

# Sabana/Talakhaya Conservation Action Plan



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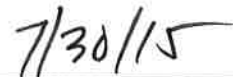


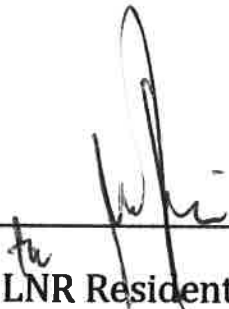
The 2012 Sabana/Talakhaya Conservation Action Plan was compiled by Aric Bickel and 2015 updates were compiled by Kaitlin Mattos at the Bureau of Environmental and Coastal Quality, Office of the Governor, Commonwealth of the Northern Mariana Islands.

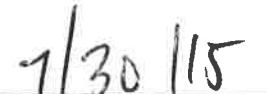
Much of the information contained in this plan was taken directly from existing CNMI Government planning documents obtained from BECQ, DLNR and other local agencies as well as US federal government documents from USDA-NRCS and others. Valuable feedback and contributions to this document were provided by local and federal government partners, non-governmental organizations and private individuals.


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## Executive Summary

This document serves as an update and the new guiding document for inter-agency cooperation and management of the Sabana/Talakhaya watershed. The first Sabana/Talakhaya Conservation Action Plan was published in 2012, but strategic actions to protect Sabana/Talakhaya's natural resources have been implemented by many partner agencies on Rota and in the larger CNMI since the CAP was first conceived in 2010. This 2015 update to the CAP provides a new situation analysis, updated scientific data and stakeholder input, and a revised list of recommended actions to achieve objectives and goals laid out since 2012.

The Sabana/Talakhaya watershed has seen a great deal of progress since the first CAP stakeholder group in 2010 began to develop a comprehensive management plan for the watershed. Illegally-set fires have decreased significantly and the Talakhaya Revegetation and Luta Livelihoods Project has become a well-known community conservation program on Rota. Many of the major threats from 2012 have decreased (such as fire and illegal hunting), although erosion and sedimentation still remains a major concern for the watershed. Coral reefs are facing global threats like climate change and are less resilient to deal with local stressors such as sedimentation. The extensive erosion and the deer populations within the Talakhaya conservation area have made native tree establishment very slow. However, grasses and *Acacia* trees have done well and coverage of highly erodible soils is improving every year. Overall, since executing the 2012 Sabana/Talakhaya Conservation Action Plan, stakeholders are happy with the progress made and optimistic about the status of conservation targets in the future, even if the biological indicators measured have not caught up with the positive changes occurring in the watershed.

Since 2012, CAP priorities have changed from focusing on implementing management activities within the watershed to focusing more on monitoring and research. It is the hope of the stakeholder group that a multi-year push towards establishing baselines for conservation targets and implementing regular monitoring protocols will allow scientists and managers the chance to evaluate the impact that watershed management activities have had in recent years and determine the most appropriate next steps. Meanwhile, momentum should be maintained for ongoing community projects such as the eco-camps and summer revegetation project. Managers can also focus on building enforcement capacity to ensure that conservation laws and regulations are being successfully enacted. Rota's isolation makes it difficult for staff to have access to new training and exchange opportunities. The identification of new funding sources for capacity-building and a renewed commitment from current project partners located on and off island could be a major step to solving these problems.

It is recommended that the Sabana/Talakhaya Conservation Action Plan continue to be implemented, reviewed, and updated by the stakeholders who contributed to this draft and to new partners. The CAP stakeholder group requested semi-annual reviews and check-ins to implement the actions described above and would like to review the entire document again in 2017-2018 to reflect new and changing concerns for the watershed. Personnel from the Coral Reef Initiative program at the Bureau of Environmental and Coastal Quality will continue to coordinate meetings with local partners on Rota, but individual agencies and organizations should assist with implementing any part of this plan as their directives allow. Partnership and collaboration will be the key to "*Protehi i rikesan i tano yan i tasi*".

## Introduction

This plan is a cooperative effort between the resource management agencies with both federal and local mandates to manage resources in the Sabana/Talakhaya watershed including: the Bureau of Environmental and Coastal Quality (BECQ) – Division of Environmental Quality (DEQ) and Division of Coastal Resources Management (DCRM), the Department of Lands and Natural Resources (DLNR) – Division of Fish and Wildlife (DFW) and Forestry Services, the Department of Public Works, the Commonwealth Utilities Corporation, the Department of Fire, and the Rota Mayor's Office. Several of our federal and NGO partners have also assisted with the development of this plan, including Natural Resource Conservation Service (NRCS), various representatives from the National Oceanic and Atmospheric Administration (NOAA), the Nature Conservancy (TNC), and the Luta Soil and Water Conservation District (LSWCD).

Increased population and development over the past two decades in the CNMI has exacerbated the threats to our coral reef ecosystems. Reduced health of coral reef and coral-reef associated habitats has been documented (MMT Data). From a long-term perspective, the decline in coral-reef coverage and marine health threatens the CNMI's cultural heritage, traditional ways of life and physical protection from storms. However, this decline also immediately impacts CNMI's tourism and fisheries industries and thus its economy. As such, the CNMI government has placed coral reef ecosystem conservation and management as a priority concern (2005 CRI Grant).

In 2008, the CNMI was approached by TNC Micronesia program and offered assistance in developing site specific management plans through the Conservation Action Plan (CAP) format. The CAP process was designed to bring multiple stakeholders to the table and incorporate both scientific and anecdotal information into an overarching set of conservation priorities. The shift of emphasis to site-specific management of threats facing the CNMI's marine environment was further supported by the NOAA Coral Reef Conservation Program (CRCP), as a way of focusing conservation efforts.

Through the CRCP priority setting process, and the CNMI Coral Reef Management Priorities document developed from it, the CNMI resource management agencies and their federal partners designated three priority watersheds for conservation action: Laolao Bay and Garapan watersheds on the island of Saipan, and Sabana/Talakhaya watershed on the island of Rota. A CAP for Laolao Bay was completed in January of 2009, laying out the conservation priorities for the area. It was decided that the Talakhaya area would benefit from a similar process, through which the following management plan was developed from 2010 to 2012 and updated in 2015. The Garapan Watershed CAP was developed in 2012 and updated in 2015.

## Site Description

### Location and Governance

The 466-mile long Mariana Island archipelago includes 15 islands, 14 of which are within the U.S. Commonwealth of the Northern Mariana Islands in the Western Pacific. The Mariana Islands are the closest Pacific island chain to Japan, approximately 1,500 miles from Tokyo or slightly less than 3½ hours by air. Saipan, Tinian, and Rota are the three developed islands of the CNMI with 90% of the population based on Saipan (2005 CRI Grant). All watersheds on the islands are considered coastal watersheds. Under CNMI law, the Coastal Resource Management Office (CRM) has regulatory jurisdiction over all lands of the Commonwealth. The Sabana/Talakhaya watershed is located on the southern portion of the island, as illustrated by the diagram below.



The Watersheds of Rota (Luta)

Rota, or Luta as it is known in the Chamorro dialect, is the second most southern island in the Mariana archipelago, approximately 3,750 miles southwest of Hawai'i. It is the southernmost and third largest island in the CNMI, after Saipan and Tinian. Rota is located at approximately 14° 10' north latitude and 145° 10' east longitude. Sinapalo village is the largest and most populated urban area followed by Songsong village.

### Dimensions

- Area: 85.38 square kilometers (32.967 square miles)
- 16.9-kilometers (10.5-miles) long
- 4.8-kilometers (3-miles) wide
- Coastline: 61.6 kilometers (38.3 miles)
- Highest point: Mt. Manira - 495 meters (1,625 ft)



- Population: 2527 (2010 - U.S. Census Bureau)

#### Distances

- Guam - 76 kilometers (47 miles; south)
- Tinian - 101 kilometers (63 miles; north)
- Saipan - 117 kilometers (73 miles; north)
- Hawaii – 6,035 kilometers (3,750 miles; northeast)

#### Land Management and Ownership

Three local government agencies partner to manage the project area including: the Bureau of Environmental and Coastal Quality (BECQ) which houses the Division of Environmental Quality (DEQ) and the Division of Coastal Resources Management (DCRM), and the Department of Lands and Natural Resources (DLNR), which houses the Division of Fish and Wildlife (DFW) and CNMI Forestry. DEQ was created through Public Law 3-23 to protect the right of each person to a clean and healthful environment. The Commonwealth Environmental Protection Act defines DEQ's purpose, jurisdiction and authorization to issue regulations and implement programs to protect the air, land, and water of the Commonwealth. DCRM was established with the implementation of Public Law 3-47 within the Office of the Governor. The CRM program was established in order to promote the conservation and wise development of coastal resources. CRM and DEQ were merged in 2013 by a governmental order. DLNR was established by Public Law 1-8 and was empowered by that law "To be responsible for the protection and enhancement of the natural resources of the islands ..." The DFW was created by Public Law 2-51 which was later revised by Public Law 10-57. The DFW is housed within DLNR and its purpose is to conserve fish, game, and wildlife and to protect endangered and threatened species. Through research, monitoring, regulation, enforcement, planning, and management, DFW seeks to ensure long-term survival and sustainability of CNMI's resources.

In order to own land in the CNMI, individuals must prove a certain degree of indigenous lineage. Land leases are available to other corporations or individuals. All lands in the CNMI fall into one of two categories: private lands or public lands. Private lands are all lands that are alienable by the titleholder. Public lands are those that were transferred into the public domain upon the creation of the Commonwealth. Public lands are freely alienable by the Commonwealth and managed by the Department of Public Lands (DPL). Public lands include government acquired lands that have been purchased by the government for public purposes, the use of which is controlled by deed restriction.

Most private lands on Rota are on flat or low sloping ground (less than 30 percent slope). These lands comprise approximately 66 percent of Rota's land base, and at least 75 percent of that land is now or will soon be committed to private land uses. The 34 percent of Rota that is less suitable for development primarily consists of cliffs or steep slopes. These are also the areas with the remaining undisturbed native forests. CNMI government programs call for the transfer of portions of public lands from public to private ownership via agricultural or village homestead programs.

Title to public land in the CNMI is vested in the Department of Public Lands (DPL). DPL, as directed by the Board of Public Lands, has the authority to dispose public lands, including the issuing of village homestead and agricultural homestead permits on lots and the subsequent transfer of these lands to private ownership.

DPL retains authority over the homestead lots until the three-year permit requirements are met whereupon the land is then legally transferred to private ownership through a deed of conveyance. This process is ongoing. (Reconnaissance Survey, 2005)

### **Project Scope**

For the purposes of this plan, the scope of the Sabana/Talakhaya watershed will be defined as the coast line between latitude 14° 6'44.69"N, longitude 145° 10'40.62"E and latitude 14°6'58.62"N, 145°12'19.65"E and all the lands draining into that coastlines' waters extending inland into the Sabana Conservation Area.

Large portions of Rota's public lands are currently protected under Rota Local Law 9-1 due to their high resource value; examples include sea bird sanctuaries and conservation areas for forests and wildlife (areas are shown in the resource maps in the Appendix). Additionally, Rota Local Law 9-2 established a marine protected area in Sasanhaya Bay on the southern portion of the island (also shown in resource maps). The Department of Land and Natural Resources (DLNR) manages these public lands and waters designated as conservation areas. Two of these areas fall within the vicinity of the Sabana/Talakhaya project area:

#### **Sasanhaya Bay Fish Reserve (Coral Gardens Marine Conservation Area)**

The reserve, created in 1994 under Rota Local Law 9-2 and regulations promulgated under public law 2-51, was the first established marine protected area in the CNMI. It is located in the Sasanhaya Bay of Rota, between and including Puña Point and the Coral Gardens; it sits directly adjacent (to the west) of the marine areas associated with the project area. The reserve, by Rota Law, is a no-take zone and also prohibits any "activities which are exploitive or destructive to the marine life and/or the World War II wrecks...within the reserve" (Rota Local Law 9-2).

Additionally, it should be noted that the United States does not recognize the CNMI as having sovereign waters. The DFW is allowed to manage native marine species which occur within three miles seaward of the low water mark on the CNMI's coastlines, this being the current area allowed to the CNMI for enforcement of local laws applicable to fish, wildlife, and coral reef protection by Order Partially Staying Judgment Pursuant to Stipulation of Parties, CNMI v. USA, Civil Action CV 99-0028, U.S. District Court for the 21 District of the Northern Mariana Islands.

#### **Sabana Protected Area**

This high plateau area in the southwestern portion of the island was established as a protected area in 1994 under Rota Local Law 9-1 to provide watershed protection, wildlife and forest conservation, as well as for community farming and medicinal plant gathering.

Within the designated area "all persons are hereby prohibited from taking or in any way harassing or disturbing all varieties of non-game wildlife, including but not limited to fruit bats and Marianas Crow;

all plant life , including any fungi, forest vegetation or grasses, with the exception of those plants that possess medicinal properties and/or those that have been used in traditional healing practices and/or those that are being utilized through normal agricultural activities; and any soil, including soil, sand or rock, within or from the area in Rota known and referred to as Sabana Heights and I Chenchon Park” (Rota Local Law 9-1).

In 2007, the Talakhaya portion of the project area was added to the Sabana Conservation Area under Rota Local Law 15-8 and is given the same status and protection as the initially established area.

## Biophysical Setting

### Physical Features:

The geology of the three most Southern and populated Mariana Islands suggest that they were once submerged below sea-level, allowing a layer of coral reef to form over the volcanic rock. This resultant limestone rock is extremely porous in nature and groundwater discharges unknown amounts of sediment or agricultural pollution that can enter the basal aquifer and marine system. Lack of knowledge about groundwater flow and water quality is a major impediment to improving conditions for many of CNMI nearshore marine systems (LAS).

There is no published information on Rota’s bedrock, but it is likely to be similar to Saipan and Tinian because of their common origins. These islands are underlain with volcanic rock resulting from eruptions approximately 60 million years ago. The volcanic cores, which were formed below sea level, have slowly uplifted and emerged from the ocean’s surface, and a series of limestone plateaus formed as coral reefs. Ninety-eight percent of Rota’s area is covered with limestone plateaus of coral reef origin. (NRCS, 2007)

Rota’s topography has five geomorphic subdivisions: the coastal lowlands, a northern plateau, a southern plateau (the Sabana), a volcanic area, and the western peninsula. On the island’s north shore, coastal lowlands dominate and are bounded on the seaward side by a narrow reef margin. Sandy soils with coconut palms occur in the inland areas, and strand vegetation dominates the coastal margin. The northern plateau, at an elevation of approximately 450 ft (137 m), comprises the eastern part of the island, with its south and east sides terminating in cliffs with rocky shoreline below. On the north side, the plateau slopes gradually toward the sea; this is the location of Mochong Beach, the largest beach on Rota. The Sabana plateau has an elevation exceeding 1,400 ft (426.7 m). Its western side is marked by cliffs that form low plateaus. On the northeast side, less pronounced cliffs and slopes lead gradually to the northern plateau. The southern and a portion of the northern boundaries of the Sabana terminate in dramatically shaped precipitous cliffs. In the northern part of the Sabana, Mt. Manila is the highest point at 1,627 ft (495.9 m). The volcanic area of the island is very different in appearance from the other geomorphic subdivisions. Streams have eroded the area into deeply etched ridges and valleys predominately covered by sword grass (*Miscanthus floridulus*). The western peninsula is a narrow isthmus that connects Mt. Taipingot with the remainder of the island. Mt. Taipingot rises in terrace formations to approximately 460 ft (140.2 m), and the peninsula is bounded by precipitous cliffs. (NRCS 2007)

Rota has a tropical marine climate with average annual temperatures of approximately 80 degrees Fahrenheit, 80 inches of rainfall and about 80 percent humidity. Rainfall averages 10.7 inches per month

during the wet season and 3.8 inches per month during the dry season. The trade winds are strongest and most constant during the dry season, when wind speeds of 15 to 25 miles per hour are common. During the rainy season there is often a breakdown of the trade winds, and on some days the weather may be dominated by westerly storm systems that bring heavy showers, or steady, and sometimes torrential, rains. (NRCS, 2007)

Two distinct climatic seasons occur in the CNMI: wet and dry (Duenas & Associates, 1996). The months of July through November are considered to be the wet season and the months of January through May are considered to be the dry season (Carruth, 2003). December and June are considered to be the transitional months. On Saipan, 67% (about 53 inches) of the rain falls during the wet season, and 21% (about 17 inches) of the rain falls during the dry season. The transitional months receive the remaining 12% (about 10 inches) of the annual rainfall.

The Talakhaya area is located along steep terrain with slopes ranging from 5 to 99 percent. There are approximately twelve different soil map units within the watershed area. Much of the Talakhaya region is considered badlands, areas of saprolite (weathered volcanic bedrock) where soil has been nearly or completely eroded. As badlands support little or no vegetation, they are actively eroding. Runoff is rapid and the hazard for water erosion is severe (Gavenda 2006, via NRCS 2007).

The upper plateau, or Sabana, consists of existing and historical agricultural areas within a mosaic of native forest. The Sabana was also the site of phosphate and manganese oxide mining prior to World War II. Rainfall percolates through the Sabana's coral limestone mantle and exits as springs and seeps along the limestone interface with the volcanic core.

Talakhaya, a 1,100-acre limestone cliff and terraced formation below the Sabana, is highly dissected by streams that have eroded the volcanic soils at the cliff base. The streams are fed by springs and runoff sources originating from rainfall on the Sabana. Steep cliffs and benches surround the Sabana/Talakhaya area and are dominated by the native limestone forest community. Talakhaya contains the island's only streams and wetland areas exist within a riparian network.

The caves and springs at Matan Hanom and As Onan are presently supplying all domestic water on Rota via pipeline. The stream flows are perennial and intermittent with flows diminished during the dry season. Flows have been substantially curtailed and possibly eliminated by increased use of the water for community water supply (WRAS 2003).

The Akina series is the predominant soil at the site. It comprises about 60 percent of the soils in the project area. The Akina soil series has 20 to 40 inches of soil over highly weathered rock (saprolite). It is acidic, has few nutrients, little ability to hold on to nutrients and may have plant-toxic levels of soluble aluminum. The Akina series consists of moderately deep, well drained soils on volcanic uplands. These soils formed in residuum derived from tuff or tuff breccia (Gavenda, via NRCS 2007).

**Biological features:**

Vegetation on Rota consists of mixed second-growth forests, grassy savannas, and dense thickets of introduced tangantangan (*Leucaena leucocephala*). Approximately 60 percent of Rota's land area still remains in native forest, although much is altered and not pristine. The best developed and most pristine native forest (including limestone forest) is on the slopes and cliffs of the Sabana (NRCS 2007).

The Talakhaya area is dominated by introduced grasses with thickets of native vegetation surrounding some of the stream areas. As noted further in section e, *Chrysopogon zizanioides* (vetiver grass), *Paspalum notatum* (bahia grass), and *Acacia* species are currently being introduced to the area by natural resource agencies through the revegetation program.

The Sabana/Talakhaya area is home to some of the largest populations of introduced Philippine Sambar Deer (*Rusa mariannus*) in the CNMI. Hunting for the species is prohibited seasonally. The deer's grazing habits are thought to be contributing to the deterioration of the native forest under-story and have made the re-introduction of native plants significantly more difficult; however, the continued health of the deer populations is a conservation priority of the local community.

Coconut crabs (*Birgus latro*) also exist within the watershed. The crabs are a highly sought food source for both personal consumption and commercial sale; their hunting is permitted seasonally. The health of the island's populations is not known at this time.

The Marianas Fruit Bat (*Pteropus mariannus mariannus*), Marianas Crow (*Corvus kubaryi*), Rota Bridled White-eye (*Zosterops conspicillata rotensis*), Green Sea Turtle (*Chelonia mydas*), the fern disciplina (*Lycopodium phlegmaria* var. *longifolium*), *Osmoxylon mariannense* and the fire tree (*Serianthes nelsonii*) exist within the watershed and are all listed under the Endangered Species Act. Additionally, the critically endangered Hawksbill Turtle (*Eretmochelys imbricata*) has been tagged in the area and is thought to be present (UWA 1998). Habitat for the listed threatened and endangered species can be found in Appendix 3.

The coral reefs adjacent to Talakhaya watershed appear to be heavily impacted by sedimentation from roads and highly eroding soils, based upon comparisons with other sites around Rota. Unfortunately, no scientifically-sound, historical data exists to judge or date the perceived declines in coral reef resources as monitoring efforts started in 2000 when conditions were already compromised. Figures are briefly expounded upon in the next section, but current coral cover sits between 5 and 7% in these areas. (Rodney Camacho, personal communication, 2011)

Limited data exist to improve our understanding of the fish assemblages in the Talakhaya region. Standard belt transects from monitoring efforts started in 2000 show low abundances of higher trophic level fish (i.e., carnivore and invertivores), and suggests a steady decline in herbivorous fish over the same period (MMT Data 2010).

Improved datasets are needed to unequivocally substantiate the trends shown in the existing data set, however this process indicated that fishing occurs regularly, yet the exact amount of fishing pressure in the area remains unknown. Several subsistence and commercially favored species are present in the area, including parrot fishes (generally *Scarus* and *Chlorurus*), rabbit fishes (*Siganus*), and unicorn fishes

(*Naso*). Any spillover effects for the area related to the existence of the Sasanhaya Bay Fish Reserve are unknown.

### Benthic Habitat

Benthic monitoring of this site has been done since 2000. Benthic data show a steady decline in coral cover from 2000 to 2005, and a small increase in cover beginning in 2007. Throughout CNMI coral monitoring data show high Crown-of-Starfish (i.e. coral predator) activity from 2003 to 2006. The initial decline in coral cover is probably linked with this phenomenon, however subsequent recovery, although slow, has been steady. Recovery has been observed at differential rates throughout the CNMI, and the difference is currently being tied with land-based pollution and herbivory levels. The coral colony size data show an increasingly skewed population developing since 2004. This is also a sign of initial recovery, whereby new coral colonies (i.e. small size corals) recruit back onto the reef. Only continued monitoring can show if these initial, seemingly favorable trends, are valid.

### Cultural and Socioeconomic Setting

The Sabana/Talakhaya area contains the only perennial streams and some of the most pristine forest in the CNMI. The use of the area is additionally important and highly valued within the community for passing on of traditional farming practices and medicinal plant collection. The endangered trongkon faia also known as “fire tree” (*Serianthes nelsonii*) and *Osmoxylon mariannense* both exist in these areas and are culturally important. There are ancient Chamorro settlement sites in the area, particularly near the perennial streams. Spanish and Japanese historical sites are also present in the watershed. (UWA 1998)

The Sabana area and the lower parts of the Talakhaya area contain some of the more productive and economically important farms on the island. They contribute largely to both the commercial and the subsistence agricultural trade.

Additionally, nearly all of the fresh water on the island comes from the water cave and the adjacent springs that sit within the project area (UWA 1998). Aside from the obvious importance of this water source, the cave itself has a specific cultural importance that is recognized by the community.

### Conservation Status

The project area stands removed from the two major urban areas of Rota, Songsong and Sinapalo. Industry in the area is limited to small scale farming and ranching operations, the majority of which exist near the closer to the shoreline where the land flattens or on top of the plateau in the Sabana area. Some of the farming plantations do run up the hillside of the watershed near the current revegetation areas; these consist mainly of *Areca catechu* (betelnut) tree plantations. Hunting in the Sabana area is prohibited, however hunting for both the Sambar deer (*Rusa unicolor*) and coconut crabs (*Birgus latro*) in the Talakhaya area is a regular occurrence (exact figures are unknown, knowledge based on user conversations). The marine areas associated with the watershed are used for fishing, but are not considered to be an important or highly productive fishing area for the island. However, there is no accurate data on fish stock health or fishing pressure at this time.

The majority of the watershed is on public land (80%), the remainder of which is private land (UWA 1998). To this date, some private landowners have been supportive of and amenable to management

actions in the watershed. However, support level may change if owners or management actions change. Managers should consider these issues before implementing any new actions.

Revegetation work has been done in this area on small scales for roughly 10 years. The efforts have greatly increased through the Luta Livelihoods/Talakhaya Revegetation Project implemented in 2006. Since the beginning of the project, volunteers and agency personnel have planted over 25,000 seedlings each year in the highly eroding areas of the watershed. Due to the poor quality of the soil and the large loss of top soil, a mix of non-native species adapted to these conditions have been used, primarily: *Chrysopogon zizanioides* (vetiver grass), *Paspalum notatum* (bahia grass), and *Acacia confusa*. Managers from the DLNR forestry program have mapped out long-term strategies to reintroduce native forest to the area as these revegetated areas mature. Pilot sites have been identified and methods for achieving these goals are being tested within them. These efforts focus mainly on thinning and lifting mature *Acacia* and inter-planting native trees and shrubs that, through continued thinning, will come to dominate the area.

Revegetation efforts have been hampered significantly by intentionally set fires. Many of these fires are thought to be set by residents to reduce the protective cover favored by the introduced Sambar deer. The deer are attracted to new grass shoots in the open areas created by the burning; here they are more easily taken by poachers. These fires have resulted in damage to areas actively being revegetated, encouraged growth of clump grasses that increase fire risks, and have created more highly eroding areas. Reducing (and if possible eliminating) these fires have been set as a management priority for the last several years.

Prior to this document, two conservation plans were developed for the Sabana/Talakhaya area aimed at conservation. The Unified Watershed Assessment was completed by the Watershed Working Group in 1998. The assessment aimed to prioritize watersheds within the jurisdiction needing management action. The Talakhaya/Sabana/Palie watershed was listed as a category 1 watershed in the report, meaning it requires restoration because its waters do not meet clean water requirements and other resource goals (UWA 1998).

NRCS developed a soils conservation plan for Rota (entire plan can be found in appendix 4) in July 2007. This plan aimed to evaluate the threats facing the soils in the watershed and mapped out strategic actions recommended to be taken to conserve them. The current revegetation and management program is based primarily on this plan as well as on-the-ground assistance from NRCS staff.

## **The CAP Management Approach**

The planning process for this management plan was done during an initial workshop in March of 2010, a follow-up meeting in May of 2010, and several subsequent one-on-one meetings. The Sabana/Talakhaya CAP published in 2012 established conservation targets, identified threats, prioritized conservation goals and created strategies to reach those goals. In April 2015, stakeholders met again to evaluate progress of the CAP so far, update the CAP with more recent scientific data, and add and remove strategic actions based on progress and the current status of the natural resources of concern. Every effort was made to include technical staff, resource managers, infrastructure managers and other government, political and

community stakeholders in this process. Individual follow-up meetings were held to complete the drafting and final version of the Conservation Action Plan.

## Vision

The vision for the Sabana/Talakhaya watershed developed by the management team is:

*“Protehi i rikesan i tano yan i tasi”*

*“Protect the wealth of our land and sea”*

## Conservation Targets

Through the CAP process, eight conservation targets were identified by stakeholders as being critical aspects of the watershed that need to be protected and managed in order for the Sabana/Talakhaya watershed to maintain its viability. These conservation targets included:

1. Birds
2. Coral reefs
3. Endangered/medicinal plants
4. Fish and invertebrates
5. Forests
6. Freshwater
7. Soil quality
8. Protected wildlife\*

\*One target was modified slightly during the 2015 update from “Targeted Wildlife” to “Protected Wildlife” to reflect the common concern that some of the “targeted” wildlife listed within this conservation target is not legal to hunt (e.g. fruit bats, deer within the conservation area). The “Protected Wildlife” target includes birds, bats, turtles, deer, coconut crabs, turtles and other species that are protected either seasonally or year-round from hunting.

## Viability and Health Status

Each of our targets was then assigned a viability or health ranking based on the following scale:

- **Very Good** – The factor is functioning at an ecologically desirable status and requires little human intervention.
- **Good** – The factor is functioning within its range of acceptable variation; it may require some human intervention.
- **Fair** – The factor lies outside of its range of acceptable variation & requires human intervention. If unchecked, the target will be vulnerable to serious degradation.
- **Poor** – Allowing the factor to remain in this condition for an extended period will make restoration or preventing extirpation practically impossible.



The viability of each of these target natural resources were rated by the multidisciplinary CAP planning team. Birds, freshwater, and targeted wildlife received a ranking of “good”, while the others were all designated “fair”. Descriptions of the ranks as well as the ranking table are found below:

\*Indicates new attribute/indicator added during 2015 revision.

Targets and KEAs	Indicators	STATUS	Data Source
<b>SOIL QUALITY – FAIR</b>			
➤ <b>Organic matter content</b>	▪ % organic matter by weight	Fair	NRCS 2010 estimate
	▪ Soil carbon index	Fair	NRCS 2010 estimate
➤ <b>Decline due to erosion</b>	▪ Rate of sediment transport*	Unknown	NOAA/UoG data available in 2015
<b>FOREST – GOOD</b>			
➤ <b>Community structure</b>	▪ % cover of critically eroding areas in Talakhaya	Fair	Forestry/BECQ 2015 estimate
	▪ Grass cover to canopy cover ratio*	Unknown	Not yet available
➤ <b>Native species richness</b>	▪ Tree species diversity in critically eroding areas	Good	Forestry/BECQ 2015 estimate
<b>BIRDS – GOOD</b>			
➤ <b>Species diversity</b>	▪ Bird species per station	Fair	DFW 2010 estimate
➤ <b>Presence of key species</b>	▪ Presence of Marianas crow and Rota white-eye*	Good	DFW 2015 estimate
<b>FISH AND INVERTEBRATES – FAIR</b>			
➤ <b>Abundance of food resources</b>	▪ Density of edible shells per 100m <sup>2</sup>	Good	MMT 2015 dataset
	▪ Density of grazing urchins	Fair	MMT 2014 dataset
	▪ CPUE of food fish*	Unknown	NOAA Creel data available soon
➤ <b>Population size and dynamics</b>	▪ Number of grazing fish	Unknown	MMT dataset
<b>PROTECTED WILDLIFE – FAIR</b>			
➤ <b>Wildlife abundance</b>	▪ Coconut crab catch per night hunting	Poor	DLNR 2015 estimate
	▪ Fruit bat sightings per hour*	Unknown	<i>Need to establish monitoring</i>
	▪ Turtle nests per beach per year*	Unknown	<i>Saipan DLNR data may be available</i>
	▪ Deer sightings per hour hunting	Good	DLNR 2015 estimate
<b>FRESHWATER – GOOD</b>			

➤ <b>Water quality</b>	▪ Fecal coliform (red flag) violations	Good	BECQ 2010 data
	▪ Turbidity*	Unknown	NOAA/UoG and BECQ data available in 2015
➤ <b>Water quantity and conveyance</b>	▪ Flow rate*	Unknown	NOAA/UoG data available in 2015
<b>ENDANGERED/MEDICINAL PLANTS – FAIR</b>			
➤ <b>Number of plants</b>	▪ Abundance of Fire Tree ( <i>Serianthes</i> )	Fair	DLNR 2006 estimate
	▪ Abundance of <i>Osmoxylon mariannense</i> (Sabana)	Fair	DLNR 2006 estimate
<b>CORAL REEFS – FAIR</b>			
➤ <b>Population structure and recruitment</b>	▪ Diversity per unit area	Fair	MMT 2015 dataset
	▪ Size class distribution	Fair	MMT 2015 dataset
➤ <b>Community structure</b>	▪ Percent of reef accreting substrate*		MMT 2014 dataset
➤ <b>Presence of key species</b>	▪ Presence of proposed listed species*	Good	MMT 2015 dataset

## Threats and Contributing Factors

A “direct threat” to one of the focal conservation targets is an activity or process that is a source of stress to the target. The stakeholders who assisted with the 2015 revision of the CAP were not interested in ranking the priorities of the threats because they did not have adequate information. Therefore, threats and which targets they are affect are listed below in no particular order. Contributing factors are activities and events that cause or exacerbate the direct threats and are also listed in the table on the following page:

## Threats and Contributing Factors

<b>Contributing Factors</b>	<b>THREAT</b>	<b>Targets Affected</b>
Limited enforcement capacity Access to water/equipment Lack of response plan Illegal hunting Private land clearing	Fire	Forest Birds Protected Wildlife Endangered/medicinal plants
Over-grazing Agricultural activities Lack of awareness and education No Biosecurity plan Lack of data Limited enforcement capacity	Invasive plants/animals	Forest Birds Freshwater Protected wildlife Endangered/medicinal plants
Limited enforcement capacity Over-grazing Agricultural activities Lack of awareness and education Fire	Deforestation	Soil quality Forest Birds Protected wildlife Freshwater Endangered/medicinal plants
Commercialization for profit Limited enforcement capacity Need for updated regulations Lack of awareness and education	Over-harvest	Forest Birds Fish and invertebrates Protected wildlife Endangered/medicinal plants
Limited enforcement capacity Invasive species (feral goats) Agricultural activities Lack of awareness and education Unmaintained road culverts Lack of road engineering Fire	Soil erosion/run-off	Soil quality Fish and invertebrates Freshwater Coral reefs
Climate change Limited preparedness	Natural disturbances	Forest Birds Fish and invertebrates Freshwater Endangered/medicinal plants Coral reefs Soil Quality
Deris for harvest/fishing Poor economic conditions Recreation Easy money (greed) Increased demand	Poaching	Protected wildlife Endangered/medicinal plants Fish and invertebrates

## Progress Updates

Since the last draft of the Sabana/Talakhaya conservation action, major progress has been made on the implementation of specific management actions to protect the watershed and address threats to natural resources. The Talakhaya Revegetation project has taken place each summer under the leadership of DLNR Forestry with support from BECQ and funding from the NOAA Coral Reef Initiative since 2007. Number of grasses and trees planted each summer has increased steadily to over 30,000 in 2014 and approaching 50,000 in 2015. The use of sterile, non-invasive vetiver grass since 2010 has greatly improved the survival of plants and regeneration when fires do occur. Vetiver grass has superior roots than native grasses that secure soils and the grass is more fire resistant and quicker to return if burned. Additionally, education and outreach programs with community members and K-12 students has focused on reducing illegal burning within the fire-prone areas. Only two major fires have been observed since 2009 and many community members are aware of the “Real Hunters Don’t Burn” message.

Year	# of Plants Planted
2007	27,498
2008	29,151
2009	18,765
2010	24,330
2011	22,089
2012	27,931
2013	26,581
2014	30,000+
<b>2015 Goal is 50,000 plants!</b>	



Part of the success of the Talakhaya Revegetation project can be credited to increased staffing capacity and materials, such as the additional of stipends for two nursery volunteers to assist with propagating seedlings in the spring, the expansion of the planting season to 12 weeks each summer, the addition of a full-time Talakhaya project assistant, and stipends for two part-time field surveillance agents to conduct outreach and assist with enforcement efforts around the conservation area during the dry season when fire risk is high. A full-time Watershed Coordinator has been based on Saipan since 2012 who assists with management and logistics for the Talakhaya project as well. The Rota Forestry nursery has been

expanded since 2010 to accommodate 40,000+ seedlings and vetiver is now propagated on-site for each planting season instead of being imported from Guam or donated from private individuals.

A continued setback for the Talakhaya Revegetation project is the lack of reliable access to the planting areas each summer. All of the access roads require permission from private landowners, who have so far been willing to assist DLNR and the volunteers with their goal, however the roads are in poor shape and the local government agencies have limited ability to repair private roads in order to continue the project on schedule. Federal funds have not been sufficient to cover incidental expenses such as aggregate and fuel for road repairs. The current state of the roads are a threat to volunteer safety and to the longevity of the vehicles used for the project and must be examined, repaired and/or re-engineered in order for the project to continue.

Management of the Sabana has increased in recent years, with land managers encouraging leasees to prevent erosion and construct windbreaks on their property. The US Fish and Wildlife Service has recently begun an endangered plant species recovery program within the Sabana and nearby areas that assist with the re-establishment of *Osmoxylon* and *Serianthes* plants.

The Division of Fish and Wildlife enforcement branch has been severely limited in their activities within the conservation area due to a lack of vehicles since 2014. Several strategic actions are listed later in the CAP that suggest ways to overcome this difficulty.

The Commonwealth Utilities Corporation continues to monitor the water caves and use these as the sources for public drinking water. In order to protect human health and maintain security, the main cave now has fences to prohibit access and a camera to monitor security. CUC conducts regular maintenance on the waterline and access roads to the caves.

Since 2012, the Talakhaya project has taken front stage at a variety of K-12 outreach events and community events, including the annual fiestas on Rota and the Rota Environmental Expo. Week-long summer camps have been conducted by BECQ and the Department of Commerce, along with other partners) to teach elementary school children about natural resources and local conservation efforts. The Micronesian Islands Nature Alliance (MINA) and its partners initiated a socio-economic survey in 2014 to gather data about the community's baseline understanding of natural resource regulations and their relationship to the environment on Rota. These surveys will be repeated every few years to monitor changes in knowledge, attitudes and perceptions over time within the Rota community.

Fisheries and marine monitoring has been a strong focus of the Division of Fish and Wildlife (DFW) and the BECQ Marine Monitoring Team for the past several years. DFW began creel surveys of fishermen in Rota to understand fishing pressure and yield and the data will soon be available to inform the CAP. The Marine Monitoring Team collects benthic habitat and invertebrate data annually and has a growing dataset that reflects the slow recovery of the reef below the Talakhaya conservation area. Monthly water quality monitoring at the Talakhaya reef flat was re-initiated in 2015 by the BECQ Water Quality/Nonpoint Source branch and will contribute to a long-term dataset that includes pH, turbidity, dissolved oxygen, temperature, salinity and microbiological parameters.

## Goals and Objectives

Five broad strategies to address the identified threats were laid out during the Conservation Action Plan process from 2010-2012:

- A) Revegetation of critically eroding areas in the Sabana/Talakhaya.
- B) Implementation of engineering actions that would decrease erosion in the watershed.
- C) Raising awareness and education of the Rota community about how fires and poaching are affecting the watershed.
- D) Creation of effective enforcement measures for local laws.
- E) Collection of necessary species population information in the area to allow for more informed policy decisions.

Goals and objectives were identified by CAP stakeholders in 2012 to define the overall aims and measurable landmarks to the conservation plan. The first three goals were written in 2012 and were included in the updated CAP by the stakeholder group. Goal 4 was added in 2015. If the objective was part of the 2012 CAP, then the corresponding reference number is recorded as 2012-[NUM]. New objectives are labeled as 2015-[NUM]. Some language may have been altered from the 2012 CAP to clarify meaning and reduce repetition.

### Goal 1: Reduce soil erosion on barren lands in Talakhaya

- Objective 2015-1: By 2025, revegetate all critically eroding areas in the watershed (defined as bare areas >15m<sup>2</sup> in size) with grasses and *Acacia* using NRCS Soils Conservation Plan.
- Objective 2015-2: By 2018, observe a positive Soil Conditioning Index (SCI) in Talakhaya revegetation area soils during 3-year assessments through reduction of erosion and establishment of *Acacia confusa* seedlings.
- Objective 2012-A3: By 2015, reduce soil loss in Talakhaya highly eroding areas by 25%.
- Objective 2015-3: By 2025, establish native trees in 25% of the revegetated bare areas.

### Goal 2: Reduce intentionally set fires and incidences of illegal hunting within the conservation area

- Objective 2015-4: By 2016, see a 50% increase in community knowledge and appreciation of resources and the threats that fire poses to them.
- Objective 2015-5: By 2018, have at least one conservation officer trained in evidence collection, report writing, etc. who will assist in the building of a case against offenders with regards to illegally set fires.
- Objective 2015-6: By 2016, revisit, evaluate and renew the established MOA between DLNR and DPS (Dept of Fire) to improve enforcement cooperation.

**Goal 3: Reduce overharvesting in the lands and waters associated with the watershed area.**

**Goal 4: Improve monitoring of terrestrial and marine resources within the watershed area (added in 2015).**

- Objective 2015-7: By 2018, DFW and MMT will collect detailed baseline data on targeted fish and invertebrates in the waters associated with the project area.
- Objective 2012-E4: By 2015, have process in place to incorporate collected scientific data into management decisions.
- Objective 2015-8: By 2019, collect baseline data for protected wildlife and plants (as defined in the conservation target above) within the watershed area.

## **Strategic Actions**

Strategic Actions were reformatted from the 2012 version of the Talakhaya CAP to separate general recommended actions from the specific steps required to complete them, which may change a lot in between CAP updates. The strategic actions listed here are divided into categories for easier reading. If the action was part of the 2012 CAP, then the corresponding reference number is recorded as 2012-[NUM]. New strategic actions are labeled as 2015-[NUM], but specific steps are not numbered. Some language may have been altered from the 2012 CAP to clarify meaning and reduce repetition.

### **General (G)**

- 2015-G.1 Check public laws for the legal boundaries of the conservation area within the watershed boundaries.
- 2015-G.2 Determine whether the CAP should address the Sabana. If so, ensure that the targets, threats and strategies reflect the Sabana as well as Talakhaya.

### **Monitoring and Data Collection (M)**

- Soil
  - 2012-A3a/A3b/B1g Continue to assess the rate of soil loss within the watershed
    - Work with University of Guam (Dr. Golabi) and NOAA (Dr. Okano) to continue in-stream monitoring and evaluate data
    - Learn about the Universal Soil Loss Equation from NRCS
    - Train DLNR staff/associates to use established methodology to collect soil loss data
    - Evaluate objectives (e.g. 25% reduction in soil loss) based on data collected and conservation targets downstream
  - 2012-A2b Conduct Soil Conditioning Index (SCI) and soil quality assessments tri-annually within the watershed
    - Work with NRCS to train and outfit Rota DLNR staff to conduct these assessments

- **Fish**
  - 2012-E1e Continue DFW/NOAA Creel surveys and incorporate analyzed data into the CAP document every 2-3 years.
    - Produce an annual report of analyzed data to be submitted to fishery managers and the public for use in CAPs and other planning documents.
- **Marine/Coral Reef**
  - 2012-E1e Continue BECQ Marine Monitoring Team surveys at long-term monitoring sites and incorporate analyzed data into the CAP document every 2-3 years.
- **Wildlife**
  - 2015-M.1 Determine methods and implement program for measuring “Protected Wildlife” indicators: crabs, fanihi, deer (combination of scientific data, and hunter/hiker interviews)
- **Vegetation**
  - 2015-M.2 Continue to collect GPS data of eroding and revegetated areas.
    - Evaluate new techniques for data collection, management and analysis
- **Water Quality**
  - 2012-A3d Continue to monitor downstream water quality
    - Continue to include Talakhaya sites in the DEQ beach water quality sampling procedure
- **Fires**
  - 2012-D4a Keep a specific annual record of fires started and the extent of damage within the Talakhaya area (Department of Fire and DLNR – Forestry can combine this information).
    - Procure a GPS for fire surveillance and planting information.
    - Compare burning in Talakhaya to the rest of the island of Rota.
- **Overall**
  - 2012-E4b Conduct bi-annual meetings with marine and terrestrial biologists and other scientists and managers on Rota to determine how to incorporate scientific data into management activities and decisions for the watershed.
    - Identify personnel from different agencies to be involved.
    - Hold meeting 1-2 months before CAP review in order to propose ideas for the CAP.
    - Coordinate science review and CAP meetings with NOAA-CRI grant cycles to get new projects included on the grant proposals.
  - 2012-E1a-d Establish and execute methods for collecting baseline terrestrial and marine data on conservation targets.
    - Conduct assessment of baseline needs for data.
    - Create methods and survey plans and identify agency or personnel responsible for data collection.
    - Present detailed reports to resource managers and Rota government officials.
    - Incorporate analyzed data into the CAP and other management documents.



## Enforcement (E)

- 2015-E.1 Continue field surveillance of the conservation area during high risk periods
  - Continue to fund seasonal surveillance agents during the dry season
  - Identify funding for one full-time year-round surveillance agent/conservation officer to focus on Talakhaya and burning prevention
  - Continue to archive bi-weekly reports on field agents' activities
- 2012-D5a-b/D6a-b: Establish a Memorandum of Agreement between DLNR and the Department of Fire and other enforcement agencies to improve enforcement cooperation
  - Assess additional capacity, equipment (e.g. vehicles) and staffing needs and contributions from each office/agency/organization
  - Include Rota Mayor's Office, agency heads and collaborators as MOU signatories
  - Organize and conduct training to address priority needs found in the assessment
  - Incorporate fire training into academy for (DFW) conservation officers
  - Identify potential funding sources to fill capacity gaps
  - Pursue short-term and sustainable funding opportunities
- 2015-E.2 Include hunting grounds locations on hunting permits

## Forestry/Revegetation (F)

- 2012-A1c/A2a Continue to conduct the annual mass planting of 40,000 seedlings during the summer (the Talakhaya Revegetation and Luta Livelihoods Project).
  - Continue to fund materials and volunteer stipends
  - Transition from planting mostly bahia and vetiver grasses to planting more *Acacia confusa* and native seedlings as areas begin to build up soil.
  - Establish fencing procedures for planting native plants in revegetated areas and obtain funding and materials.
- 2012-A1d Maintain and/or procure vehicles to support the summer planting and year-round data collection within the Talakhaya watershed.
  - Continue to fund vehicle maintenance for DLNR vehicles.
  - Continue to improve road access to the conservation area for planting purposes.
  - Obtain ATVs/trailers for delivery of planting materials on bad access roads.
- 2015-F.1 Increase *Serianthes* plantings within the Talakhaya and *Osmoxylon* plantings within the Sabana.

## Land Management (L)

- 2015-L.1 Identify highly erodible private lands that are not farmable and connect them with land exchange programs if eligible (e.g. wetland exchange, forest legacy, CELCP).
- 2015-L.2 Align public land lease regulations (number of years) within the Sabana with NRCS regulations in order to take advantage of NRCS assistance programs.
- 2015-L.3 Regulate allowable agricultural techniques within the Sabana in order to reduce agrochemical contributions to groundwater and surface waters.

## Infrastructure Management (I)

- 2015-I.1 Improve and maintain roads, culverts, trails, walkways and staging areas for use for the revegetation project and outreach programs.
  - Continue to partner with Public Works to assess and improve access roads prior to the revegetation season.
  - Train Rota personnel to design and build low-impact infrastructure and maintain existing infrastructure within the watershed.

## Outreach (O)

- 2015-O.1 Continue week-long summer camps focused on conservation efforts.
- 2015-O.2 Continue to conduct K-12 outreach programs during the school year.

## New Research (R)

- 2012-A1g Conduct studies evaluating native Rota flora for use in revegetation work.
- 2015-R.1 Study pesticide and nutrient flow from the Sabana area – determine if prohibitions need to be implemented and enforced in certain areas that contribute heavily to groundwater and surface water
- 2015-R.2 Gain an understanding of medicinal plants affected by invasive species such as the Cuban slug, ivy gourd and others.

## Supplemental Topics

Several ideas were brought up at the 2015 Talakhaya CAP review workshop that are worth mentioning here but did not fit into another part of the CAP. The first is the growing use of Rota as habitat for introduced populations of Guam rails. Although this is not a priority topic for the Talakhaya watershed, for Rota, or for the CNMI in general, it may be worthwhile to understand the Guam rail project in the context of the Sabana/Talakhaya watershed by speaking with the US Fish and Wildlife Service and the Guam Department of Aquatic and Wildlife Resources.

In 2012, Rota managers were exploring the designation of the Sabana Conservation Area as an “organic farming only” agricultural area, where the use of agricultural chemicals would be prohibited. The designation is in response to worries of pesticide, fertilizer, or other chemicals leaching into the island’s water source from the Sabana. Nearly 100% of the drinking water supply on Rota is pumped from a water pooling cave, which sits just below the cliff line of the Sabana within the Sabana/Talakhaya watershed (UWA 1998). No further information on this initiative was available for the 2015 update.

Rota’s well-established Forestry program and tree planting projects may bring about opportunities to earn carbon sequestration credits through various exchanges. Erin Derrington at the Bureau of Environmental and Coastal Quality (based on Saipan) has offered to look into this further.

Finally, the economic situation on Rota is likely to be a major factor when examining resource use and conservation. Stakeholders suggested that poor economic conditions and the high cost of living may increase the demand for local resources such as deer, fish and other targeted species. The CAP committee is not comfortable making the recommendation that Rotanese stop using local resources in

favor of buying imported food from the grocery stores, but this increase in demand should be paid attention to when looking into new regulations on fishing and hunting.

## Discussion and Next Steps

The Sabana/Talakhaya watershed has seen a great deal of progress since the first CAP stakeholder group met in 2010 to develop a comprehensive management plan for the watershed. Illegally-set fires have decreased significantly and the Talakhaya Revegetation and Luta Livelihoods Project has become a well-known community conservation program on Rota. Many of the major threats from 2012 have decreased (such as fire and illegal hunting), although erosion and sedimentation still remains a major concern for the watershed. Coral reefs are facing global threats like climate change and are less resilient to deal with local stressors such as sedimentation. The extensive erosion within the Talakhaya area and the deer populations within the conservation area have made native tree establishment very slow. However, grasses and *Acacia* trees have taken off and coverage of highly erodible soils is improving every year. Overall, since executing the 2012 Sabana/Talakhaya Conservation Action Plan, stakeholders are happy with the progress made and optimistic about the status of conservation targets in the future, even if the biological indicators measured have not caught up with the positive changes occurring in the watershed.

Since 2012, CAP priorities have changed from focusing on implementing management activities within the watershed to focusing more on monitoring and research. It is the hope of the stakeholder group that a multi-year push towards establishing baselines for conservation targets and implementing regular monitoring protocol will allow scientists and managers the chance to evaluate the impact that watershed management activities have had in recent years and determine the most appropriate next steps. Meanwhile, momentum should be maintained for ongoing community projects such as the eco-camps and summer revegetation project. Managers can also focus on building enforcement capacity to ensure that conservation laws regulations are being successfully enacted. Rota's isolation, even more so than Saipan and Tinian due to lack of daily passenger and cargo flights and lack of year-round ocean cargo access, makes supplies and materials (including vehicles, gasoline, repairs and maintenance) expensive and make it difficult for staff to have access to new training and exchange opportunities. The identification of new funding sources for capacity-building and a renewed commitment from current project partners located on and off island could be a major step to solving these problems.

It is recommended that the Sabana/Talakhaya Conservation Action Plan continue to be implemented, reviewed, and updated by the stakeholders who contributed to this draft and to new partners. The CAP stakeholder group requested semi-annual reviews and check-ins to implement the actions described above and would like to review the entire document again in 2017-2018 to reflect new and changing concerns for the watershed. Personnel from the Coral Reef Initiative program at the Bureau of Environmental and Coastal Quality will continue to coordinate meetings with local partners on Rota, but individual agencies and organizations should assist with implementing any part of this plan as their directives allow. Partnership and collaboration will be the key to "*Protehi i rikesan i tano yan i tasi*".

## **Works Cited**

**CNMI CRI Management Grants 2005, 2007, 2007, 2008, 2009, 2010, 2011**

**CNMI & Guam Stormwater Management Plan – Volume 1 Final, Horsley Witten Group Inc., October 2006.**

**CNMI DEQ 305(b) Report, 2010.**

**Conservation Plan: Talakhaya, Rota, NRCS, 2007.**

**Laolao Bay Conservation Action Plan, CNMI Government and The Nature Conservancy, 2009.**

**MMT Data, CNMI Government and Pacific Marine Resources Institute, 2000-2011.**

**Reconnaissance Survey: Significant Natural Areas and Cultural Sites in Rota, CNMI, National Parks Service, 2005.**

**Rota Local Law 9-1, 1994.**

**Rota Local Law 9-2, 1994.**

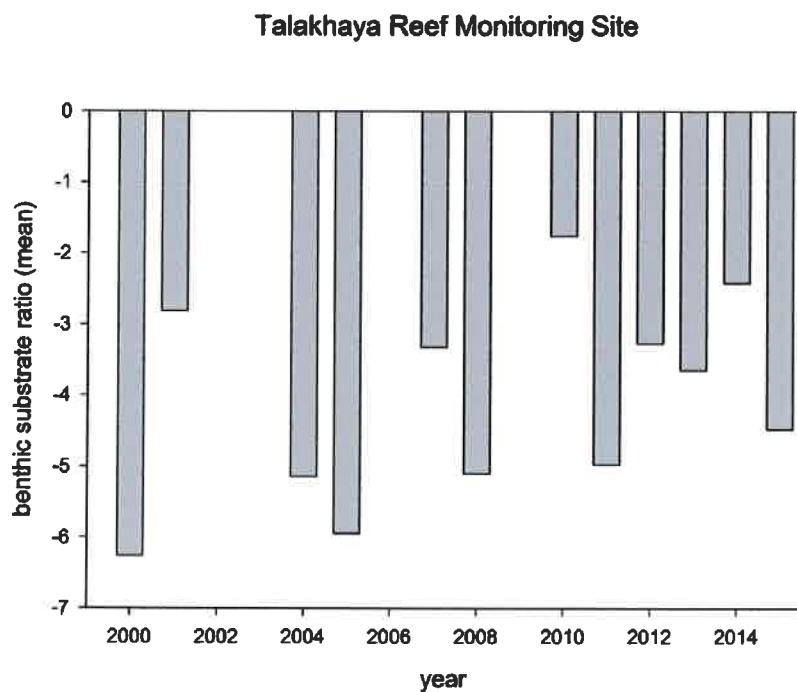
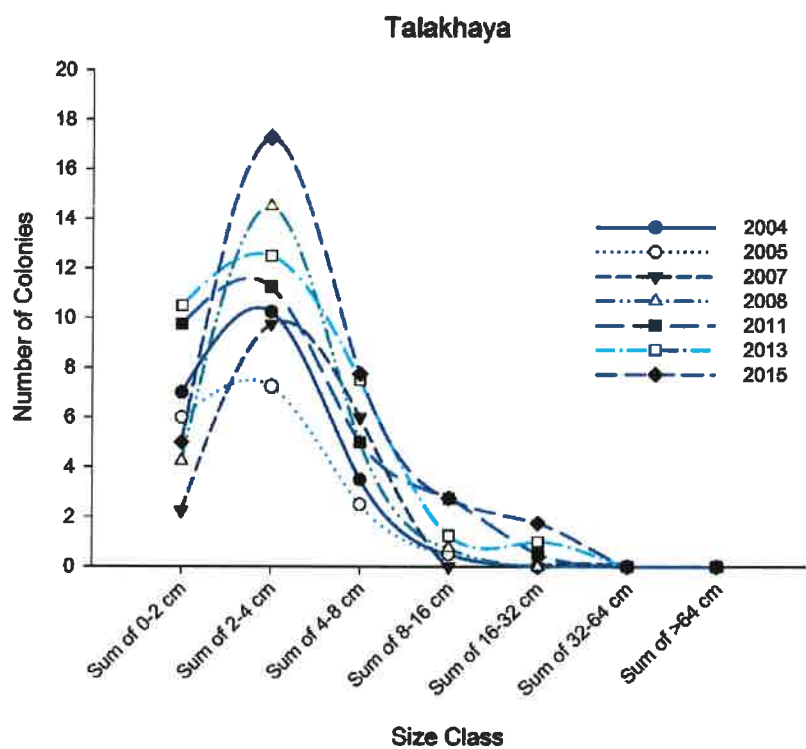
**Rota Local Law 15-8, 2007.**

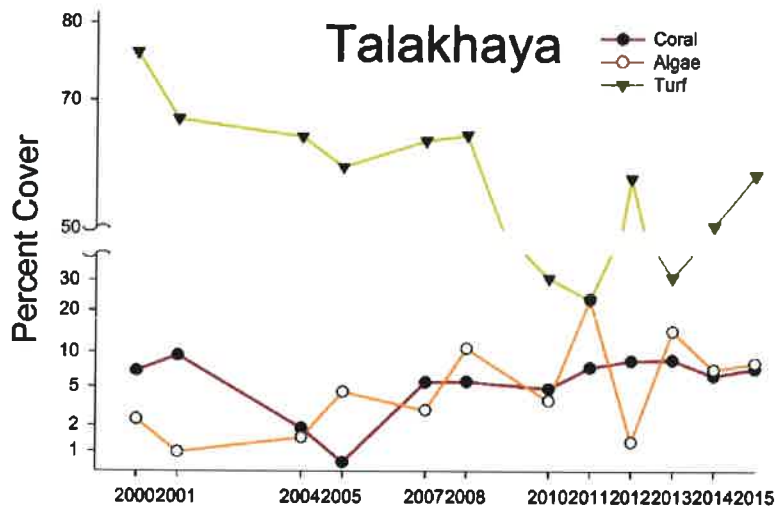
**Unified Watershed Assessment (UWA), Interagency Watershed Working Group, 1998.**

**Watershed Restoration Action Strategy (WRAS), Division of Environmental Quality, 2003.**

## Appendix I: Marine Monitoring Graphical Data

Fish and Invertebrates and Coral Reef Graphical Data from the CNMI Marine Monitoring Team (courtesy of Steven Johnson)





## Appendix II: 2015 CAP Review Stakeholders

Talakhaya CAP Review Meeting Attendance (April 23, 2015 at the As Paris Conference Room)

### BECQ:

Kaitlin Mattos  
Avra Heller  
Erin Derrington  
Jihan Buniag  
Fran Castro

### CUC Rota:

Anthony Barcinas  
Gabriel Dela Cruz

### Dept of Public Works:

Bert B. Ogo

### Dept of Fire:

Joel Hocog

### DLNR:

Frank M. Manglona  
Harry Mendiola  
Kevin T. Atalig  
Ben Atalig  
Roman Manglona  
Pedro A. Manglona  
James Manglona  
Isaac Calvo  
Barry Atalig  
Jeffrey Masga

Maximo Muña

M. Barum  
David Calvo  
Justin Pangelinan  
David Atalig  
Tammy Summers (NOAA)

### Mayor's Office of Rota:

Gardner Barcinas  
Tom Mendiola

### USDA -NRCS:

Brent Schumacher  
Jay Doronila

## Appendix III: Resource Maps

Land use and conservation areas in Rota, CNMI (source NPS)









**Scale: 1:75,000**  
0 1 Kilometers  
0 1 Miles

**Legend:**

- Birds (excluding Mariana crows)**
  - Seabird nesting colonies
  - Rota endemic wherry habitat
- Reptiles**
- Sea turtle roosting areas**
- Mammals**
- Marine habitat roosting areas**
- Plants**
  - Neoglossia robusta*
  - Coccothraustes mexicanus*, etc.
  - Solanum elaeagnifolium*
  - Tournefortia bicolor*
- Invertebrates**
  - Palaemonetes*
  - Phragmites*
  - Veronica*
- Lot or land designation boundary**

**Island of Rota (Luta)**  
**Commonwealth of the Northern Mariana Islands**

**FIGURE 8**  
**Threatened / Endangered and Rare Species**

**Biological Data Source:** Dec. 1997  
**Date:** August 5, 2005

# Marianas Crow Critical Habitat Map





[illegible]

## Appendix IV: Workplan for CRI-Funded Projects (FY2016-2017)

### Commonwealth of the Northern Mariana Islands



#### OFFICE OF THE GOVERNOR

Coral Reef Initiative Program  
P.O. Box 501304, Saipan, MP 96950-1304



### COVERSHEET

Title: CNMI's FY15-16 Coral Reef Conservation Cooperative Agreement  
CFDA number: 11.482, Coral Reef Conservation Program  
Federal Funding Opportunity Number: NOAA-NOS-OCRM-2015-2004040  
Award Dates: October 1, 2015-Sept 30, 2016

#### **Applicant Name and Contact Information:**

Eloy S. Inos, CNMI Governor  
P.O. Box 10007  
Saipan, MP 96950

#### **Applicant Organization:**

CNMI Office of the Governor – Bureau of Environmental and Coastal Quality (BECQ) & Division of Fish and Wildlife (DFW) under the Dept. of Lands and Natural Resources.

#### **Primary and alternate points of contact:**

- 1) Frances A. Castro, CNMI POC
- 2) Frank Rabauliman, Administrator, BECQ

#### **Contact information including address, phone and fax numbers, and e-mail address:**

Office of the Governor, CNMI Bureau of Environmental and Coastal Quality  
Gualo Rai Center, Suite 201, P.O. Box 501304, Saipan, MP 96950  
Tel: (670) 664-8500; Fax: (670) 664-8540 Email: [coralreefpoc@gmail.com](mailto:coralreefpoc@gmail.com);  
[frankrabauliman@deq.gov.mp](mailto:frankrabauliman@deq.gov.mp)

**Geographic Location:** Commonwealth of the Northern Mariana Islands

**Amount of federal funding requested:** Year 1: \$892,327  
Year 2: \$866,586

## Application Summary

In FY2014 and 2015, we are requesting for both programmatic and project funding. Our programmatic requests include the coordination and representation of CNMI at the U.S. Coral Reef Task Force and other coral reef related meetings, continuation of the Education and Outreach Coordinator position, a Coral Reef Project Coordinator, a Watershed Coordinator, a Marine Protected Area (MPA) coordinator along with the outreach projects that they will carry out, continued support for the CRI internship program introducing post-secondary students to coral reef management, funding for monitoring biologists and programmatic support for the continuation of our long-term monitoring program. Projects include the implementation of the Talakhaya and Garapan conservation action plans (CAP), the development of a Tinian CAP, a project studying terrestrial runoff in the Western Lagoon, a disturbance response coordination workshop (Y1 only), a study of climate change impacts on CNMI reef ecosystems, a human impacts study on Managaha along with an observer position, a commercial reef fish data specialist, and the stipend for a Micronesia Challenge Young Champion. Some other personnel requests are directly tied to specific projects. This grant application also accounts for CRCP holdbacks for All Islands Secretariat support (\$24,286) and for the Coral Fellows Program (\$10,714).

Through the completion of the following tasks, both programmatic and project specific, the CNMI will address its local management priorities and those aligned with NOAA's national priorities to reduce key threats facing our coral reefs and to improve our resource management.

## Project A: Implementation of the Talakhaya CAP

### Project linkages to Jurisdictional, LAS, and CRCP Priorities

**GOAL 1:** *Improve the condition of CNMI's coral reef ecosystems by reducing the amount of sediment, nutrients and other land-based sources of pollution in CNMI's watersheds* **Objective 1.3:** Develop and begin to implement a CAP or comprehensive watershed management plan for a key watershed in Rota to improve water quality and condition of adjacent coral reefs. **This project is directly tied to three key outcomes of the CNMI LAS, namely LBSP – 1) Restoring three priority watersheds in the CNMI, one each on the islands of Saipan, Tinian and Rota, to reduce the amount of sediment runoff and erosion. 2) Stabilize soils in the CNMI "badlands" through revegetation of native flora. The Talakhaya CAP works to *increase awareness and involvement*: through volunteer participation in planting process and a related education and outreach campaign. *Coral reef resources management*: Develop and secure adequate staff, training, and technical assistance to manage threats to coral reef resources and implement the CNMI coral reef initiative. Task Outcomes linked with NOAA CRCP's National Goals and Objectives - This project directly fulfills NOAA LBSP Objectives L1.2 – identifying and prioritizing critical watersheds, and L1.3 – implementing and developing LAS for the identified watersheds.**

### Project Summary

The Talakhaya Watershed Revegetation Project has been going on since 2007 and has been greatly augmented by the completion of a Conservation Action Plan for the watershed in 2010. The Talakhaya CAP identified soil loss and sedimentation due to land clearing and human-induced wildfires as the main threats to the watershed and the coral reefs that receive the land-based sedimentation. Since re-planting of the cleared upland areas began in 2007, there has been a slow but steady improvement in

the state of the coral reefs within the watershed. The presence of field surveillance agents during the hottest and driest months has contributed to a sharp decline in number of fires detected in the conservation area. Collaboration between USDA-NRCS soil scientists and local government partners has improved the methods used for planting each year. The project relies on the hiring of local volunteers to complete the work and simultaneously educate the community about the issues and how citizens can contribute positively to their environments. After a cursory evaluation of historic revegetation areas in Talakhaya in 2014, methods in 2015 and beyond will be adjusted to focus on planting barren areas with grasses and Acacia “starter” trees (as has been happening since 2009), as well as revisiting previously planted areas and adding native and bird-friendly species to these areas to assist with forest succession dynamics. The requested budget mimics positive changes implemented in FY2014 such as hiring Maximo Muna as the full-time Talakhaya nursery specialist and lengthening the planting season and field surveillance season. This year, BECQ would like to explore the option of contracting the volunteer recruitment services to an outside entity to make the process easier and timelier. Additionally, a modest increase in the supply budget is requested to reflect price increases for needed supplies and small road improvements to ensure site access.

#### **Task Description and Methodology**

- Preparation for the Talakhaya planting season will begin in October each year with the procuring of supplies such as fertilizer, planting pots, peat moss, top soil, seeds, and fuel. Vehicle repairs, as needed, will be completed at this time in order to ensure the safety of volunteers and staff as well as consistent access to the revegetation sites in the summer. In addition to the supplies requested here, in-kind man hours, nursery space, equipment and vehicles will be contributed by DLNR-Rota.
- Two field agents will be hired to be stationed on the two access roads to the Talakhaya Conservation Area on rotating schedules for 24 hrs/week on rotating schedules for 20 weeks from January to June, coinciding with the hottest and driest period when fires are most likely to cause extensive damage. Field agents have been working in the area for the last four years and their presence has been an effective deterrent to anyone thinking of setting fires in the watershed, as evinced by only one major fire occurring since the field agent program began.
- Two nursery assistants will be recruited to assist the Talakhaya Nursery Specialist with collecting seeds, preparing medium and growing the plants for the Talakhaya planting season. Nursery assistants will work for 10 critical weeks in the spring to get plants started before the planting season. They will also assist with Nursery Specialist and DLNR Foresters with field work and site preparation related to the planting project, as needed.
- The Talakhaya project team, including the Watershed Coordinator, DLNR Forestry staff and the Talakhaya Nursery Specialist will work with USDA-NRCS soil specialists and other agencies to evaluate past planting areas and determine the best areas to plant in the coming season.
- Twenty volunteers will be recruited to participate in the Talakhaya Revegetation and Luta Livelihoods project from June through September (as weather permits). Volunteers will be chosen based on their physical ability to assist with the project and their need for part-time work. Volunteers must commit to the whole season and will be paid a small stipend to offset the costs of transportation and food when they are assisting with the project.
- Volunteers led by Rota Forestry staff will plant >40,000 seedlings of vetiver grass, Bahia grass and acacia trees in areas with exposed soil that are fire prone (This is a 30% increase over previous years.) Additionally, 5,000 native tree seedlings will be planted in areas previously revegetated with grass and Acacia to increase diversity and wildlife habitat. Volunteers will also create rock and coconut husk mats and barriers to divert stormwater and decrease erosion.

- DCRM and Rota Forestry staff will complete GIS mapping of planted and barren areas and will monitor seedling and grass survivorship into the dry season. Currently, survivorship of grasses is near 90% and seedling survivorship is greater than 60%. The CNMI Marine Monitoring Team will monitor benthic indicators below the revegetation site annually to contribute to long-term monitoring of the revegetation project's success.
- At the end of the planting season, a Planting Festival will be conducted to acknowledge the volunteers and increase community awareness and stewardship for natural resources.

### ***Outcomes and Products***

- 40,000 grasses, Acacia and native tree seedlings planted in the Talakhaya area each summer
- 20+ new volunteer watershed stewards recruited and taught the importance of taking care of natural resources and conservation areas
- Survivorship of >60% of plants and grasses from past years
- Quarterly and semi-annual reports on the tasks completed and progress of the Talakhaya project
- GIS maps of newly revegetated areas overlaid on past revegetation efforts to contribute to planning

### **Project Schedule**

<b>Year 1 Projects/Tasks</b>	<b>Oct-15</b>	<b>Nov-15</b>	<b>Dec-15</b>	<b>Jan-16</b>	<b>Feb-16</b>	<b>Mar-16</b>	<b>Apr-16</b>	<b>May-16</b>	<b>Jun-16</b>	<b>Jul-16</b>	<b>Aug-16</b>	<b>Sep-16</b>
Order supplies, award contract, repair vehicles												
Recruit field agents and monitor access roads for 20 weeks												
Hire nursery assistants, begin growing plants												
Evaluate past planting, determine priority areas, map revegetation sites												
Recruit volunteers, outplant 40,000 seedlings												
Complete progress reports and CAP updates												

<b>Year 2 Projects/Tasks</b>	<b>Oct-</b>	<b>Nov-</b>	<b>Dec-</b>	<b>Jan-</b>	<b>Feb-</b>	<b>Mar-</b>	<b>Apr-</b>	<b>May-</b>	<b>Jun-</b>	<b>Jul-</b>	<b>Aug-</b>	<b>Sep-</b>
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	16	16	16	17	17	17	17	17	17	17	17	17
Order supplies, award contract, repair vehicles												
Recruit field agents and monitor access roads for 20 weeks												
Hire nursery assistants, begin growing plants												
Evaluate past planting, determine priority areas, map revegetation sites												
Recruit volunteers, outplant 40,000 seedlings												
Complete progress reports and CAP updates												

### Project Management and Personnel

The BECQ Watershed Coordinator (currently Kaitlin Mattos) will act as the project manager, providing logistics support, ordering materials, coordinating reports and CAP updates, and assisting with other project duties as necessary. The head forester at DLNR Rota (currently James Manglona) will act as the project coordinator and will run the day to day operations of the program and communicate with the project manager as needed. The Talakhaya Nursery Specialist will conduct field and nursery work solely for the Talakhaya project and will be the only staff 100% committed to the Talakhaya project. Logistical assistance will be conducted by an independent contractor in the CNMI. The contractor will assist with recruiting field agents, nursery volunteers and planting volunteers and will pay small stipends to the volunteers to cover the cost of food and transportation while the volunteers participate in the project. The contractor will be chosen through an RFP process overseen by the CNMI government.

Talakhaya CAP Budget Summary--Year 1			
Category	Federal funds	Matching funds	Total
Personnel	\$16,480	\$29,100	\$16,480
<ul style="list-style-type: none"> <li>Talakhaya Nursery Specialist salary = 50% nursery work, 50% field work, 100% related to the Talakhaya revegetation project and field surveillance / <b>MATCHING – in form of salary</b></li> </ul>			



<b>time committed by Rota Forestry staff</b>			
<b>Fringe</b>	\$3,239		\$3,239
<i>Fringe benefits (19.65%) = 6.2% Social security (mandatory); 1.45% Medicare; 4% Health insurance (optional); 4% Group life insurance (optional); 4% 401K DC Retirement contribution</i>			
<b>Travel</b>	\$7,520		\$7,520
R/T plane tickets to Rota for project coordinator and manager/director (4 trips x 2 people x \$300/ticket) = \$2,400.00; Per diem (4 trips x 4 days x 2 people @ \$125/day) = \$4,000.00; Car rental (4 trips x 4 days @ \$70/day) = \$1,120.00			
<b>Supplies</b>	\$20,740		\$20,740
Fuel for planting, road repair and field agents = \$5,000.00 ( <b>Fuel</b> ); Top soil (300 x 1 cu. ft. bags @ \$9/ea) = \$2,700.00 ( <b>Supplies – Ops</b> ); Peat moss (20 x 3.8 cu. ft. bags @ \$30/ea) = \$600.00 ( <b>Supplies – Ops</b> ); Bahia ( <i>Paspalum notatum</i> ) grass seed (50 lbs) = \$500.00 ( <b>Supplies – Ops</b> ); Fertilizer tablets (120 boxes @ \$70/ea) = \$8,400.00 ( <b>Supplies – Ops</b> ); Deepot planting cells and trays (5,000 @ \$0.50/ea) = \$2,500.00 ( <b>Supplies – Ops</b> ); Plant carrying bags (3 @ \$80/ea) = \$240.00 ( <b>Supplies – Ops</b> ); Miscellaneous supplies (ice, gloves, spray paint, shovels, etc.) = \$800.00 ( <b>Supplies – Ops</b> )			
<b>Contractual</b>	\$47,790		\$47,790
Contract with local NGO or business to hire and provide transport/food allowances for volunteers and other costs associated with implementation of the Talakhaya CAP			
<ul style="list-style-type: none"> <li>• Seasonal field agent stipends (2 agents x 24 hrs/week x 20 weeks @ \$7.35/hr) = \$7,056.00</li> <li>• Nursery assistant stipends (2 assistants x 30 hrs/week x 10 weeks @ \$5/hr) = \$3,000.00</li> <li>• Planting volunteer stipends (20 volunteers x 30 hrs/week x 10 weeks @ \$5/hr) = \$30,000.00</li> <li>• Planting festival outreach materials and supplies = \$1,500.00</li> <li>• Administrative costs for contractor (15%) = \$6,233.40</li> </ul>			
<b>Other</b>	\$3,250	\$36,500	\$3,250
Shipping fees for delivering supplies to Rota (250 lbs @ \$1/lb) = \$250.00 ( <b>Freight/Handling</b> ); Vehicle repair and maintenance for revegetation transport vehicles (\$1,000.00 x 3 vehicles) = \$3,000.00 ( <b>Repair and Maintenance</b> ) / <b>MATCHING</b> in form of Rota Forestry vehicle use and other in kind project contributions			
<b>TOTALS</b>	<b>\$99,019</b>	<b>\$65,600</b>	<b>\$164,619</b>

<b>Talakhaya CAP Budget Summary--Year 2</b>			
<b>Category</b>	<b>Federal funds</b>	<b>Matching funds</b>	<b>Total</b>

Personnel	\$16,975	29,100	\$16,975
<i>Talakhaya Nursery Specialist salary = 50% nursery work, 50% field work, 100% related to the Talakhaya revegetation project and field surveillance / <b>MATCHING – in form of salary time committed by Rota Forestry staff</b></i>			
Fringe	\$3,336		\$3,336
<i>Fringe benefits (19.65%) = 6.2% Social security (mandatory); 1.45% Medicare; 4% Health insurance (optional); 4% Group life insurance (optional); 4% 401K DC Retirement contribution</i>			
Travel	\$7,520		\$7,520
<i>R/T plane tickets to Rota for project coordinator and manager/director (4 trips x 2 people x \$300/ticket) = \$2,400.00; Per diem (4 trips x 4 days x 2 people @ \$125/day) = \$4,000.00; Car rental (4 trips x 4 days @ \$70/day) = \$1,120.00</i>			
Supplies	\$20,740		\$20,740
<i>Fuel for planting, road repair and field agents = \$5,000.00 (Fuel); Top soil (300 x 1 cu. ft. bags @ \$9/ea) = \$2,700.00 (Supplies – Ops); Peat moss (20 x 3.8 cu. ft. bags @ \$30/ea) = \$600.00 (Supplies – Ops); Bahia (<i>Paspalum notatum</i>) grass seed (50 lbs) = \$500.00 (Supplies – Ops); Fertilizer tablets (120 boxes @ \$70/ea) = \$8,400.00 (Supplies – Ops); Deepot planting cells and trays (5,000 @ \$0.50/ea) = \$2,500.00 (Supplies – Ops); Plant carrying bags (3 @ \$80/ea) = \$240.00 (Supplies – Ops); Miscellaneous supplies (ice, gloves, spray paint, shovels, etc.) = \$800.00 (Supplies – Ops)</i>			
Contractual	\$47,790		\$47,790
<i>Contract with local NGO or business to hire and provide transport/food allowances for volunteers and other costs associated with implementation of the Talakhaya CAP</i> <ul style="list-style-type: none"> <li>• <i>Seasonal field agent stipends (2 agents x 24 hrs/week x 20 weeks @ \$7.35/hr) = \$7,056.00</i></li> <li>• <i>Nursery assistant stipends (2 assistants x 30 hrs/week x 10 weeks @ \$5/hr) = \$3,000.00</i></li> <li>• <i>Planting volunteer stipends (20 volunteers x 30 hrs/week x 10 weeks @ \$5/hr) = \$30,000.00</i></li> <li>• <i>Planting festival outreach materials and supplies = \$1,500.00</i></li> <li>• <i>Administrative costs for contractor (15%) = \$6,233.40</i></li> </ul>			
Other	\$3,250	\$36,500	\$3,250
<i>Shipping fees for delivering supplies to Rota (250 lbs @ \$1/lb) = \$250.00 (Freight/Handling); Vehicle repair and maintenance for revegetation transport vehicles (\$1,000.00 x 3 vehicles) = \$3,000.00 (Repair and Maintenance) / <b>MATCHING in form of Rota Forestry vehicle use and other in kind project contributions</b></i>			
<b>TOTALS</b>	<b>\$96,611</b>	<b>\$65,600</b>	<b>\$162,211</b>

## Appendix V: Letter of Support from DLNR Resident Director David Calvo

July 17, 2015

Dear Kaitlin:

Hafa Adai from Rota:

Thank you for the opportunity to provide us a copy of the draft of the updated Talakhaya/Sabana Conservation Action Plan (CAP) to comment on.

After reviewing this draft, we notice some typo errors on the second page of the draft. You may want to take a closer look since this is the signatory page of the (CAP). Also since the last two pages of the draft is where we deleted some of the goals and objectives during our meeting in April of this year, due to financial restrictions or of no significant values, there may be others in this plan that we may not be able to meet target dates for many factors. We just have to take it year to year to see what is achievable and perhaps in a few years, we may want to revisit and evaluate this plan.

The Forestry Section within the Department of Lands and Natural Resource here have done an outstanding job in the revegetation efforts of the Talakhaya over the years. We know that with the leadership of Mr. James Manglona and the rest of the DLNR staff, we can continue to make progress. This off course will depend on the continuous financial support by the Coral Reef Initiative grant for the paid volunteers and fire patrol guards funded by NOAA for this worthy project.

On page six of the draft, the village of Sinapalo has more residents now than Songsong village as proven by the (SEM-Pasifika) survey done by the Rota team on Rota from July 14 to 20, 2014.

With the assistance of all stakeholders, we know that we can accomplish most of our goals and objectives outlined in this plan. The stream flow monitoring being done by our good partners from UOG is on hold for now pending funding availability.

We also would like to request for grant funding amount and cost breakdown from this grant for this specific project. This will assist us in planning ahead with assistance from DLNR.

Once again, thank you for this opportunity to comment on this draft. We all look forward for our continuous and harmonious working relationship with this endeavor.

Sincerely;



David M. Calvo  
DLNR, Res. Dir.

## Appendix VI: Eliminated Objectives and Strategic Actions from 2012

The following objectives and strategic actions from the 2012 CAP were eliminated from the 2015 update for reasons explained in *italics* below.

- Strategic Action A3c: Explore the purchasing of equipment and training of staff or stakeholders to meet mulching recommendations laid out in the NRCS soil conservation plan.
  - *Mulching is not recommended because the benefit will not be worth the expense of initiating this project.*
- Objective B1: By 2013, produce an engineering design plan that if implemented would reduce soil erosion by an estimated 25% in the Talakhaya watershed.
  - *Too vague. Engineering designs are not thought to be needed in the bare and forested areas, only on road surfaces.*
- Objective B2: By 2015 have begun the process to install engineering alternatives outlined in the engineering design
  - *See above. Engineering design plan is no longer thought to be needed.*
- Objective B3: By 2015, have installed 1000ft of firebreak into the highly eroding areas of Talakhaya (in accordance with NRCS Soil Conservation Plan).
  - *Firebreaks are no longer desired because they are not likely to be worth the cost and effort of installation.*
- B3a: Evaluate locations where firebreaks could be used.
  - *See above. Firebreaks are no longer desired because they are not likely to be worth the cost and effort of installation.*
- B3b: Begin installing firebreaks in recommended locations.
  - *See above. Firebreaks are no longer desired because they are not likely to be worth the cost and effort of installation.*
- B1b: Conduct field survey of on the ground data. (to be done by NRCS or contracted firm)
  - *Too vague.*
- B1d: Evaluate sediment basins. (to be done by NRCS or contracted firm)
  - *Sediment basins are no longer desired because they are not likely to be worth the cost and effort of construction due to materials and land costs and space requirements. There is not enough space in the lower watershed to catch sediment.*
- B1e: Evaluate hillside ditches. (to be done by NRCS or contracted firm)
  - *Hillside ditches are not likely to be worth the cost of installation due to their relatively minor contribution to stopping sediment and the lack of ideal locations for such a practice.*
- B2b: Prioritize engineering actions based on available manpower and materials against effectiveness for reducing erosion in the watershed
  - *Engineering design plan is no longer a priority and cost effectiveness will always be taken into account for projects.*
- B2c: Begin installing high priority alternatives as soon as possible.
  - *Not specific. "Alternatives" not identified.*

- Objective C1: By 2013, have assessed the attitudes, behaviors, and knowledge of the Rota population regarding identified resources and intentionally set fires.
  - *Completed in 2012 and 2014. No longer a priority due to reduction in fires and existence of socioeconomic survey data.*
- C1a: Develop and test a survey that will allow managers to better understand the attitudes, behaviors and knowledge of the Rota community regarding environmental issues.
  - *Completed in 2012 and 2014.*
- C1b: Recruit and train 10 enumerators from the Rota community to conduct the survey.
  - *Completed in 2012.*
- C1c: Conduct survey with a statistically representative sample of the Rota population and analyze data gathered.
  - *Completed in 2012 and 2014.*
- C1d: Create final report detailing recommendations for moving forward with outreach campaigns in the Rota community.
  - *Completed in 2012, 2014 and 2015.*
- C1e: Present results to resource managers and the Rota community.
  - *Completed in 2015.*
- Objective C3: By 2014, increase public awareness of Rota community to natural resources use and importance by 35% (or as recommended from knowledge survey).
  - *General "awareness of natural resources" is no longer a priority. More specific environmental knowledge (e.g. about illegal burning, erosion) is desired instead.*
- Objective D2: By 2014, construct a surveillance tower and procure adequate equipment for surveillance agents (equipment to include ATV, cameras, binoculars, etc).
  - *No longer a priority. Tower surveillance would be expensive and less effective than ground surveillance on the access roads as is currently being done.*
- D2a: Conduct needs assessment for necessary equipment.
  - *Associated with Obj. D2 above, no longer a priority.*
- D2b: Assess possible locations for surveillance tower and choose most advantageous.
  - *Associated with Obj. D2 above, no longer a priority.*
- D2c: Contract construction work and procure equipment.
  - *Associated with Obj. D2 above, no longer a priority.*
- D2d: Establish stringent maintenance and inventory systems to ensure maximum life of equipment.
  - *Associated with Obj. D2 above, no longer a priority.*
- Objective E3: By 2015, have conducted a community survey to assess attitudes and motivations toward developing a locally managed marine area within the project area. [Could be coupled with objective C1].
  - *Establishment of a locally-managed marine area is thought to be outside the scope of this Conservation Plan and the Talakhaya area may not be an ideal site location for this.*
- E3a: Develop and test a survey that will allow managers to better understand the attitudes and motivations of the Rota community regarding a possible LMMA.
  - *Related to Objective E3 above, no longer a priority.*

- E3b: Recruit and train 5 enumerators from the Rota community to conduct the survey.
  - *Related to Objective E3 above, no longer a priority.*
- E3c: Conduct survey and analyze data gathered.
  - *Related to Objective E3 above, no longer a priority.*
- Objective D3: By 2015, have one full time agent (logging 40hrs week in surveillance and support of the project goals) on staff.
  - *No longer an individual priority, but may resurface during the enforcement discussions and MOA to be established between DLNR and other enforcement agencies. Funding must be identified for additional staff.*
- D3a: Recruit and interview candidates from the Rota community for the position.
  - *Related to Objective D3 above, no longer a priority.*
- D3b: Train hired agent on necessary skills for position, including surveillance techniques, scene reporting, basic science behind the project, nursery care, planting techniques, etc.
  - *Related to Objective D3 above, no longer a priority.*

## **Appendix VII: Rota Creel Project Plan**

*This document will be included in the final print of CAP.*