
Sports
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Bikenibeu Tarawa
Kiribati

WHC/74/MR/APA/10/367

06 October 2010

Subject: Inscription of the *Phoenix Islands Protected Area* (N 1325) (Kiribati) on the World Heritage List.

Dear Sir,

I have the pleasure to inform you that the World Heritage Committee, at its 34th session (Brasilia, Brazil, 25 July – 3 August 2010), examined the nomination of the *Phoenix Islands Protected Area* and decided to **inscribe** the property on the World Heritage List. Please find attached the Decision **34 COM 8B.2** adopted by the Committee. However, please note that the Statement of Outstanding Universal Value included in the text of the Decision will have to be revised and finally adopted at the 35th session of the Committee in Bahrain, June 2011.

I am confident that your government will take the necessary measures for the proper conservation of this new World Heritage property. The World Heritage Committee and its Secretariat, the World Heritage Centre, will do everything possible to collaborate with you in these efforts.

The *Operational Guidelines for the Implementation of the World Heritage Convention* (paragraph 168), request the Secretariat to send to each State Party with a newly inscribed property a map of the area(s) inscribed. Please examine the attached map and inform us of any discrepancies in the information by and not later than **15 December 2010**.

The inscription of the property on the World Heritage List is an excellent opportunity to draw the attention of visitors to, and remind local residents of, the *World Heritage Convention* and the outstanding universal value of the property. To this effect, you may wish to place a plaque displaying the World Heritage and the UNESCO emblems at the property. You will find suggestions on this subject in the *Operational Guidelines for the Implementation of the World Heritage Convention*.

In many cases States Parties decide to hold a ceremony to commemorate the inscription of a property on the World Heritage List. Upon request to the World Heritage Centre by the State Party, a World Heritage Certificate can be prepared for such an occasion.

I would be grateful if you could provide me with the name, address, telephone and fax numbers and e-mail address of the person or institution responsible for

the management of the property so that we may send them World Heritage publications.

Please find attached the brief descriptions of your site, prepared by IUCN and the World Heritage Centre, in both English and French. As these brief descriptions will be used in later publications, as well as on the World Heritage website, we would like to have your full concurrence with their wording. Please examine these descriptions and inform us, by and not later than **15 December 2010**, whether there are any changes that should be made. If we do not hear from you by this date, we will assume that you are in agreement with the text as prepared.

Furthermore, as you may know, the World Heritage Centre maintains a website at <http://whc.unesco.org/>, where standard information about each property on the World Heritage List can be found. Since we can only provide a limited amount of information about each property, we try to link our pages to those maintained by your World Heritage property or office, so as to provide the public with the most reliable and up-to-date information. If there is a website for the newly inscribed property, please send us its web address.

As you know, according to paragraph 172 of the *Operational Guidelines for the Implementation of the World Heritage Convention*, the World Heritage Committee invites the States Parties to the *Convention* to inform the Committee, through the World Heritage Centre, of their intention to undertake or to authorize in the area protected under the *Convention* major restorations or new constructions which may affect the outstanding universal value of the property.

The full list of the Decisions adopted by the World Heritage Committee at its 34th session is available online at <http://whc.unesco.org/en/sessions/34COM/>.

May I take this opportunity to thank you for your co-operation and for your support in the implementation of the *World Heritage Convention*.

Please accept, Madam, the assurances of my highest consideration.



Francesco Bandarin
Director a.i.
World Heritage Centre

cc: IUCN
UNESCO Office Apia

BRIEF DESCRIPTION

The Phoenix Island Protected Area (PIPA) is a 408,250 sq.km expanse of marine and terrestrial habitats in the Southern Pacific Ocean. The property encompasses the Phoenix Island Group, one of three island groups in Kiribati, and is the largest designated Marine Protected Area in the world. PIPA conserves one of the world's largest intact oceanic coral archipelago ecosystems, together with 14 known underwater sea mounts (presumed to be extinct volcanoes) and other deep-sea habitats. The area contains approximately 800 known species of fauna, including about 200 coral species, 500 fish species, 18 marine mammals and 44 bird species. The structure and functioning of PIPA's ecosystems illustrates its pristine nature and importance as a migration route and reservoir. This is the first site in Kiribati to be inscribed on the World Heritage List.

BREVE DESCRIPTION

L'Aire protégée des îles Phoenix (APIP) est composée d'habitats marins et terrestres qui s'étendent sur 408250 km² dans l'océan Pacifique sud. Le bien inscrit comprend le groupe des îles Phoenix, un des trois groupes d'îles formant Kiribati. Il s'agit de la plus grande aire marine protégée au monde. L'APIP conserve l'un des derniers écosystèmes intacts d'archipel corallien océanique de la planète, avec ses 14 des monts sous-marins (probablement des volcans éteints) et autres habitats d'eaux profondes. La zone abrite environ 800 espèces connues de la faune, dont près de 200 espèces de coraux, 500 espèces de poissons, 18 mammifères marins et 44 espèces d'oiseaux. La structure et le fonctionnement des écosystèmes de l'APIP illustrent sa nature vierge et son importance en tant que voie de migration et de réservoir. C'est le premier site des îles Kiribati à être inscrit sur la Liste du patrimoine mondial.

Extract of the Decisions adopted by the 34th session of the World Heritage Committee (Brasilia, 2010)

Decision: 34 COM 8B.2

The World Heritage Committee,

1. Having examined Documents WHC-10/34.COM/8B and WHC-10/34.COM/INF.8B2,
2. Highly commends the State Party on the efforts that have been made towards the establishment and protection of the Phoenix Islands Protected Area, Kiribati which comprises one of the world's largest marine protected areas and commends the State Party for its exemplary multi-agency approach, its comprehensive and strategic management plan, its successes with island restoration projects, and the proposal to progressively expand the no-take zones over time;
3. Inscribes the **Phoenix Islands Protected Area, Kiribati**, on the World Heritage List on the basis of criteria **(vii)** and **(ix)**.
4. Adopts the following Statement of Outstanding Universal Value:

Brief Synthesis

As a vast expanse of largely pristine mid-ocean environment, replete with a suite of largely intact uninhabited atolls, truly an oceanic wilderness, the Phoenix Islands Protected Area (PIPA) (408,250 sq km), the largest marine protected area in the Pacific, is globally exceptional and as such is a superlative natural phenomenon of global importance.

PIPA contains an outstanding collection of large submerged volcanoes, presumed extinct, rising direct from the extensive deep sea floor with an average depth of more than 4,500 metres and a maximum depth of over 6,000 metres. Included are no less than 14 recognised seamounts, submerged mountains that don't penetrate to the surface. The collection of atolls and reef islands represent coral reef capping on 8 other volcanic mountains that approach the surface.

The large bathymetric range of the submerged seamount landscape provides depth defined habitat types fully representative of the mid oceanic biota.

Due to its great isolation, PIPA occupies a unique position in the biogeography of the Pacific as a critical stepping stone habitat for migratory and pelagic/planktonic species and for ocean currents in the region. PIPA embraces the full range of marine environments in this area and displays high levels of marine abundance as well as the full spectrum of age and size cohorts, increasingly rare in the tropics, and especially in the case of apex predator fish, sea turtles, sea birds, corals, giant clams, and coconut crabs, many of which have been depleted elsewhere. The overall marine tropic dynamics for these island communities across this archipelago are better functioning (relatively intact) compared with other island systems where human habitation and exploitation has significantly altered the environment. The complete representation of ocean and island environments and their connectivity, the remoteness and naturalness are important attributes which contribute to the outstanding universal value.

Criterion (vii); PIPA, an oceanic wilderness, is sufficiently remote and inhospitable to human colonisation as to be exceptional in terms of the minimal evidence of the impacts of human activities both on the atolls and in the adjacent seas. PIPA is a very large protected area, a vast wilderness domain where nature prevails and man is but an occasional visitor. PIPA is distinguished by containing a large suite of seamounts complete with a broad expanse of contextual abyssal plain with a natural phenomenon of global significance. The essentially pristine environment, outstanding underwater clarity, the spectacle of large groups of charismatic aquatic animals (e.g. bumphead parrotfish, Napoleon wrasse, surgeonfishes, parrotfishes, groupers, maori wrasse, sharks, turtles, dolphins, manta rays, giant clams) in quantities rarely found elsewhere in the world, aesthetically outstanding coral reef features (e.g. giant clams, large coral heads) together with the spectacle of huge concentrations of seabirds on remote atolls, makes PIPA a truly kaleidoscopic natural "oceanscape" exhibiting exceptional natural beauty of global significance.

Criterion (ix); With its rich biota, as a known breeding site for numerous nomadic, migratory and pelagic marine and terrestrial species, and the known and predicted high level of biodiversity and endemism associated with these isolated mid-ocean atolls, submerged reefs and seamounts, PIPA makes an outstanding contribution to ongoing ecological and biological processes in the evolution and development of global marine ecosystems and communities of plants and animals.

PIPA has exceptional value as a natural laboratory for the study and understanding of the significant ongoing ecological and biological processes in the evolution and development of marine ecosystems of the Pacific, the world's largest ocean, indeed all oceans. PIPA is of crucial scientific importance in identifying and monitoring the processes of sea level change, growth rates and age of reefs and reef builders, (both geologically and historically) and in evaluating effects from climate change.

Integrity

PIPA's boundaries are clearly defined. The boundaries are mostly straight lines with some adjustments to the boundaries to align with the Exclusive Economic Zone (200NM) of Kiribati. There are various clearly delimited zones within PIPA as described in the Management Plan. PIPA's large size and full inclusion of oceanic and island habitats in this area and coverage of numerous examples of key habitats (coral reefs, islands, seamounts) together with its predominantly natural state give exceptional conservation importance. Despite some human impacts (fishing, invasive species) the integrity of the property and oceanic ecosystems processes at scale are globally outstanding for island archipelagos and most other tropical marine environments found worldwide.

Protection and Management requirements

PIPA is a highly protected area fully legally established under the PIPA Regulations 2008. These regulations include provision of a management plan and clear permitting processes and

rules for activities allowable within the site. The 2010-2014 PIPA Management Plan, endorsed by Kiribati's cabinet in 2009 is under implementation. Management capacity and success is steadily building and Kiribati is using a "whole of government approach with partners" to ensure a management system that is sustainable and suitable to the circumstances of a small developing state. Of particular note is the success in capture and fining of illegal fishing vessels and in the removal of invasive species from globally important islands for seabird conservation.

For long term sustainability Kiribati and its partners are committed to a PIPA Trust Fund. The Fund's legislation, the Board and by-laws are all now in place and 2.5 million USD secured for the endowment with fundraising now a primary focus. Kiribati has recognized the need to further build management capacity, particularly for surveillance and enforcement, and continues to do so through site, national, regional and bilateral partnerships. The link to the Nauru Agreement (8 Pacific Island States) to manage tuna fishing in the region are important and provide, through license provisions, the first active linkage to management of the neighbouring high seas for a World Heritage site. Kiribati licenses for fishing in the Kiribati EEZ, including PIPA, is only allowable if the licensee agrees not to fish in the adjacent high seas. This is enforceable through the mandatory 100% observer coverage.

5. Recommends the State Party to:

- a) Strengthen the management framework for fisheries, including the extension of no-take areas, measures to prevent degradation of seamounts and concrete timelines for the phasing out of tuna fishing;
- b) Ensure an appropriate and sustainable budget towards the management of Phoenix Islands Protected Area through a funded and functional trust fund or through other appropriate mechanisms;
- c) Ensure capacities and resources for refined and systematic monitoring, surveillance and law enforcement;

6. Welcomes the sister site agreement between the Governments of Kiribati and the United States of America on the management of Phoenix Islands Protected Area and Papahānaumokuākea Marine National Monument respectively, and encourages State Parties to continue and, as possible, expand on this collaboration;

7. Also welcomes the strong support from the States Parties Australia, France, New Zealand and the United States of America, as well as from international institutions and non-governmental organizations and encourages these partners to further support the management, surveillance and funding of Phoenix Islands Protected Area, including the nomination of the area for inscription on the World Heritage list.

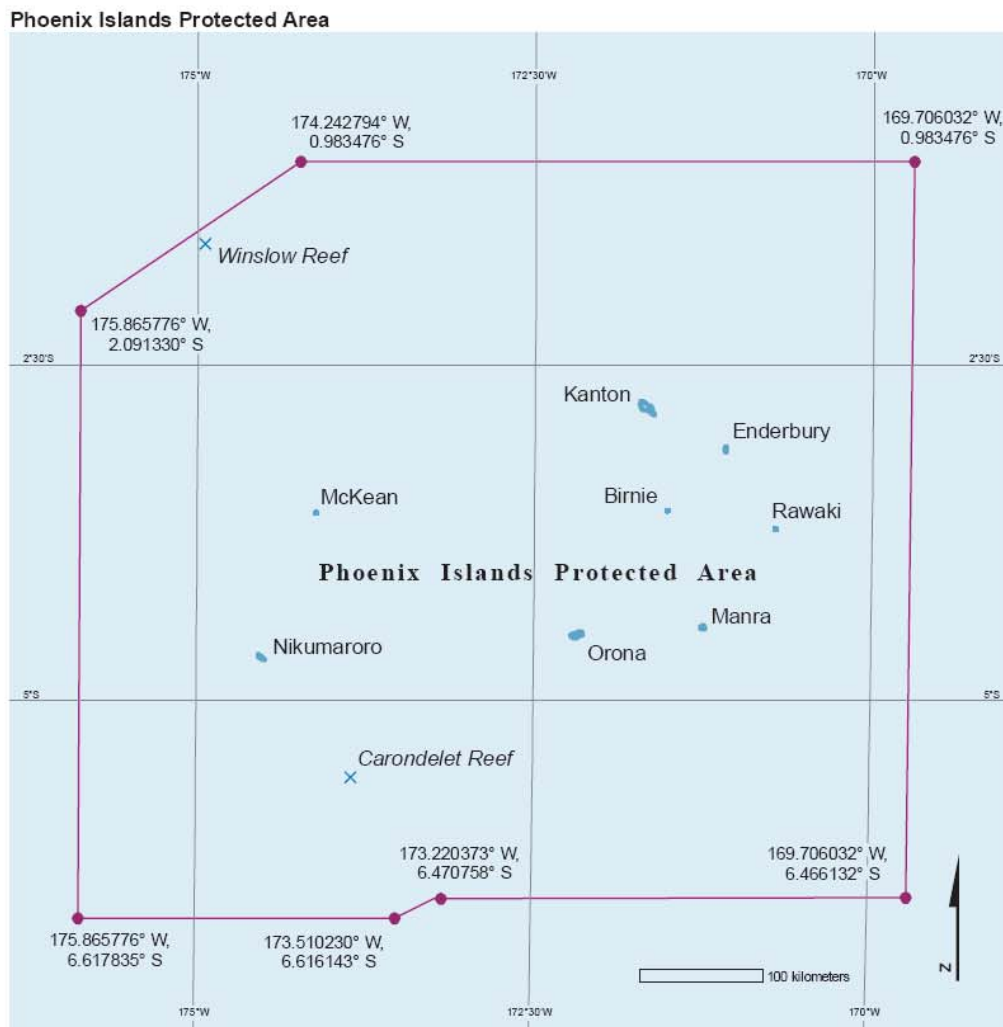
8. Requests the State Party to submit to the World Heritage Centre by **1 February 2012** a report on the recommendations above for examination at its 36th session in 2012.





Surface and coordinates of the property inscribed on the World Heritage List by the 34th session of the World Heritage Committee (Brasilia, 2010) in accordance with the Operational Guidelines.

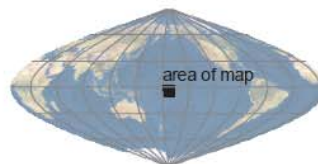
State Party	Name	ID N	Area	Buffer Zone	Centre points Coordinates
Kiribati	Phoenix Islands Protected Area	1325	40825000 ha	-	S03 38 59 W172 51 27

1. e) Maps and plans, showing the boundaries of the nominated property and buffer zone

Map 1. Phoenix Islands Protected Area Boundary Map



-  PIPA boundary
-  PIPA coordinate
-  atoll
-  submerged reef



scale: 1/5,000,000
 projection: Sinusoidal
 central meridian: 180°
 datum: WGS84

data:
 Conservation International - Pacific Islands
 VMap0, National Geospatial Intelligence Agency

acknowledgements:
 New England Aquarium

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