Commonwealth of the Northern Mariana Islands
FOREST ACTION PLAN
2020 – 2030

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PACIFIC COASTAL RESOURCE PLANNING

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List of Acronyms

AAC	Agricultural Advisory Committee
AMP	American Memorial Park
APC	Area of Particular Concern
BECQ	Bureau of Environmental and Coastal Quality
BTS	brown tree snake
CAP	Conservation Action Plan
CFAA	Cooperative Forestry Assistance Act
CFHP	Cooperative Forest Health Program
CNMI	Commonwealth of the Northern Mariana Islands
CRB	coconut rhinoceros beetle
CRCP	Coral Reef Conservation Program
CWPP	community wildfire protection plan
DCCA	Department of Community and Cultural Affairs
DCRM	BECQ Division of Coastal Resources Management
DEQ	BECQ Division of Environmental Quality
DFEMS	Department of Fire and Emergency Medical Services
DFW	DLNR Division of Fish & Wildlife
DLNR	Department of Lands and Natural Resources
DOA	DLNR Division of Agriculture
DPL	Department of Public Lands
EEZ	exclusive economic zone
FAP	Forest Action Plan
FDM	No'os / Farallon de Medinilla
FDP	Uracas / Farallon de Pajaros
FIA	Forest Inventory & Analysis
FLEP	Forest Land Enhancement Program
FSP	Forestry Stewardship Program
HPO	Historic Preservation Office
ISC	Invasive Species Councils
ISSAP	Invasive Species Strategy and Action Plan
LSR	Landscape Restoration
MC	Micronesia Challenge
MINA	Mariana Islands Nature Alliance
MOS	Office of the Mayor of Saipan
MPA	Marine Protected Area
NIPF	non-industrial private forest
NMC-A&NR	Northern Marianas College -Aquaculture & Natural Resources
NMC-CREES	Northern Marianas College-Cooperative Research, Extension, & Education Service
NOAA	National Oceanic and Atmospheric Administration
NOAA-OCM	NOAA-Office for Coastal Management
NPS	National Park Service
NRCA	National Resource Condition Assessment
NRCS	Natural Resource Conservation Service
OPD	Office of Planning and Development
PIRCA	Pacific Islands Regional Climate Assessment
RSIC	Regional Invasive Species Committee
SWARS	Statewide Assessment and Resource Strategy
SWG	State and Tribal Wildlife Grants

TNC   The Nature Conservancy
UCF   Urban and Community Forestry
USFS   US Forest Service
USFWS   US Fish and Wildlife Service
USGS   US Geological Survey
WMP   Watershed Management Plans
WUI   Wildland Urban Interface

1. Introduction

This document represents the Statewide Forest Resource Assessment and Strategy, now known as the Forest Action Plan (FAP) for the Commonwealth of the Northern Mariana Islands (CNMI). The CNMI FAP is an analysis of forest resource conditions and trends, threats and opportunities, and a prioritization of strategies for forest resource management. State FAPs are required under the 2008 Farm Bill in order for states and territories to be eligible for funding under the Cooperative Forestry Assistance Act (CFAA), and must be updated at least every ten years. The CNMI completed the first of these plans in 2010, then referred to as the CNMI Statewide Assessment and Resource Strategy (SWARs). Future five-year reviews are conducted within the ten-year comprehensive assessment.

State Forest Action Plans offer a practical and comprehensive roadmap for investing federal, state, local, and private resources where they can be most effective in achieving three national conservation goals as defined by the US Forest Service (Figure 1).

NATIONAL THEMES AND OBJECTIVES

1. Conserve Working Forest Landscapes
   1.1. Identify and conserve high priority forest ecosystems and landscapes
   1.2. Actively and sustainably manage forests

2. Protect Forests from Harm
   2.1. Restore fire-adapted lands and reduce risk of wildfire impacts
   2.2. Identify, manage, and reduce threats to forest and ecosystem health

3. Enhance Public Benefits from Trees and Forests
   3.1. Protect and enhance water quality and quantity
   3.2. Improve air quality and conserve energy
   3.3. Assist communities in planning for and reducing wildfire risks
   3.4. Maintain and enhance the economic benefits and values of trees and forests
   3.5. Protect, conserve, and enhance wildlife and fish habitat
   3.6. Connect people to trees and forests, and engage them in environmental stewardship activities
   3.7. Manage and restore trees and forests to mitigate and adapt to global climate change

Figure 1: National themes and objectives as defined by the US Forest Service.

The CNMI FAP is organized into two primary sections:

- The **CNMI Forest Resource Assessment** contains an assessment of the current state and trends of forest resources in the CNMI, a synopsis of other relevant plans in the CNMI, an

analysis of current and future threats to these forest resources, and the identification of priority forest areas or landscapes.

- The **CNMI Forest Resource Strategy** identifies and prioritizes strategies that can be undertaken by CNMI Forestry that will address some of the threats and priorities that were identified under the assessment.

The process of developing the CNMI State FAP is by design a collaborative effort with heavy reliance on the input and involvement of the councils, agencies, and private entities that manage or have interest in protecting the CNMI's natural resources, specifically the stakeholders who are a part of the State Forestry Stewardship Coordinating Committee – formerly known in the CNMI as the CNMI Forestry Advisory Council. At the time of the development of this Forest Action Plan, the CNMI Forestry Advisory Council had not assembled in several years. CNMI Forestry instead engaged stakeholders through the Planning and Development Advisory Committee's Natural Resources Task Force, under the Office of Planning and Development (OPD), as well as with other key private partners and local agencies such as the CNMI Department of Fire and Emergency Medical Services (DFEMS). All of these stakeholders were heavily involved in the identification of priorities and the development of strategies for this FAP. As such, a third section of this document is devoted to a discussion of stakeholder groups that were coordinated with in support of the development of this document and the methodology employed.

Background and Setting

The Commonwealth of the Northern Mariana Islands is a commonwealth of the United States that comprises the fourteen northern islands of the Mariana Archipelago, located in the Western Pacific. These islands range in size from the smallest island of No'os / Farallon de Medinilla (FDM) at less than 1 km^2 to the largest island of Saipan with a land area of 119 km^2. The islands of the CNMI can be divided into two geologic groups: the southern islands of No'os/FDM, Saipan, Tinian, Aguigan, and Rota comprise the older and larger islands that were formed approximately 15-30 million years ago; and the younger northern islands (Anatahan, Sarigan, Guguan, Alamagan, Pagan, Agrigan, Asuncion, Maug, and Uracas / Farallon de Pajaros (FDP)) which were formed 0-5 million years ago. All of the islands are volcanic in origin, however only the northern islands remain active, with the most recent major eruptions occurring at Uracas in 1967, Pagan in 1981, and Anatahan in 2003.

Forested acres in the CNMI

62,992

The climate of the CNMI is tropical, with a mean annual temperature of 28.3ºC (83ºF) and mean annual rainfall of 213 cm (84 in) (Starmer et al. 2008). The wet season generally occurs between July and November, with the dry season occurring between December and June. The CNMI lies in "typhoon alley", dubbed the busiest location for tropical cyclones on earth with 41 super typhoons being recorded in the region between 2000 and 2014. An average of three tropical cyclones have passed within 300 nm of Saipan each year since 1970 (Lander 2004), including an uptick of activity in recent years. In the years since the 2010 SWARs, Typhoon Soudelor (Category 4, 2015), Typhoon Mangkhut (Category 4, 2018), and Super Typhoon Yutu (Category 5+, 2018) each caused millions of dollars in damage and severely damaged forest resources on the islands of Saipan, Tinian, and Rota.

The CNMI is divided into four municipalities: Rota, Tinian (including Aguigan), Saipan, and the Northern Islands which comprises the northern nine islands (No'os / FDM to Uracas / FDP). CNMI's population of 53,833 people (2010 Census) is concentrated on the southern islands of Saipan, Tinian, and Rota, with the vast majority (approximately 90%) of people and most of the CNMI's economic activity occurring on Saipan. A small population of people live seasonally on the northern islands of Agrigan, Pagan, and Alamagan, and there are plans within the CNMI government for resettlement of the island of Pagan following the evacuation of the island's population during the volcanic activity of the 1980s.

Approximately 75% of all forests in the CNMI are found on the larger, populated, southern islands (Table 1).

Table 1: Forest area by CNMI island, as calculated by Liske-Clarke 2015 from NOAA Coastal Change Analysis Program data (NOAA 2009a-n).

Island	Hectares	Acres	% of CNMI Total
Rota	5,180.4	12,801.2	20.32
Aguigan	404.6	999.8	1.59
Tinian	6,780.8	16,755.9	26.60
Saipan	7,265.9	17.954.9	28.50
No'os (FDM)	7.9	19.5	0.03
Anatahan	272.0	672.2	1.07
Sarigan	168.9	417.4	0.66
Guguan	170.3	420.7	0.67
Alamagan	484.7	1.197.6	1.90
Pagan	2,052.7	5,072.4	8.05
Agrigan	2,336.2	5,773.0	9.16
Asuncion	319.5	789.6	1.25
Maug	47.9	118.3	0.19
Uracas (FDP)	0.0	0.0	0.00
TOTAL	**25,491.7**	**62,992.4**	**100.00**

The scope of this document encompasses the entire archipelago, but the analysis and strategies will focus primarily on the southern municipalities of Saipan, Tinian / Aguigan, and Rota due to the concentration of forest resources and population on these islands.

CNMI Forestry Program

The forest resources of the CNMI are managed by the Forestry Section under the Division of Agriculture (DOA) under the CNMI Department of Lands and Natural Resources (DLNR). Besides the main office on Saipan, the islands of Tinian and Rota each have their own Forestry Section within their Department of

Lands and Natural Resources, which is under the Office of the Mayor. The heads of the departments on these islands are appointed by the mayor on each island. Their annual budget is appropriated by the CNMI legislature. They also get federal funds through the CNMI government to support their activities, including funds from the three U.S. forestry programs. Under Public Law 1-8 (1978), DLNR is empowered "To be responsible for the protection and enhancement of the natural resources of the islands…" and "To maintain and provide for the conservation of forests." The Forestry Section is responsible for providing for the protection, management, and improvement of the forest resources of the CNMI, including those on both public and private land. The CNMI Forestry Mission Statement is as follows:

> *To promote best land management practices while sustaining a healthy diversity and productivity on our limited and fragile forest and grassland resources for present and future generations. Its mission will be carried out through conservation, protection, and the enhancement practices while keeping the islands' present landscape provisions in the process.*

CNMI Forestry is divided programmatically by issue and collaborate with DFEMS on fire:

- **Cooperative Forest Health Program:** The Cooperative Forest Health Program (CFHP) focuses on the maintenance of forest and tree health and detection and integrated pest management of invasive and detrimental species that threaten the CNMI's forests resources.
- **Forest Stewardship Program:** The principal goal of the CNMI Forestry Stewardship Program (FSP) is to aid and influence landowners to promote good land and forest stewardship practices. A goal is to influence landowner behavior in regard to land use, promoting their practice of good stewardship. FSP complements this goal by investing in practices to establish, restore, protect, manage, maintain, and enhance the health and productivity of non-industrial private forest (NIPF) habitat for flora, soil, water, and air quality, wetlands, and riparian buffers. FSP also can fund (on private or Commonwealth land): afforestation, reforestation, improvement of bad and grass land, reducing the risks and helping restore, recover, and mitigate the damage to forests caused by fire, insects, invasive species, disease, and damaging weather.
- **Urban & Community Forestry Program**: Urban and Community Forestry (UCF) is a cooperative program with the US Forest Service (USFS) and other organizations that focuses on the stewardship of urban natural resources. This program seeks to facilitate the effective management of forests and trees in an urban and community environment, including towns, villages, boulevards, parks, schools, churches, government areas, residential areas, commercial areas and historical sites.
- **Landscape Restoration Program:** Under the Landscape Restoration (LSR) program, grants are competitively secured for projects that may include FSP, UCF, Forest Health and/or Fire program work.
- **Cooperative Forest Fire Program:** DFEMS has the responsibility for preventing and suppressing fires within the Commonwealth of the Northern Mariana Islands. Through the Cooperative Fire Program, DFEMS focuses on addressing wildland fire risk through training, education and prevention, and fire suppression and control efforts. DFEMS works closely

with the CNMI Forestry in fire mitigation and restoration by promoting fire prevention through the use of live fuel breaks on targeted areas.

2. CNMI Forest Resource Assessment

History of Forest Resources in the CNMI

Native forests that once covered most of the inland areas of the islands of the Marianas have been under increasing anthropogenic pressure, beginning with Chamorro settlement of the islands about 4,000 years ago and ramping up with Spanish and German colonization and agricultural development beginning about 400 years ago. The Japanese administration of the islands in the first half of the 20th century was heavily oriented toward commercial agricultural production, with most accessible areas of the southern islands being cleared of native forest tree stand and mangroves and converted to agricultural land, primarily sugarcane. New forests of sosugi (*Acacia confusa*) were established to be harvested for fuel wood.

The invasion of Saipan and Tinian by the US military during World War II brought with it heavy artillery bombing and clearing of vegetation, causing further destruction to the little remaining native forests on the islands. A notable exception to this was Rota, which was not invaded during the war and retains a higher proportion of native forests than the other populated islands. Areas of mangrove wetland along the Saipan coast were then later used as a landfill up until 1978 (Greene et al 2019).

Following WWII and the soil disturbance and destruction of vegetation on Saipan and Tinian, the fast-growing tree *Leucaena leucocephala* (tangantangan) was further introduced and widely dispersed on the islands. This species now dominates much of the forest area of Saipan and Tinian, forming homogenous stands that shade out and compete with native vegetation.

Current Status of Forests in the CNMI

The forests and forest resources in the CNMI can be classified into seven categories as outlined in Liske-Clarke 2015:

- **Native Forests:** Due to the aforementioned widespread disturbance that has affected the forests of the CNMI, the "native forests" do not refer to areas of intact, undisturbed forests but rather areas of forests where a higher number of native species are found. Native forests are characterized by a closed canopy of tall broadleaf trees and dark, humid conditions at the forest floor. Trees may reach heights of 14 meters (45 feet), with some trees being recorded as tall as 23 meters (75 feet), and understory vegetation is dense and multilayered. Much of the CNMI's native forest can be found on Rota, with over 4,500 hectares of native forest (as cited from Donnegan et al. 2011).
- **Mixed Forest:** These forests comprise a mixture of native and nonnative species and represent forests that are recovering from disturbance such as agricultural production or WWII development or bombardment. The canopy is approximately 2-20 meters in height, and there is dense understory vegetation.
- **Tangantangan Forest:** As previously described, tangantangan is a fast-growing non-native tree species that was introduced to the Marianas and used for soil stabilization following WWII, particularly on Saipan and Tinian. These trees may reach a height of up to 10 meters with an open understory.
- **Agroforest:** This forest type comprises areas where people have planted tropical food trees. These areas are generally located near urban centers, and may either be currently tended or abandoned.

- **Developed:** This includes any urban area where trees, shrubs, and other vegetation may be present, and generally falls under the Urban & Community Forestry Program.
- **Grassland and Savanna:** These areas occur on limestone soils such as those found on the Sabana on Rota and around Mount Tapochau on Saipan. These ecosystems can be critical in erosion control but tend to be vulnerable to burns and other disturbances. CNMI Forestry plays a key role in the revegetation of these areas that have been cleared.
- **Wetlands:** Wetlands in the CNMI are limited in extent, totaling only 642 acres and occurring only on the largest islands (Liske-Clarke 2015). The largest wetlands in the CNMI are Lake Susupe on Saipan and Lake Hagoi on Tinian.

Conservation Areas in the CNMI

A large proportion of the CNMI's forestland and wildlife habitat on public lands is legally protected as "Conservation Areas"; most of these Conservation Areas are under the administration of the DLNR Division of Fish & Wildlife (DFW). The northern islands of Guguan, Asuncion, Maug, and Uracas are protected under the CNMI Constitution as wildlife conservation areas and are to be used solely for the preservation and protection of natural resources (Figure 2). The northern island of Sarigan is under management of the CNMI Department of Public Lands (DPL) but is regulated by DFW. On the southern populated islands conservation lands comprise 9% of Saipan, 4% of Tinian, and 22% of Rota, including the following Conservation Areas under DFW jurisdiction:

- Rota (Figure 3):
    - Sabana Heights
    - Wedding Cake Conservation Area
    - I'Chenchon Park Bird Sanctuary
- Saipan (*Figure 4*):
    - Bird Island Wildlife Conservation Area
    - Kagman Wildlife Conservation Area
    - Susupe Wetland (Lake Susupe)
    - Costco Park Wetland Mitigation Pond
    - Saipan Upland Mitigation Bank Area (SUMBA/Marpi Forest)
    - Mariana Islands Housing Alliance Mitigation Bank

CNMI Conservation Areas:
Northern Islands – Ascuncion, Maug, Uracas

Data Sources:
ESRI-NOAA-NGDC World Oceans Base Layer Service
ESRI World Imagery Service
United States Census Bureau
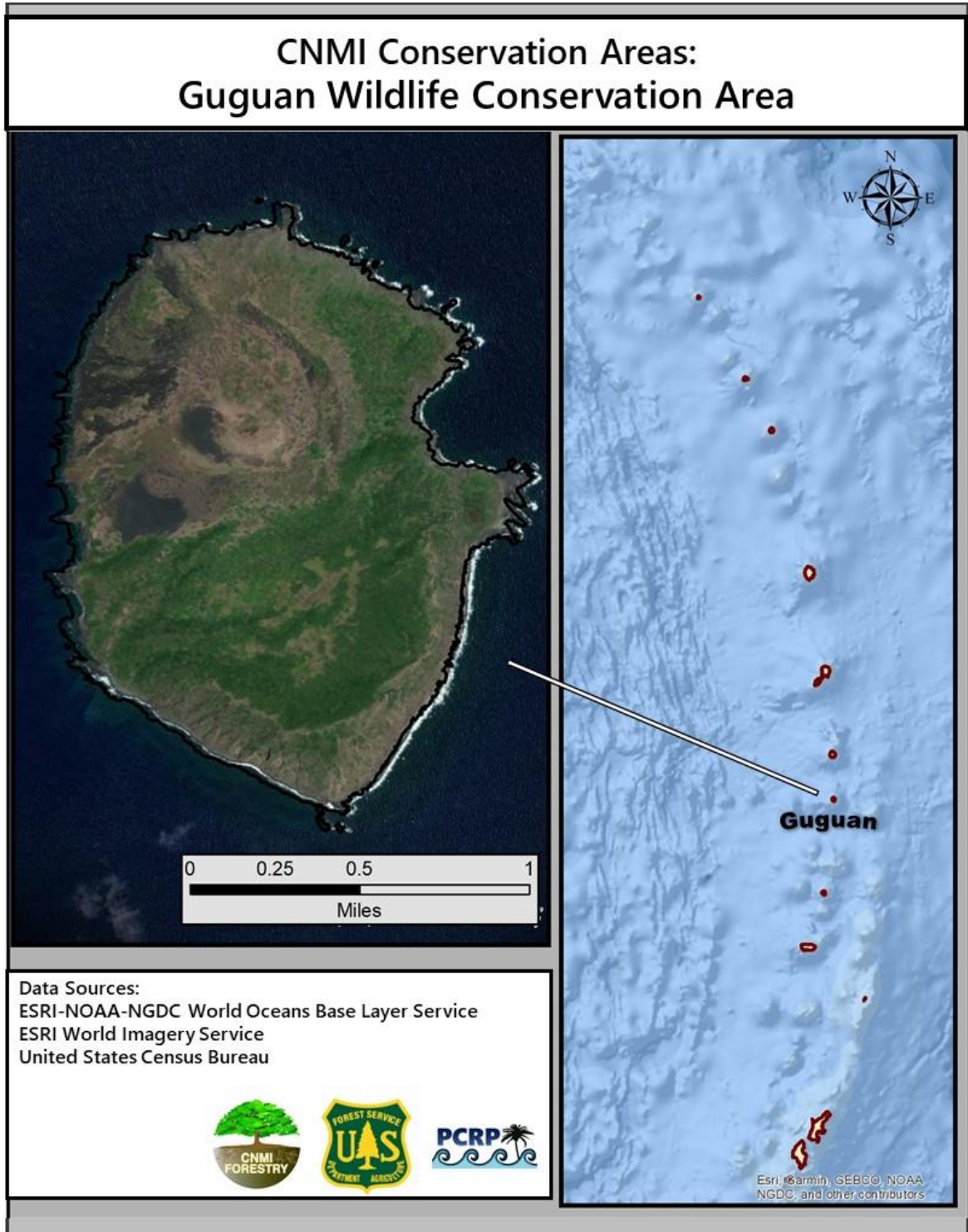
Figure 2: Conservation areas in the Northern Islands: Asuncion, Maug, Uracas, and Guguan.

CNMI Conservation Areas: Wedding Cake Mountain

Rota
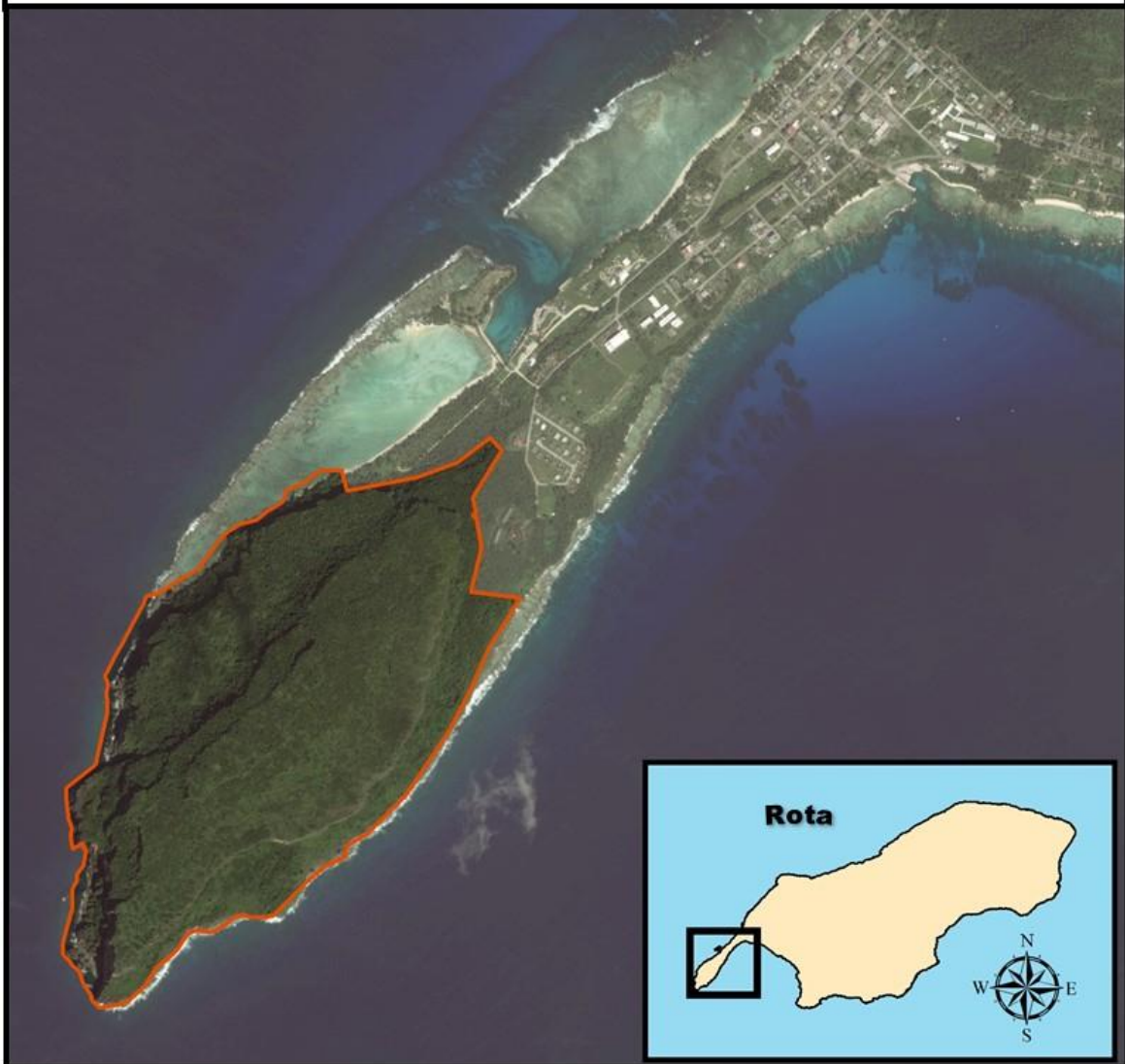
0   0.125 0.25   0.5
Miles

Wedding Cake Conservation Area

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Department of Public Lands; CNMI DLNR
United States Census Bureau

CNMI Conservation Areas: I'Chenchon Bird and Wildlife Sanctuary

Rota

0   0.25   0.5   1
Miles
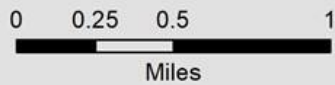
I'Chenchon Bird & Wildlife Sanctuary

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Department of Public Lands; CNMI DLNR
United States Census Bureau
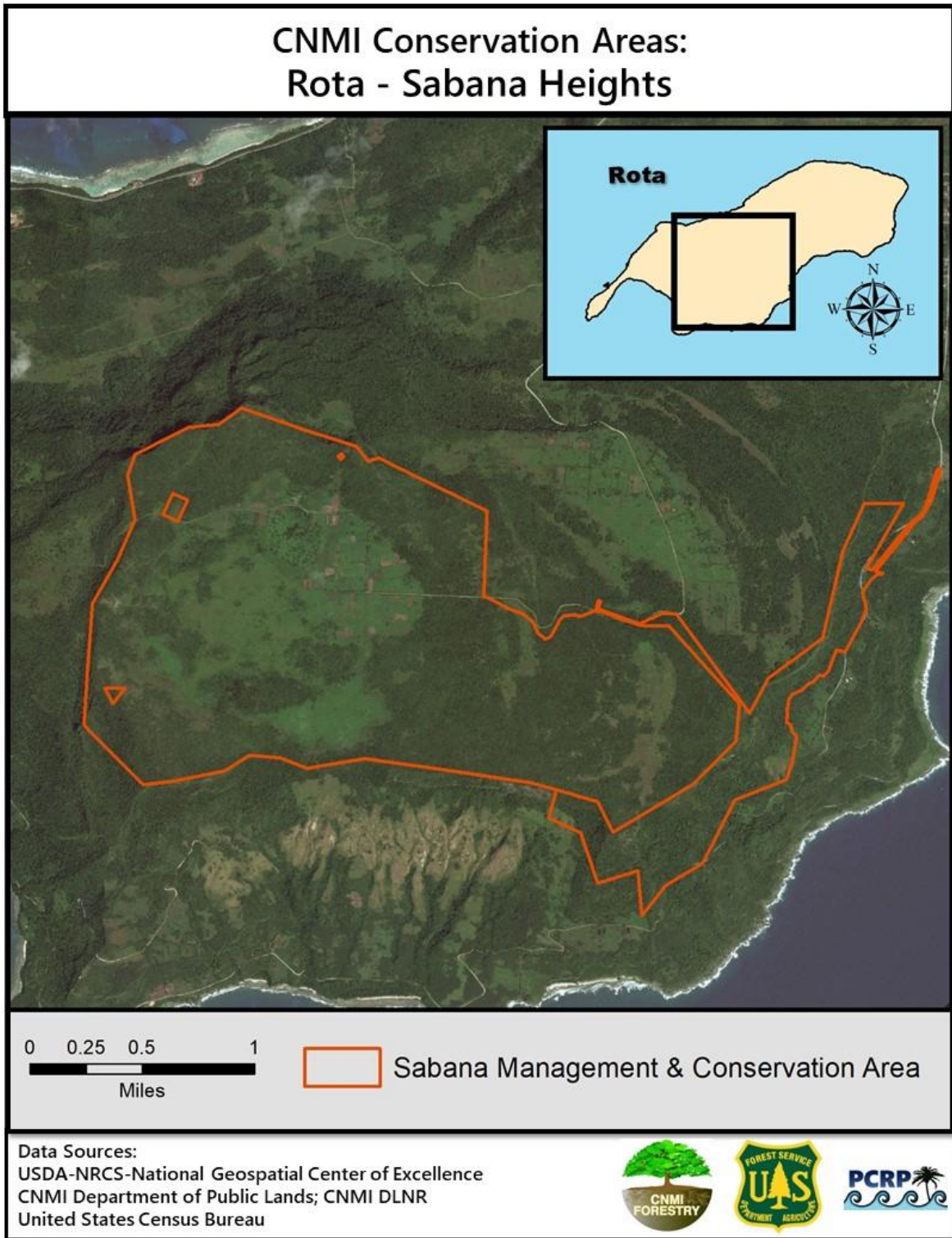
Figure 3: Conservation areas on the island of Rota.

CNMI Conservation Areas:
Bird Island Wildlife Conservation Area
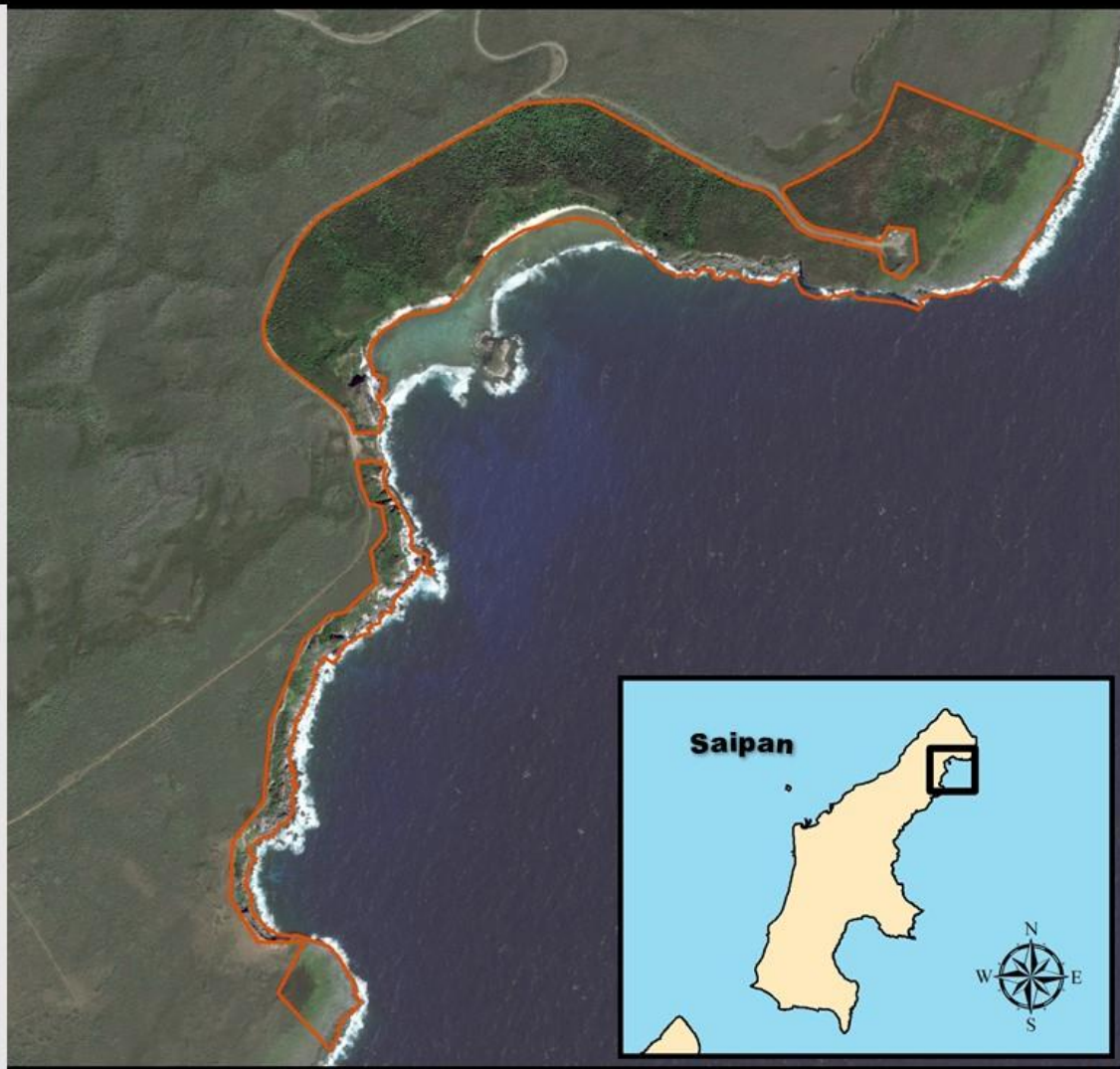
Bird Island Conservation Area

0   0.125 0.25   0.5
Miles

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Department of Public Lands
United States Census Bureau

CNMI Conservation Areas:
Costco Mitigation Wetland

Saipan

0   125   250   500
Feet
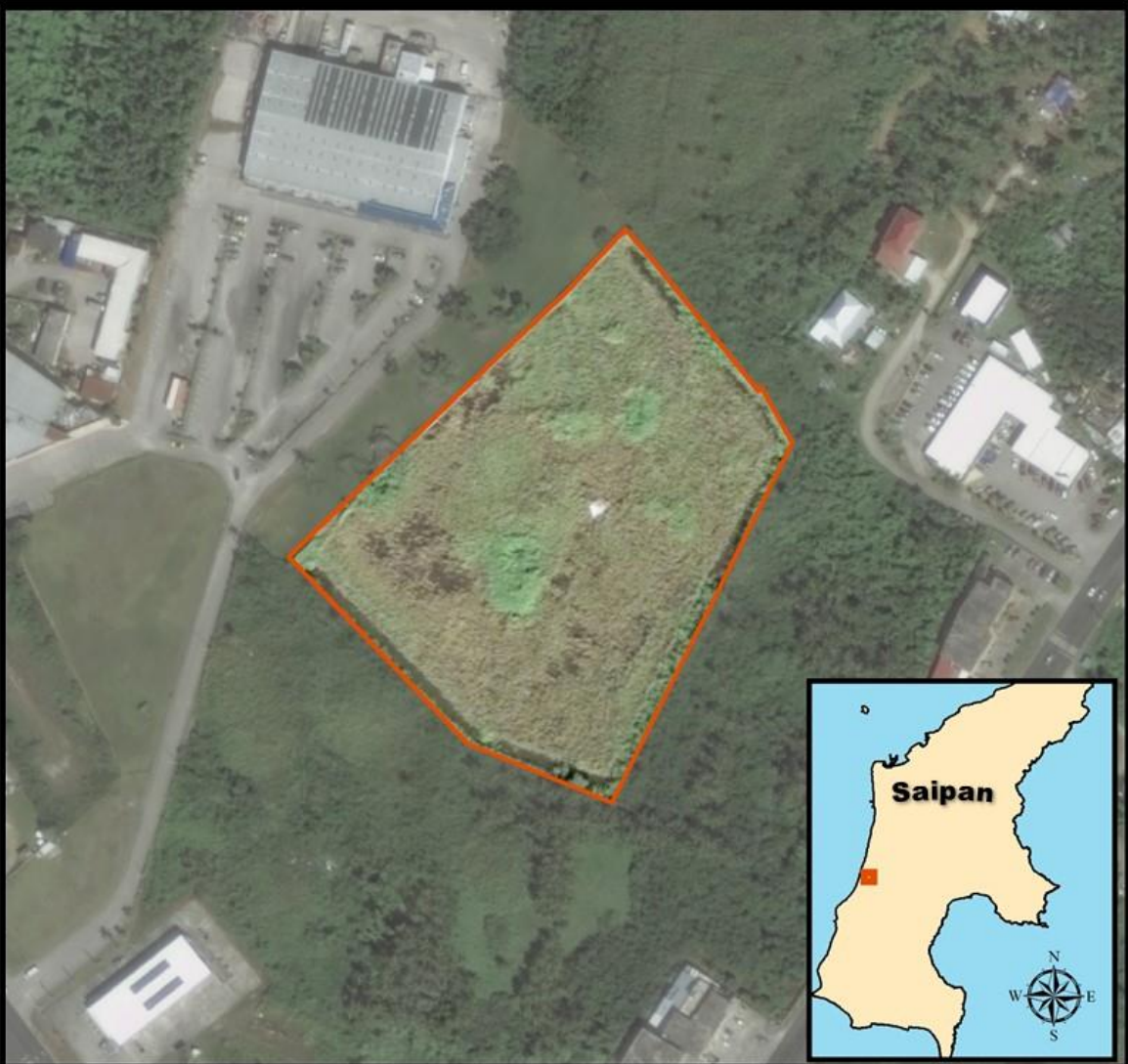
Costco Mitigation Wetland

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Department of Public Lands; CNMI DLNR
United States Census Bureau

CNMI Conservation Areas:
Kagman Wildlife Conservation Area
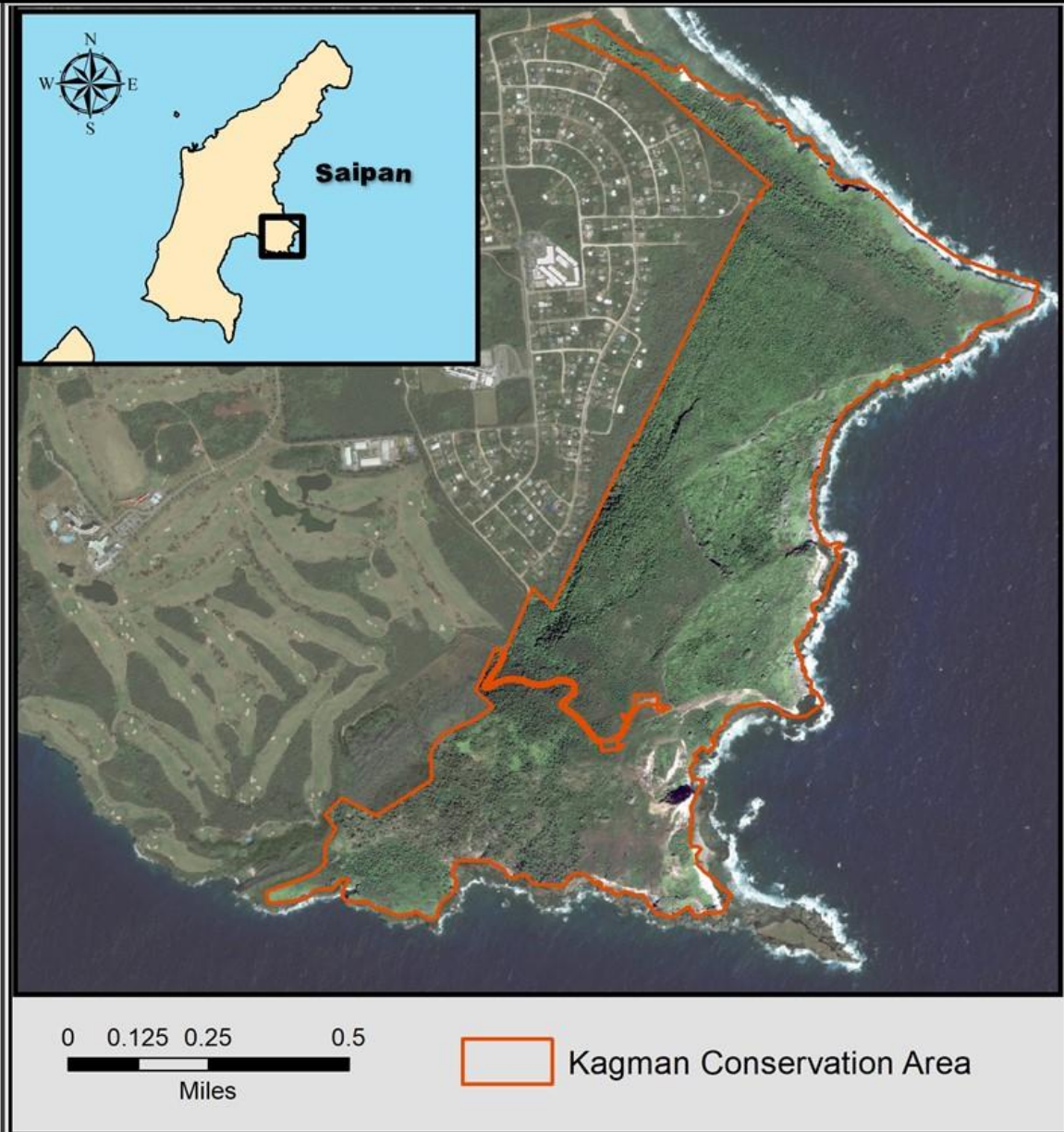
Saipan

0   0.125 0.25   0.5
Miles

☐ Kagman Conservation Area

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Department of Public Lands
United States Census Bureau

CNMI FORESTRY   FOREST SERVICE U.S. DEPARTMENT AGRICULTURE   PCRP

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CNMI Conservation Areas:
Marpi Upland Mitigation Bank

Marpi Upland Mitigation Bank

Nightingale Reed Warbler & Micronesian Megapode Survey Area

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Department of Public Lands; CNMI DLNR
United States Census Bureau
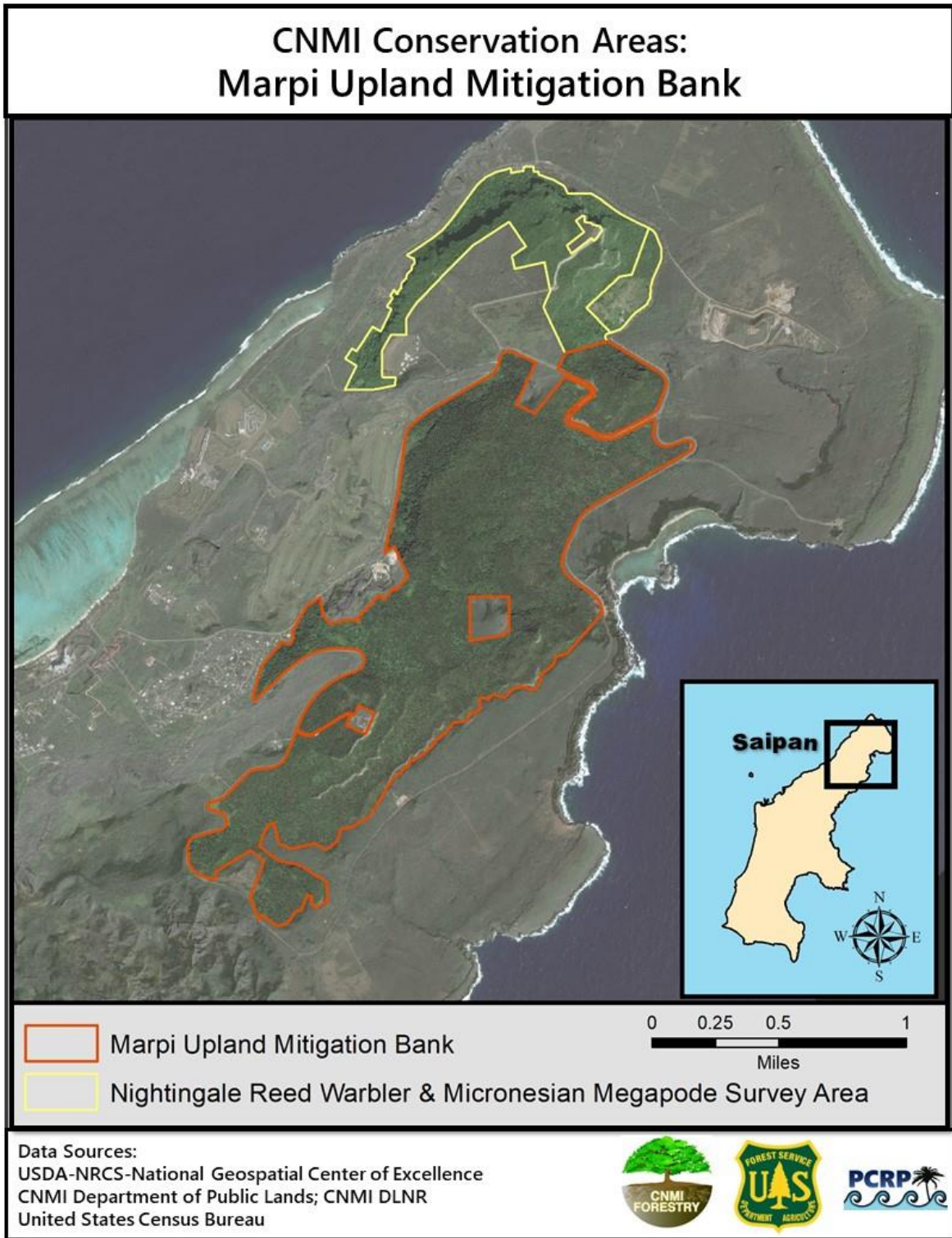
CNMI Conservation Areas:
Lake Susupe Wetland Complex
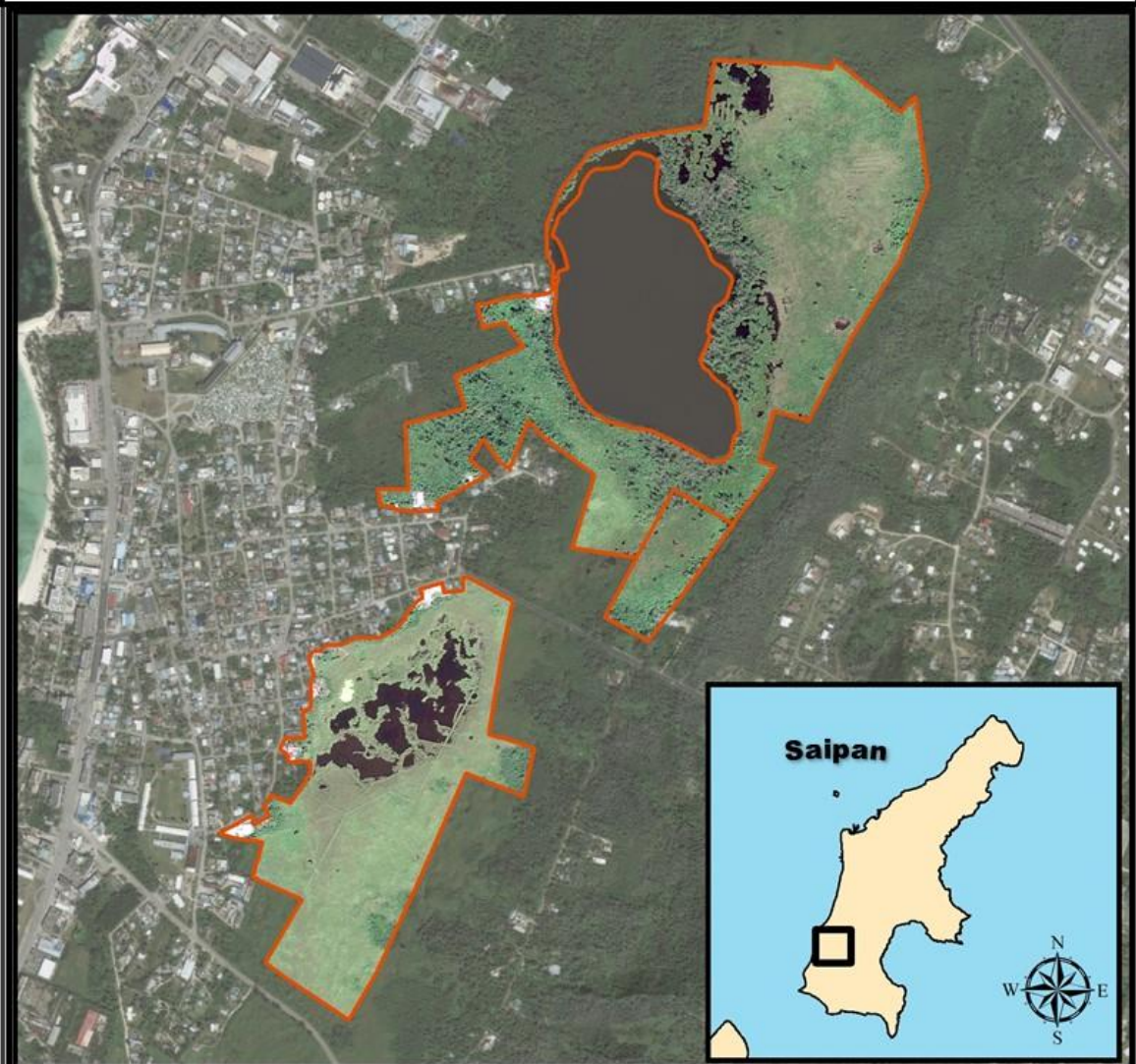
Saipan

| 0 | 0.125 | 0.25 | | 0.5 |
Miles

Susupe Wetland Complex

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Department of Public Lands
United States Census Bureau
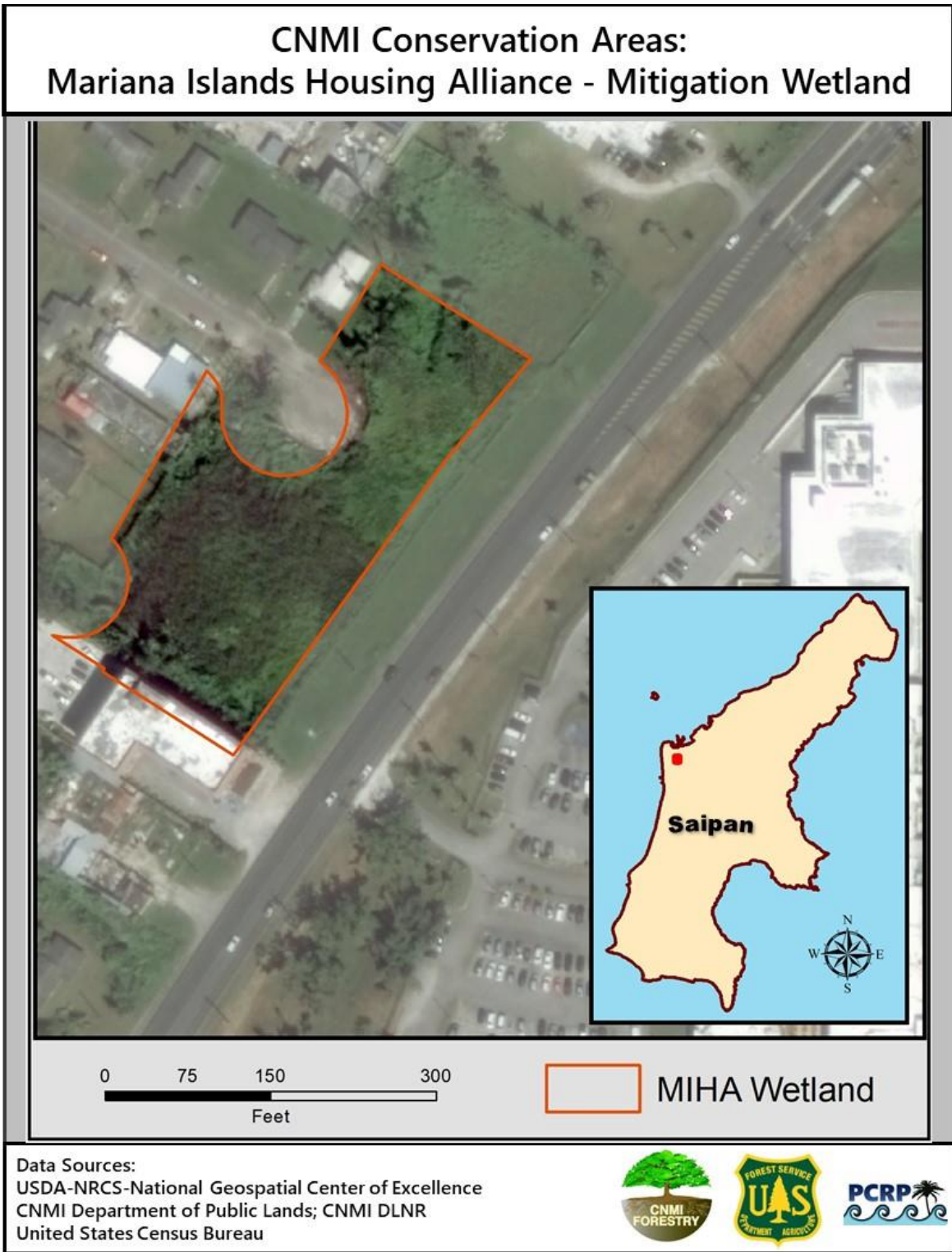
Figure 4: Conservation areas on the island of Saipan.

In addition, there are several areas on Tinian designated as priority areas that are not legally protected as Conservation Areas (Figure 5):

- Tinian
  - Carolinas Heights
  - Kastiyu
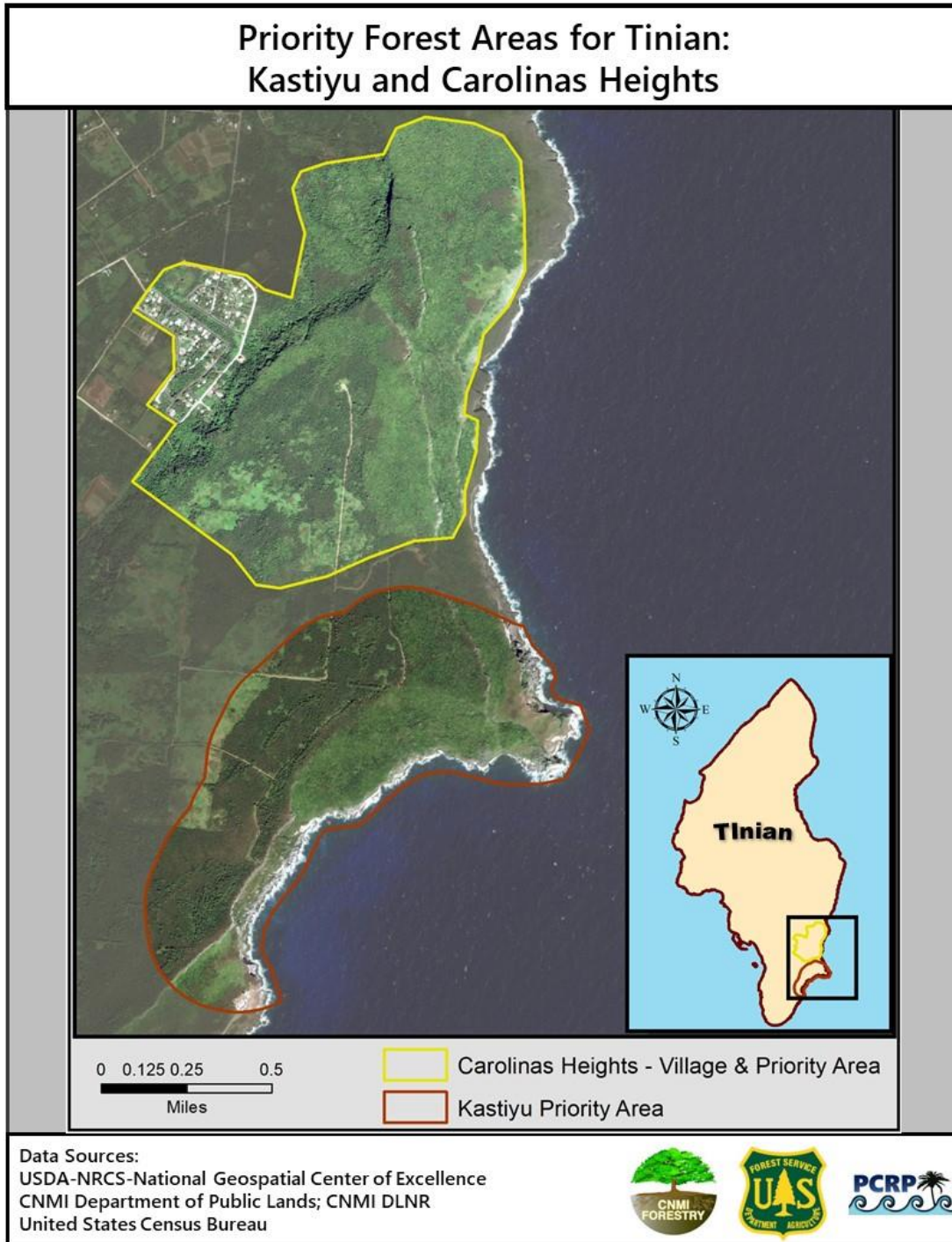
Figure 5: Priority areas on Tinian.

Forest Stewardship Areas in the CNMI

Potential Forest Stewardship Lands - Saipan

Forest Stewardship Potential

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
U.S. Forest Service
United States Census Bureau
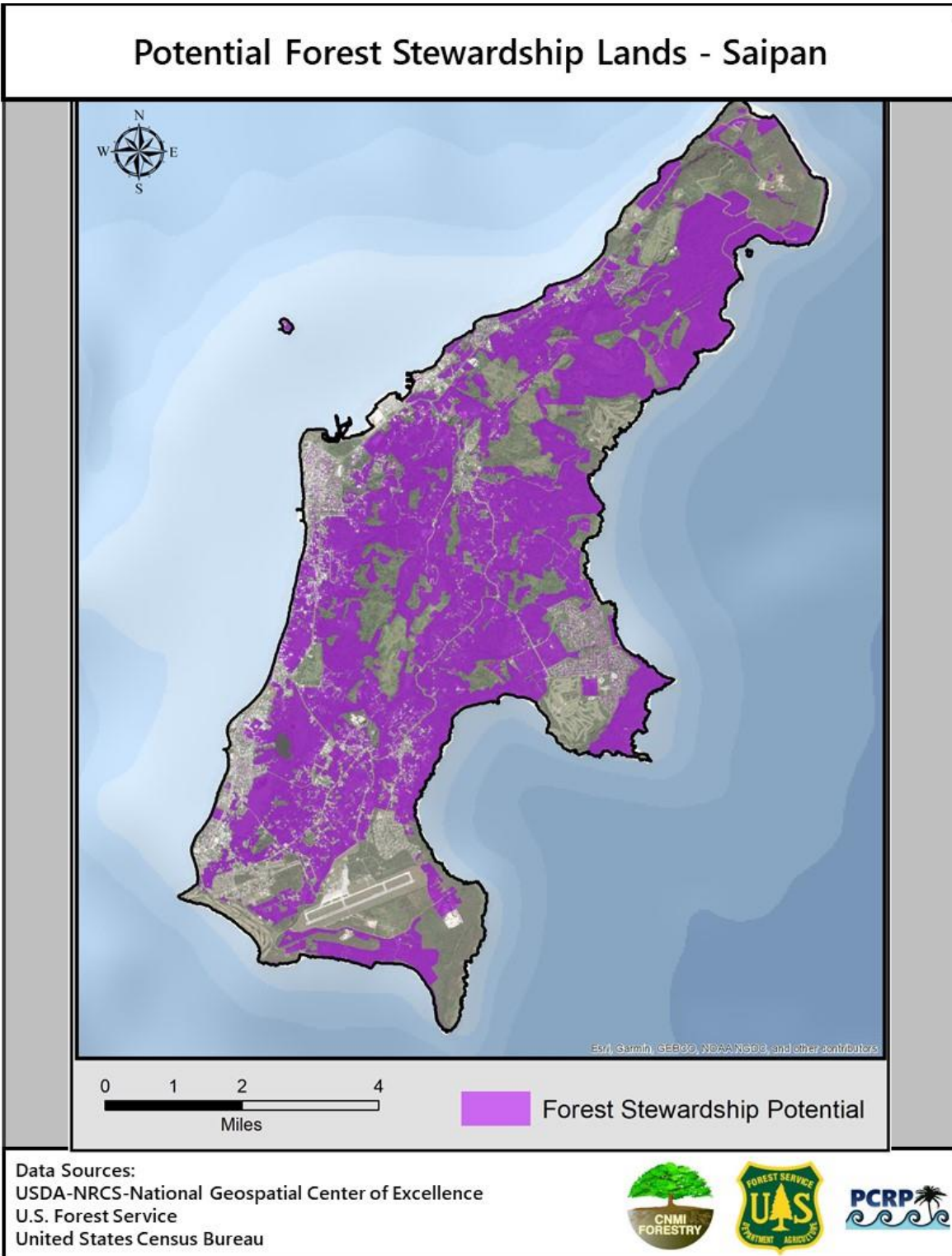
Potential Forest Stewardship Lands - Tinian
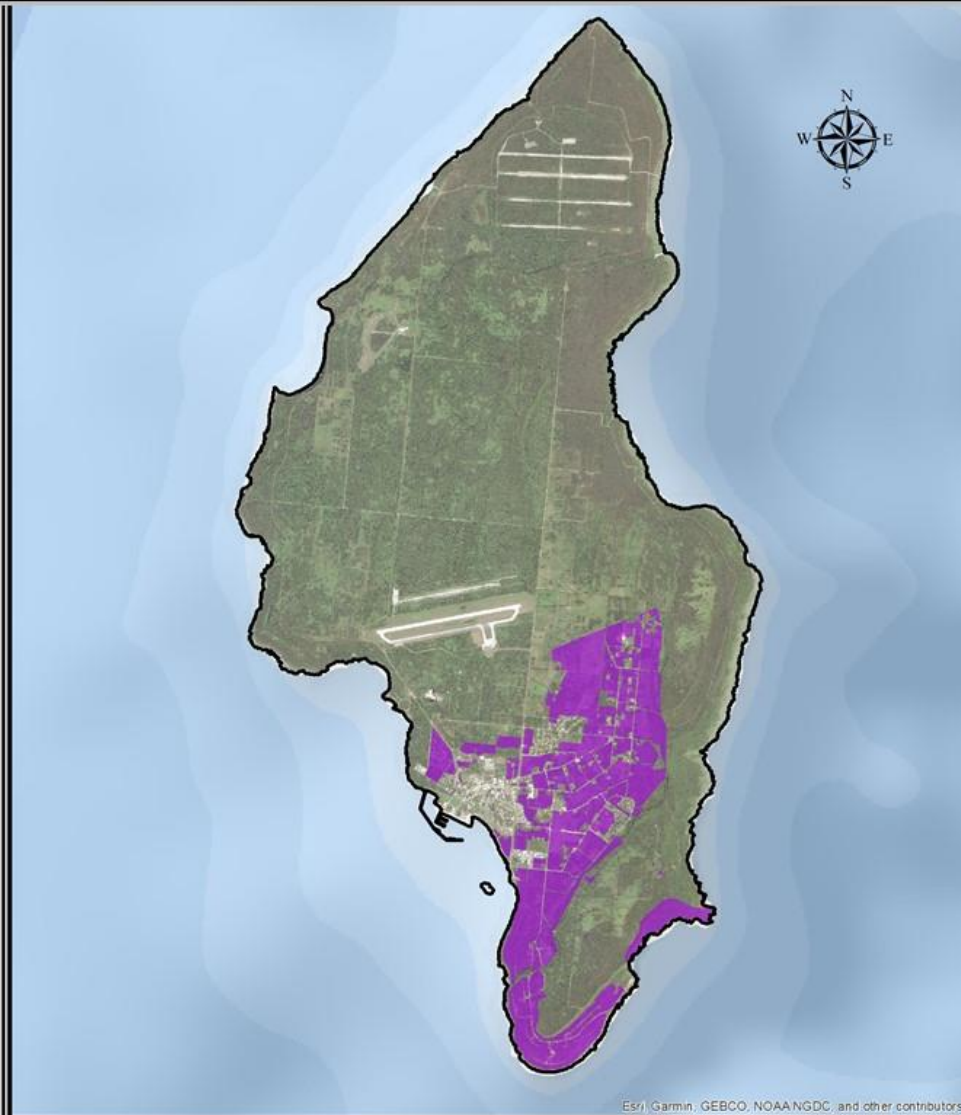
Forest Stewardship Potential

0   1   2   4
Miles

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
U.S. Forest Service
United States Census Bureau

Potential Forest Stewardship Lands – Aguijan (Goat Island)

Forest Stewardship Potential

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
U.S. Forest Service
United States Census Bureau

Potential Forest Stewardship Lands –
Pagan, Alamagan, Agrihan
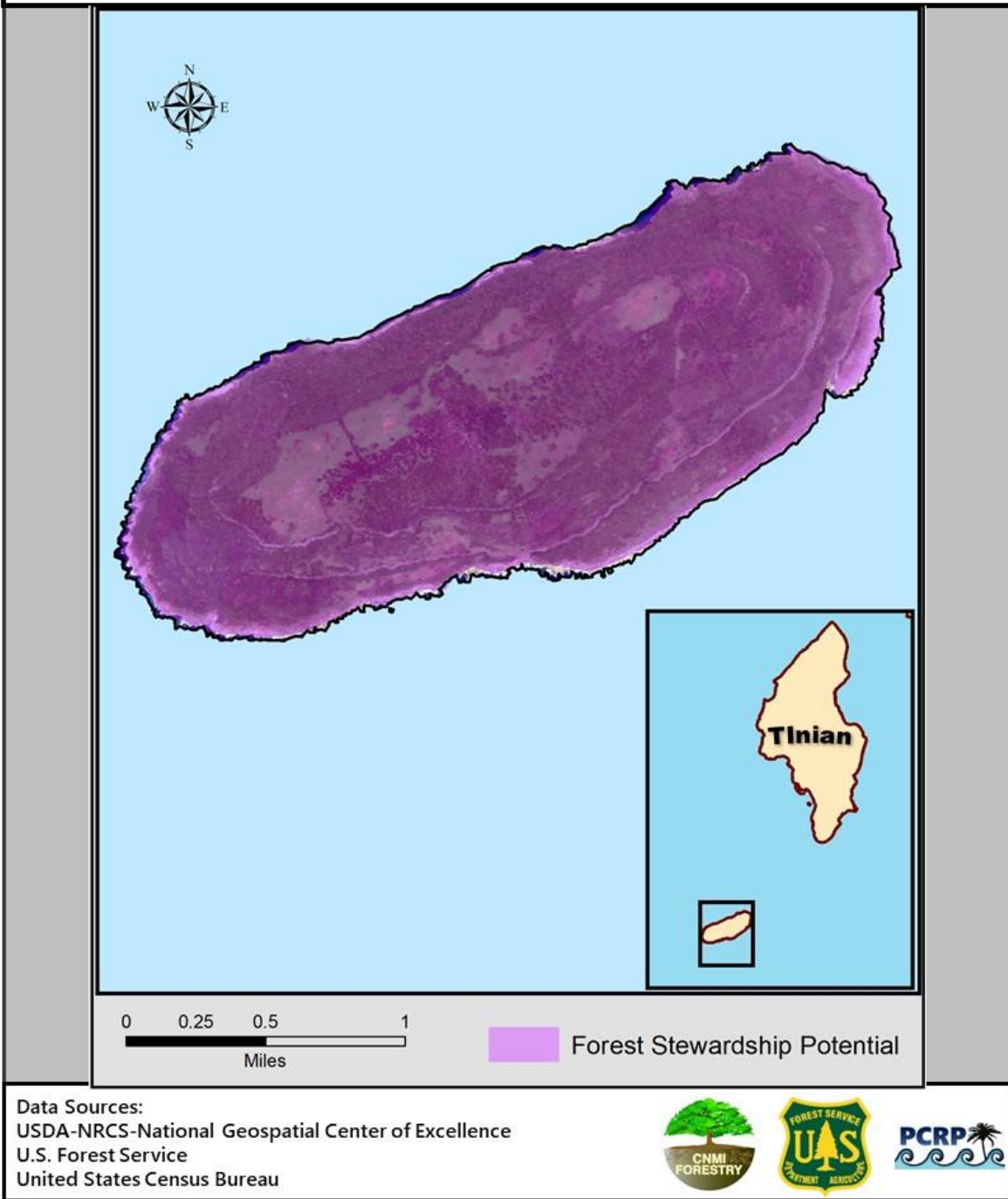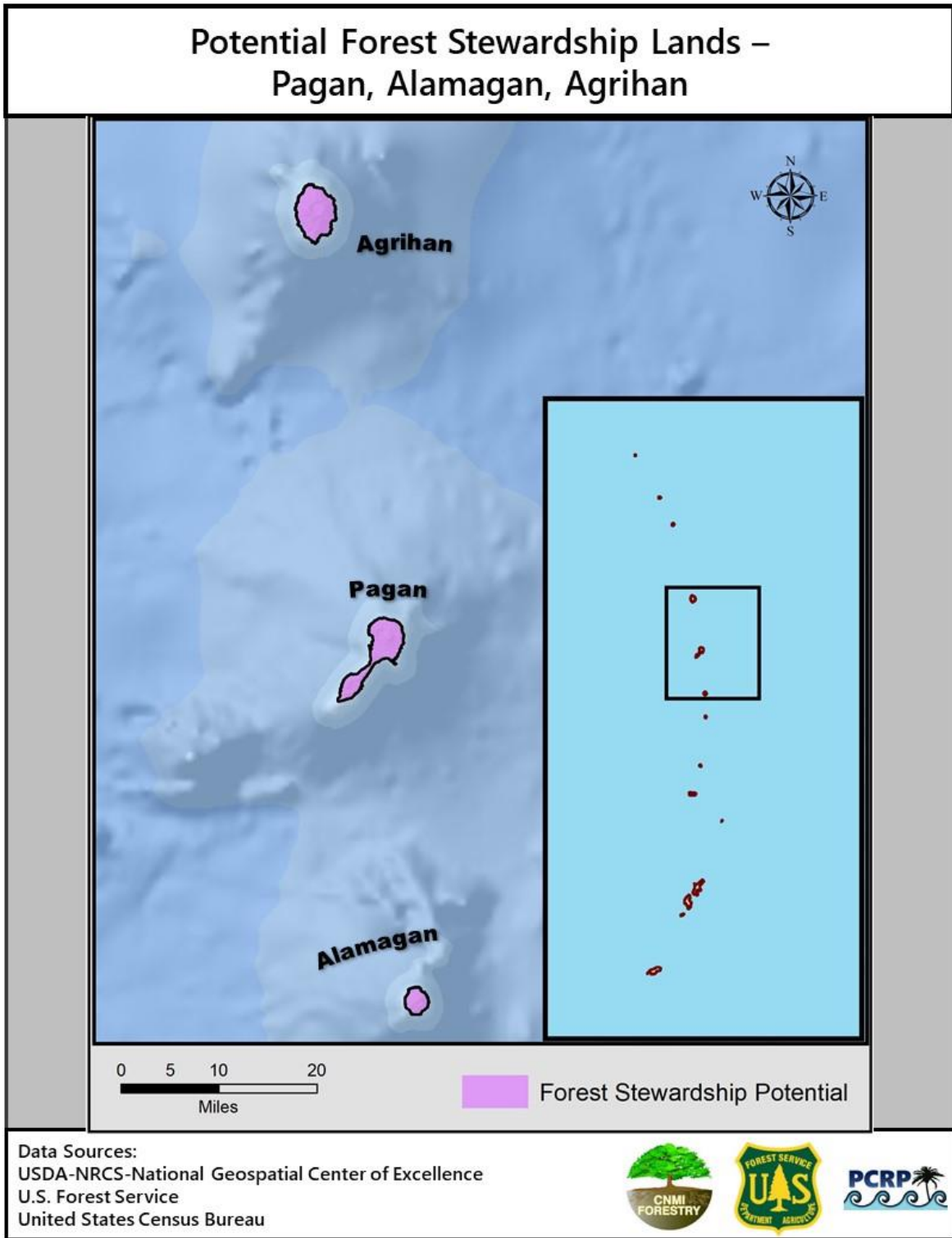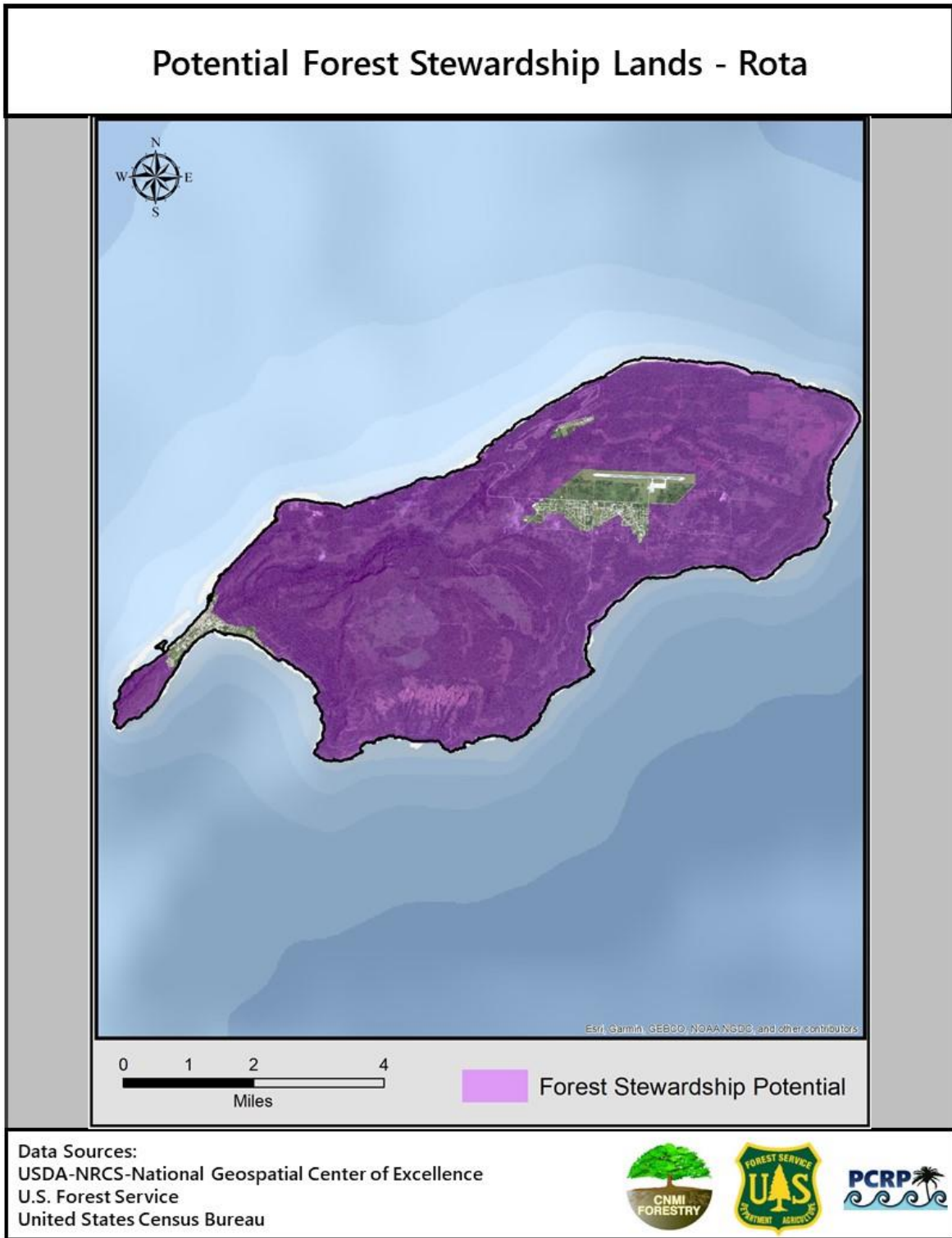
Figure 6: Forest Stewardship Areas in the CNMI.

These "Stewardship Potential" maps were prepared in October 2020 to indicate "High Stewardship Potential" lands (purple), meaning rural private lands and commonwealth lands that are forested or have potential to be forested. Federal, federally leased, and urban lands, and water, are not eligible for the

Forest Stewardship program and are shown as "Non-Stewardship Potential." Besides guiding program implementation, these maps are used in the national Forest Stewardship accomplishments system, and are variously called "Stewardship Priority Areas," "Important Forest Resource Areas," or "Forest Stewardship Federal/State Investment Areas." They will be updated when local priorities have changed, with advice from the CNMI Forest Stewardship Program Coordinating Committee.
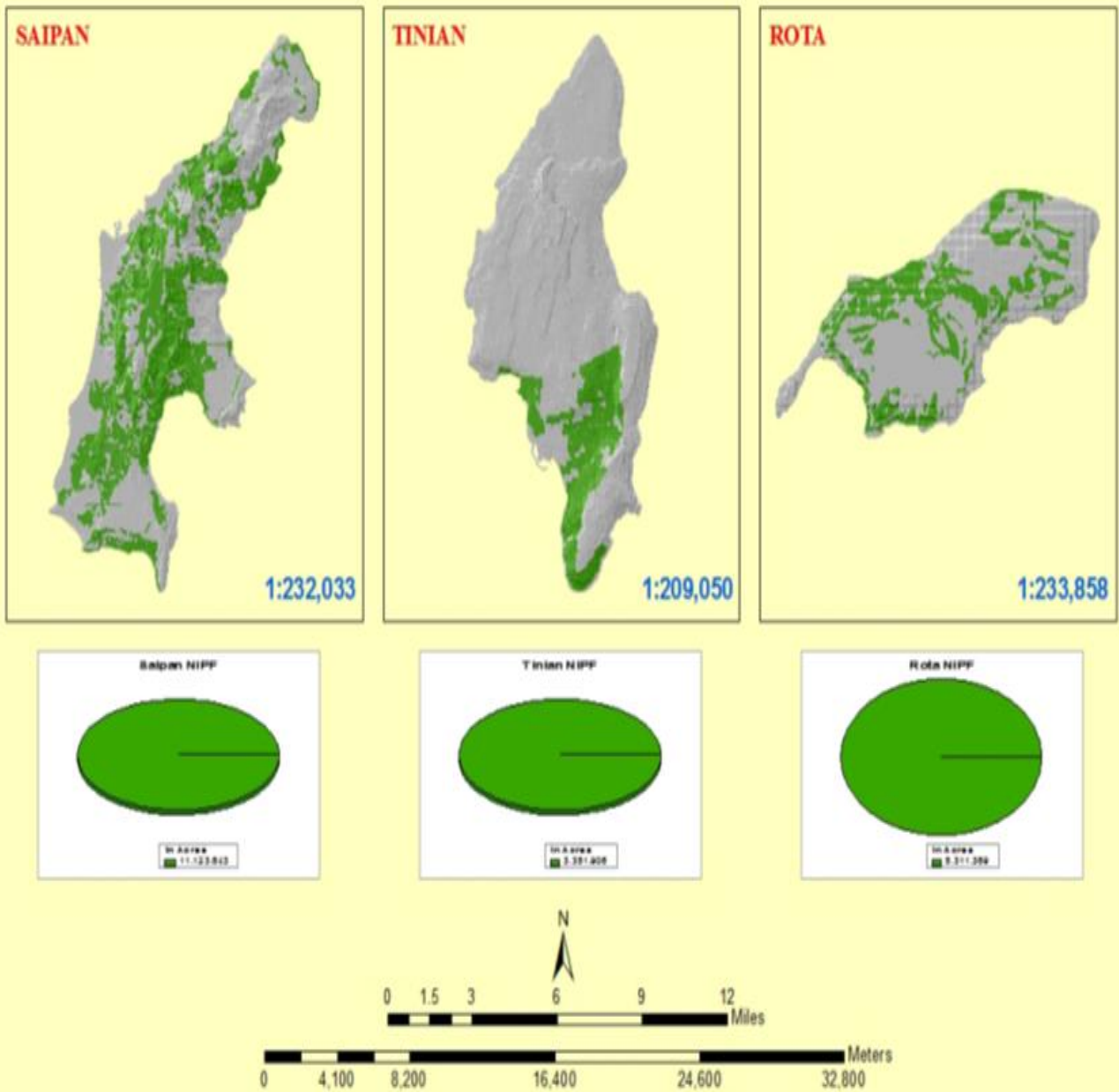
Figure 7: Non-industrial private forestlands on Saipan, Tinian, and Rota.

The principal goal of the CNMI Forestry Stewardship Program is to aid and influence landowner in-regard to land management, promoting good stewardship practice by incorporating the Forest Land Enhancement Program (FLEP) program objectives and complementing other federal, local, and private forestry assistance programs. Under the advisement of the State Forest Stewardship Committee, the CNMI Forestry will work with its federal, local, and private partners during the next five years to identify opportunities for enhancement and better management of its forest on State and NIPF throughout the CNMI. Program goals, objectives, and strategies will continuously be improved to meet the needs of stakeholders to address challenges and changes in our governmental policies, economic conditions, and environmental impacts, social and cultural aspects. The CNMI Forest Stewardship Program provides technical and financial assistance to owners of non-industrial private forestland who are committed to the restoration, maintenance, enhancement and/or conservation of their forest resources. The strategic direction of the FSP is to assist the non-industrial private forestland to more actively manage their forestland and related resources of those owners through the use of State, Federal, and private sector resource management expertise, financial and technical assistance, and educational programs.

Micronesia Challenge

The Micronesia Challenge (MC) is a shared commitment made by the Federated States of Micronesia, Guam, Palau, CNMI, and the Republic of the Marshall Islands originally launched in 2006 to effectively conserve 30% of marine resources and 20% of terrestrial resources by 2020. During the 24th Micronesia Island Forum in 2019, the Leaders recognized the success of the first 15 years of the Micronesia Challenge and endorsed the new Micronesia Challenge 2030 goals to effectively manage 50% of marine resources, including the exclusive economic zone (EEZ), and 30% of terrestrial resources by 2030. The goal now also includes a larger voice for fisheries management, reducing invasive species, restoring habitats, increasing livelihood opportunities and reducing risks to communities from climate impact in Micronesia.

Forest Conditions and Trends/Threats

The CNMI forests are faced with many challenges ranging from the destruction of typhoons to soil erosions and forest fires, with the latter two usually a result of man-made activities. These challenges continue to persist throughout the CNMI history since the islands were discovered and settled by the natives about 4,000 years ago. The economic boom resulting from the garnet industry in the early 1980s also impacted our forest resources, as more people were clearing lands for residential dwellings or business establishments.

Despite these challenges, the people are beginning to be more conscious about their environment and have been implementing programs to protect and restore their forest resources, as well as to detect and destroy invasive species from making the islands their home. With assistance from USFS, and occasionally from other federal agencies, the CNMI will be able to address some of these threats and priorities identified in this plan, including the mucuna and coconut rhinoceros beetle infestations, the two most devastating treats to treat in the CNMI.

Forest Trends Since the Previous SWARS

Coconut rhinoceros beetle on Rota

The coconut trees and other palm trees on the island of Rota are being threatened by a new invasive species, the coconut rhinoceros beetle (CRB). In October 2017, the first siting CRB was found on the Island of Rota at Tweksberry Beach Park and the former Paupau Hotel. CRB was considered a high priority to eradicate to avoid spread all over the island of Rota. CRB was found in 2020 in the Gagani and Talakhaya areas of Rota four miles from the original CRB quarantine areas at Tweksberry Beach Park and Paupau (Figure 8). After confirming that decaying coconut trees and scissor cuts on the palm leaves existed via drone-conducted surveys the CRB team immediately began dissecting trees, setting traps, and recording CRB findings in these new areas – 660+ larvae and over 60 adult beetles were found. DFEMS and Department of Community and Cultural Affairs (DCCA) assisted DLNR in the response.

The new infestations prompted the Mayor of Rota to declare a State of Significant Emergency due to the negative impacts by CRB on Rota's agriculture and food security. Collaboration with local landowners remains critical to detect and eradicate CRB. With continued support from the public, federal partners, and local governments the Municipality of Rota is optimistic in containing the spread and preventing CRB reaching Tinian and Saipan.

The latest findings of CRB larvae and new breading sites on Rota by the Invasive Species Team was on March 3, 2021 at the Benjamin Taisacan Manglona International Airport. Damage to palms was also found. The new site is in the northeastern part of the island, approximately 7 road miles from the finds in 2020 in the Gagani and Talakhaya areas.

Figure 8: CRB quarantine area (pink color) and locations of new infestations (orange color) detected in 2020 on Rota. Source: https://governor.gov.mp/news/press-releases/third-coconut-rhinoceros-beetle-site-discovered-on-rota/

Forest conditions on Rota

The original vegetation on Rota was probably very simple. On the limestone terraces, a mixed forest existed. On the lower terraces, the forest was semi xerophytic, that is, dry season deciduous, and on the highest terraces, it was moist forest. The indigenous Chamorro's who have inhabited Rota for three thousand years unquestionably made major modifications to the island's native vegetation. Today, some areas on Rota show evidence of having been terraced in ancient times for the cultivation of rice and taro.

Rota has two tree species, *Serianthes nelsonii* and *Osmoxylon mariannense*, and a perennial herbaceous species, *Nesogenes rotensis*, which are federally listed as endangered. *Osmoxylon mariannense* and *Nesogenes rotensis* are both endemic to Rota. The US Fish and Wildlife Service (USFWS) has also identified three plant species found on Rota, *Lycopodium phlegmaria, Coelogyne guamensis* and *Nervilia jacksoniae*, as species of concern. The CNMI has also classified *Serianthes nelsonii* and *Lycopodium phlegmaria* var. *longfolium* as threatened/endangered species

To date, only 121 specimens of *Serianthes* have been found on Rota. *Osmoxylon* is endemic to Rota where only about 20 specimens have been found. This small, unique population of *Osmoxylon* appears to be in decline as evidenced by the death of several previously mapped older trees and the lack of evidence of any new saplings being noted as new generation. The primary factors threatening these rare tree

species are lack of regeneration probably caused by ungulate browsing and insect predation on seeds. Native flora of the Northern Mariana Islands evolved in an environment free of ungulates making several species vulnerable to heavy browsing. Three species of ungulates, Philippine deer (*Cervus mariannus*), feral pig (*Sus scrofa*), and domestic cattle (*Bos taurus*) are likely involved in the destruction of these tree species. Attempts to propagate *Osmoxylon* from cuttings have so far been unsuccessful. *Nesogenes rotensis* is another species found only on Rota, thriving within the salt spray zone of Poña Point and that population is believed to consist of less than 20 individuals.

Also, Rota provides habitat for several animal species listed by the USFWS and the CNMI as threatened or endangered, or as candidates for listing. Three bird species, the Mariana crow (*Corvus kubaryi*), the Rota bridled white-eye (*Zosterops conspicillatus rotensis*), and the Mariana common moorhen (*Gallinula chloropus guami*) are federally listed as endangered. The Mariana fruit bat (*Pteropus m. mariannus*) is now listed as a threatened species. The Mariana crow and the Rota bridled white-eye populations have significantly declined in recent decades. The Mariana common moorhen is found at one location on Rota, the Rota Resort, where the island's only freshwater wetland habitat exists. Two species, the Mariana swiftlet (*Aerodramus bartschi*) and the Micronesian megapod (*Megapodius l. laperous*), were historically present on Rota, but have since been extirpated. A small population of the Mariana common moorhen has become established at the wastewater treatment ponds of the Rota Resort. Recent analysis conducted by the DFW has shown that most other bird populations on Rota also have substantially declined over the past few decades.

Lower Limestone Terraces. In drier northeastern Rota where the terrain is more level and less rocky, small to medium size *Intsia bijuga* is common. The forest here is relatively low and scrubby with *Hibiscus tiliaceus* and *Pandanus* spp. being common. Other species here include *Guamia mariannae*, *Guettarda speciosa*, *Eugenia* spp., *Morinda citrifolia*, *Maytenus thompsonii*, *Triphasia trifolia*, *Polyscias grandifolia*, *Cycas circinalis*, *Flagellaria indica*, and *Caesalpinia major.*

Mid-elevation Limestone Terraces. A substantial portion of the limestone terraces of the Sabana contain native forest in good condition. Species found here include: *Serianthes nelsonii*, *Heritiera longipetiolata*. *Artocarpus* spp., *Hibiscus tiliaceus*, and *Osmoxylon mariannese*. Understory species include *Macaranga thompsonii* and *Pipturus argentus*. Epiphytes are abundant and include *Freycinetia reineckei, Asplenium nidus, Davallia solida* and other ferns; *Coelogyne guamensis* and other orchids; and mosses.

Upper Limestone Terraces. At the higher altitudes, the forest changes to a wetter type which is very luxuriant and has a full canopy. In these wet parts the principal trees are *Elaeocarpus joga*, *Hernandia labyrinthica*, *Fagraea berteroana*, *Pandanus*, *Guettarda*, *Ficus prolixa, F. tinctoria, Artocarpus mariannensis, Pipturus, Laportea, Guamia, Claoxylon, Osmoxylon, Macaranga, Pisonia umbellifera* and others, with *Psychotria, Piper, Discocalyx, Maesa* and other shrubs and many ferns in the undergrowth. *Freycinetia* and *Alyxia* are common lianas. Epiphytic ferns and orchids are abundant.

Development pressures on CNMI forests
The rapid growth and expansion of development left little time to consider proper vegetative planning, beautification or protection of our islands' ecosystem. Most available land in the CNMI is located in an undeveloped area covered with limestone forest, ranging from the far southern to the northern coastline. Now, public lands are being divided for homestead lots as well as for governmental or commercial function. These actions resulted in fewer indigenous trees for wildlife habitat and a constant depletion of our natural resources. Natural disasters such as typhoons and floods are a recurring nightmare as

elsewhere in the Pacific. With the increase of developed environment, the native vegetation has been opened, allowing disasters to rip away valuable resources such as soil on erodible areas and vegetation on urban forest. In part, by the break of the urban forest, an increasing damage to homes and farms is inevitable. As for the CNMI economic, tourism remains a major and consistent industry second by small entrepreneurs, exporting agricultural goods and livestock. However, with the recent marketing strategy, a more powerful development will soon be a reality. These investors will be developing high casino and gambling arenas, followed by complementary businesses. These developments increase the demands for expansion on land use development.

Soil erosion

Soil erosion is affecting many local food sources. Not only is the loss of valuable topsoil decreasing agricultural productivity, but ocean resources are affected as reef and lagoon areas are silted in. Erosion of topsoil not only affects productivity through loss of nutrients and organic matter, but the rooting zone in an eroded soil is usually denser, has less water holding capacity, and generally can be a more difficult environment for plant growth (Figure 9).

Saipan Soil Erodibility
K-Factor Value from USDA-NRCS Soil Survey

0   0.75   1.5   3
Miles

N
W   E
S

The K Factor is a component of the Universal Soil Loss Equation, which quantifies soil types' potential for erosion. K-factor values in CNMI range from 2 (low erodibility) to 62 (high). Values on Saipan have a general range of 10-24.

Soil Erodibility: USLE K-factor

- 5 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 30
- 31 - 62

Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
USDA-NRCS SSURGO

CNMI FORESTRY

FOREST SERVICE
US DEPARTMENT OF AGRICULTURE

PCRP

Tinian Soil Erodibility
K-Factor Value from USDA-NRCS Soil Survey

0   0.75   1.5   3
Miles

The K Factor is a component of the Universal Soil Loss Equation, which quantifies soil types' potential for erosion. K-factor values in CNMI range from 2 (low erodibility) to 62 (high). Values on Tinian generally range from 10-24.

Soil Erodibility: USLE K-factor

- 5 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 30
- 31 - 62

Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
USDA-NRCS SSURGO

Rota Soil Erodibility
K-Factor Value from USDA-NRCS Soil Survey

Soil Erodibility: USLE K-factor
- 5 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 30
- 31 - 62

The K Factor is a component of the Universal Soil Loss Equation, which quantifies soil types' potential for erosion. K-factor values in CNMI range from 2 (low erodibility) to 62 (high). Values on Rota have a general range of 11-20.

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
USDA-NRCS SSURGO

Figure 9: Soil erodibility on Saipan, Tinian, and Rota.

Soil and nutrient depletion
Expensive fertilizer and a lack of land management skills also contribute to a reduction in soil productivity. The loss of soil nutrients in some soils is not always replaced with fertilizers or other

sources of important nutrients. The use of leguminous trees for fixing nitrogen, or green manure as a fertilizer, can increase quantities of soil nutrients. Farmers are not aware of the impacts on the soil from the practices they are using. Meanwhile, nutrients lost from the land are harmful to life in the lagoon and on the reef.

Water shortage

On Saipan, many areas do not have water 24 hours a day. Part of this is the result of an antiquated distribution system, which leaks water at a rate estimated as high as 50%. Over pumping of existing wells and urban development in watersheds also contribute to the problem. Although an abundance of water is available underground, over pumping in an aquifer reduces the localized water supply beyond what can be naturally replaced by rainfall. It also causes salt water to enter the water supply. Urban development in watersheds reduces the surface area that can absorb rainfall to re-supply the underground aquifers.

Flooding

Six populated areas of Saipan are subjected to flooding during heavy rainstorms and typhoons. A number of factors working together causes this, including: developing structures in natural floodplain areas; removal of vegetative cover from the land; improper design of structures that affect water runoff. This problem can be averted by reestablishing forest cover on abandoned lands now covered by grass. Forests absorb more rainfall than does grassland.

Climate Change and Extreme Weather Events

The "Climate Change in the Commonwealth of the Northern Mariana Islands" report under the Pacific Islands Regional Climate Assessment (PIRCA), recently released by the East-West Center (Grecni et al. 2021) summarized the potential threats and challenges that climate change may pose to the CNMI. These are summarized as:

- Average temperatures have risen and are likely to continue to rise.
- Changes in rainfall patterns may cause more extreme drought or flooding events.
- Stronger tropical storms and typhoons are expected globally and around the Mariana Islands, although their frequency in the region may decrease.
- Sea level rise threatens infrastructure, including housing, businesses, and transportation, as well as ecosystems and cultural sites. More frequent and intense coastal flooding and erosion are anticipated as sea level rise accelerates.
- Oceans are warming, causing coral bleaching that is already widespread and severe and may lead to extensive coral loss in the coming decades.

These projected impacts have already affected CNMI forest resources in recent years. Most notably, as described above the CNMI has experienced three tropical cyclones since the previous SWARS that resulted in federal disaster declarations: The Category 4 Typhoon Soudelor in 2015, and the Category 4 Typhoon Mangkhut and Category 5+ "Super Typhoon" Yutu in 2018. Major storm events may damage or destroy trees and tree crops, delay fruiting and flowering, and affect pollinator species.
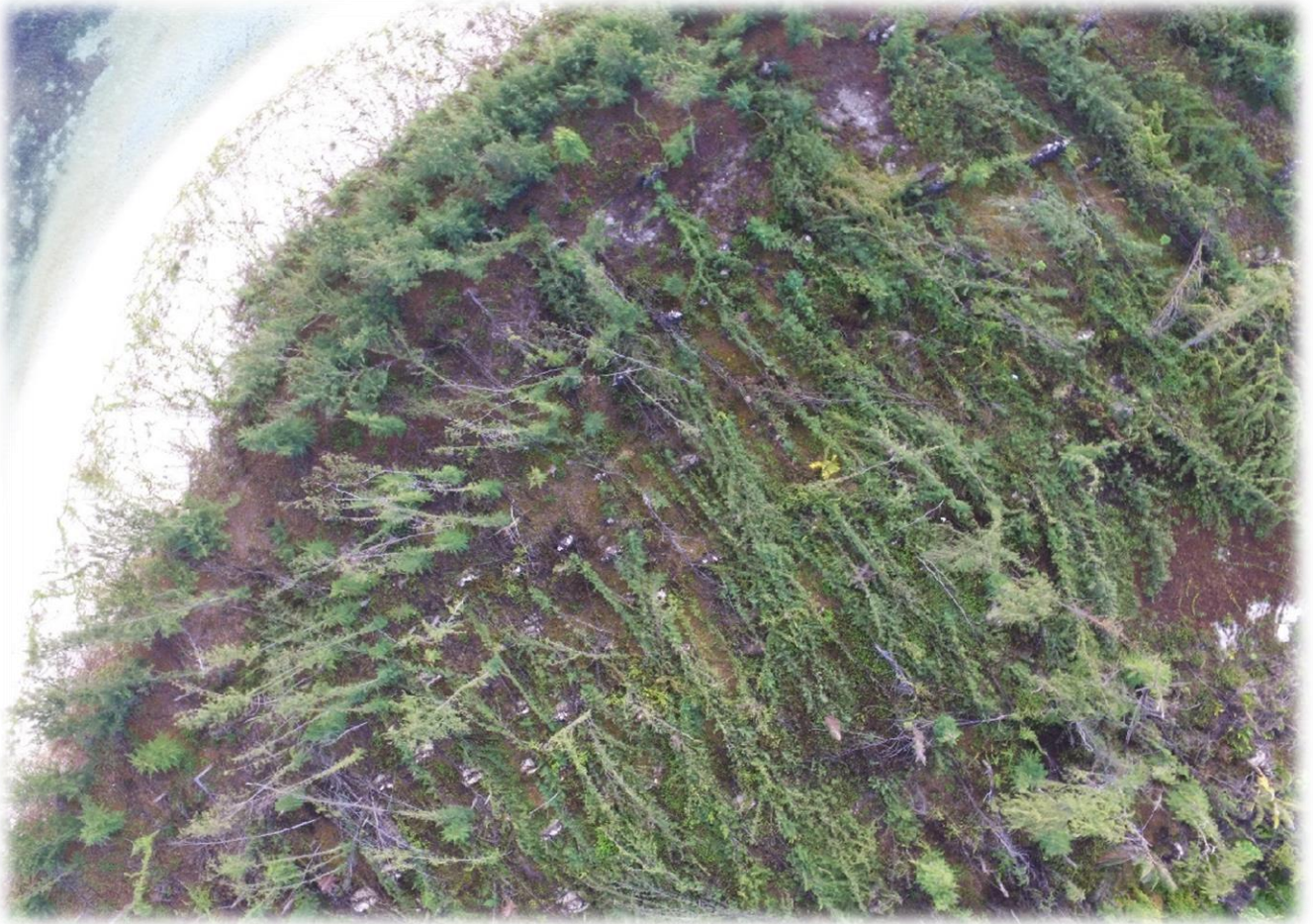
Figure 10: Aerial photo of felled secondary forest in American Memorial Park after Typhoon Soudelor (Photo by M. Kottermair 2016, as found in Greene et al. 2019).

In addition, changes in rainfall patterns leading to longer or more intense dry periods may increase the risk of wildland fires and hinder regrowth efforts. Changes in temperature and rainfall patterns may also increase native tree and crop species' vulnerability to pests and diseases (Grecni et al. 2021). The small and highly fragmented remains of native limestone forest are particularly vulnerable to invasive species, and the hydrological features underlying and surrounding Saipan's coastal wetlands and mangroves may be quite sensitive to changes in sea level, salinity, and sedimentation that may be exacerbated by climate change (Greene and Skeele 2014).

Invasive Species

Under Executive Order 13112 the definition of 'Invasive species' means, with regard to a particular ecosystem, a non-native organism whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health. Whether introduced deliberately or unintentionally, or through natural means, an invasive species finds itself in a new environment, removed from the restraints of competitive factors and possibly even bolstered by environmental conditions. The result can be devastating to native species, causing severe ecological and economic damage.

In the Mariana Islands, native species are being lost at an alarming rate. CNMI has 102 native species (all major groups of organisms) currently listed as threatened with about 10% of all native animals are

categorized as Extinct, Extinct in the Wild, Critically Endangered, Endangered or Vulnerable. The situation for native plants is worse – 15% of both Guam's and the CNMI's plants are in these categories.

The impact of these numbers goes beyond individual species. In isolated island environments there are far fewer species than are found on continents. A 10-15 percent loss of native species, accompanied by invasions of non-native species, is an ecological catastrophe. No longer in equilibrium, native ecosystems are susceptible to being overrun and overwhelmed by invading species, bringing cascading effects.

In the CNMI, as in most island states, there is a strong interdependence between ecosystem services and the local economy. We depend upon our marine and terrestrial ecosystems for wild foods and indigenous medicines. Forests provide materials for outdoor structures, traditional buildings and roofing, woven products and art. We enjoy recreation and find solace in our natural spaces. Our wetlands protect our coral reefs by filtering surface runoff and provide important wildlife habitat. Our well water is filtered through soils that remove impurities and contaminants and our tourism-based economy is directly tied to the appeal of our natural environment to our visitors.

Invasive species have altered the terrestrial habitats of all islands in the Marianas, both significantly and permanently, reducing the value of ecosystem services. Each island has its own combination of invasive species, providing a preview of the potential impacts of specific invasive species on other island ecosystems.

In its *Wildlife Action Plan for the CNMI 2015-2025*, DFW lists plant and non-plant invasives of concern to wildlife across all islands of the CNMI (Table 2). There is also concern about invasive ants, snails and wasps that can have devastating impacts by preying on or parasitizing native invertebrates. Invasive vines and other plants are identified as major threats to island forests and habitat. Scarlet gourd (*Coccinia grandis*), chain-of-love (*Antigonon leptopus*), alalaga/paper rose (*Operculina ventricosa*), bitter vine (*Mikania micrantha*), bitter gourd (*Momordica charantia*) and wood rose *(Merremia tuberosa)* are of particular concern as they are visibly rapidly spreading across many islands. Water hyacinth (*Eichhornia crassipes*), is called out as a threat to wetland habitats. Lantana (*Lantana camara*) is another concern. Recognized world-wide as a noxious weed infesting millions of hectares of land, lantana can be found on all the large islands and now dominates large areas of Aguigan with its dense and thorny thickets.

Table 2: Plant and non-plant invasive species of concern in the CNMI (Source: Liske-Clarke 2015).

*"Current Management Plan" key: **P** – prevention/education (not yet here); **E** – eradication (just arrived or just discovered); **S** – small populations; **C** – control (management to contain or reduce but not eliminate; **N** – no management at this time (lack of resources, or too extensive).*

Scientific Name Common Name	Common Name English	Common Name Chamorro	Habitat	Current Management Plan
Coccinia grandis	Scarlet gourd / Ivy Gourd	Pipi'non maka	Vine	C
Mikania scandens	Mile a minute	Mala'it	Vine	N
Lantana camara	Lantana	Lantana	Shrub	C
Mucuna prurien	Sea bean	Akang'kang dan'kulu	Vine	N
Antigonon leptopus	Mexican creeper / Chain of love	Ka'dena	Vine	N
Spathodea companulata	African tulip	Flores guafi	Tree	C
Mimosa diplotricha	Giant mimosa / wit-a-bit	Subet'biun chosa	Shrub	N
Chromolaena odorata	Bitter bush	Masigsig	Shrub	C
Operculina ventricosa	Paper rose / Wood rose	Ala'lag	Vine	N
Biden pilosa	Beggars tick / Guam daisy	Flores Guahan	Shrub	N

Scientific Name Common Name	Common Name English	Common Name Chamorro	Habitat	Current Management Plan
Oryctes rhinoceros	Coconut Rhino Beetle	Gaga Niyok	Insect	P
Wasmannia auropuntata	Little Fire Ant	Odot aga'ga (Di'kiki)	Insect	P
Eleutherodactylus coqui	Common cuqui	Kai'ru	Frog	P
Darna pallivitta	Nettle caterpillar	Ulu gangochi	Caterpillar	N
Solenopsis invicta	Red imported Fire-ant	Odot aga'ga	Insect	N
Puccinia psidii	Eucalyptus rust	Ga'ga Tina'ke	Fungus	N
Quadrastichus erythrinae	Erythrina gall wasp	Sasa'tan Gaogao	Insect	N
Aulacaspis yasumatsui	Asian cycad scale	Ga'ga fading	Insect	C
Veronicella cubensis	Cuban slug	Ta'gula	Slug	C
Phellinus noxious	Black sock / Brown root rot	Chot'nut atbot	Fungus	N

Information more recently collected via Forest Inventory & Analysis (FIA) plots found that 29 invasive plants/trees occurred within the plots; over 90% of the plots had some level of invasive plants/trees and the average % cover by invasive plants/trees was 56% (Table 3).

Table 3: All invasive plant species, occurrence (# and % of subplots present), and average % cover in CNMI FIA invasive subplots.

Scientific Name	# of Subplots Present	% Occurrence	Average % Cover
Leucaena leucocephala	72	58%	41
Mikania micrantha	65	52%	8
Passiflora suberosa	46	37%	4
Lantana camara	36	29%	8
Chromolaena odorata	31	25%	3
Triphasia trifolia	27	22%	14
Centrosema molle	25	20%	12
Coccinia grandis	22	18%	11
Urochloa maxima	21	17%	29
Operculina turpethum var. ventricosa	19	15%	14
Mimosa diplotricha	15	12%	5
Achyranthes aspera	14	11%	3
Bidens alba	14	11%	16
Momordica charantia	14	11%	3
Pennisetum polystachion	7	6%	2
Amaranthus spinosus	5	4%	10
Antigonon leptopus	5	4%	22
Pithecellobium dulce	5	4%	14
Adenanthera pavonina	4	3%	24
Epipremnum pinnatum	4	3%	23
Spathodea campanulata	4	3%	33
Stachytarpheta jamaicensis	4	3%	1
Acacia confusa	3	2%	13
Syngonium angustatum	2	2%	21
Buddleja asiatica	1	1%	5
Euphorbia cyathophora	1	1%	1
Mucuna pruriens	1	1%	10
Thunbergia grandiflora	1	1%	70
Tradescantia spathacea	1	1%	2

The FIA protocol records disturbances (from animals, weather, vegetation, fires, & general human activity) of 1 acre in size or larger, or that affect 25% or more of all trees or 50% or more of a single tree species on each forest condition sampled per plot. Up to three disturbances and three treatments can be recorded per forest condition.

Also recorded on the plots was all types of disturbances including that from animals, weather, vegetation, fires, humans, insects and diseases and disturbance from unknown sources (Table 4). Disturbance by tree diseases was highest in terms of percent forest area followed by that caused by vegetation suppression and livestock. In general disturbances were highest in the lowland tropical forest when compared to those in strand forests and agroforests (also note CNMI forest types are dominated by lowland tropical rainforest =93%) however disturbances caused by humans was highest in agroforests.

Table 4: Estimated area (acres) and % of total forest area affected by disturbance type (CNMI FIA plots).

Disturbance Description	Estimated Area	% of Forest Area
Tree Disease	24125	40%
Vegetation Suppression	15368	26%
Livestock	6700	11%
Human Disturbance	3973	7%
Insect Damage	1847	3%
Crown Fire Damage	1618	3%
Unknown Disturbance	471	1%
Undisturbed	19473	32%

In addition to current invasive species occurrences, observed changes in climate are having far-reaching effects upon ecosystems that favor the spread of invasive species. Changing climatic conditions influence three fundamental elements of invasion mechanisms on land: the source location, the pathway and the destination. While all species are challenged by climate change, invasive species are by nature highly flexible adapters to new and changing environments, which gives them an edge over competing species at source locations and destinations. Climatic changes will create new invasive species pathways because of physical changes to terrestrial and marine environments that allow movement, and the appearance of vectors that aid invasive species movement.

Specific Invasive Species of Concern
As described above, since completing our last Forest Action Plan (previously SWARS) a coconut rhinoceros beetle infestation was detected on Rota in 2017 at the Tweksberry Beach Coconut Grove, a popular tourist attraction adjacent to the west harbor and marina. The CRB larvae were later confirmed to be the same destructive strain of CRB found on Guam – CRB-G. Because of the severity and destructiveness of this pest the Government of the CNMI continues to receive funding from the U.S. Department of Interior, Office of Insular Affairs. They have also received tremendous support – training, supplies & materials, etc. – from partner agencies, including the US Forest Service. Since the original find, CRB has spread to other parts of Rota but has not been detected on other CNMI islands. Eradication efforts are ongoing in hopes of removing the CRB population on Rota and reducing the threat to other islands (Figure 11). The coconut palm resource on Rota will continue to decline and die at increasing rates if the eradication project is not successful.

Figure 11: Destruction of coconut rhinoceros beetle host material on Rota, 2019. (Photo source: James Manglona, CNMI DLNR)

Another of Guam's most devastating invasive species, the Asian cycad scale (*Aulacaspis yasumatsui)*, invaded Rota in 2007 and continues to cause cycad decline. Plots were established on Rota to monitor cycad (*Cycas micronesica*) health after the infestation (T. Marler, U of G). Initially the plots contained 10,631 plants per hectare in 2008. This declined to 500 plants per hectare in 2018 indicating about 100 trees dying per hectare per year. An overall plant health index rating completed in 2017 revealed the health of the Rota plant population had reached an all-time low. Known biological control on Rota is the predator *Rhyzobius lophanthae*, but it is not effective on smaller plants thus cycad extirpation is likely without further intervention. All empirical and observational evidence indicates the most urgent need to conserve the Rota cycad populations are to introduce an effective consortium of organisms that can control the scale on all sizes of plants thus enabling successful establishment and growth of young plants.

Current efforts are underway to reduce and/or eradicate the dangerous and harmful impact of an invasive species in the CNMI, the *Macuna pruriens*. It is known worldwide to be widely cultivated for nutritional and medicinal values; however, it is a non-native plant to the Marianas. This invasive species vine was introduced to Saipan in the early 1990s and is now widespread on that island, growing in small patches and are 5 to 10 acres apart.

It is locally known as the Papago vine. In its fruit ripening stage, the vine has loose spicules attached to the seed pods, which causes severe itching, triggering allergies when in contact with the plant. When the wind speed picks up, the spicules become airborne and can travel long distances. It will penetrate cars, residential homes, warehouses, offices, and outdoor recreational facilities. Its spicules will stick to any surface, including other plants, concrete walls, heavy equipment, and picnic tables.

Figure 12: Macuna pruriens is a non-native plant to the Marianas.

The public needs to know that physical contact with *Mucuna pruriens* is exceptionally harmful to children and adults, especially those with skin allergies. Anyone who comes in contact with the spicules will

experience itching so severe that it renders the individual helpless for at least two hours or more. Persons with chronic skin disorders such as psoriasis or eczema do end up in the hospital when they encounter the plant's spicules. Most vulnerable are infants, toddlers, senior citizens, and anyone who lives close to an established forest.

The best option for adequate control and eradication of *Macuna pruriens* will be the use of herbicides. Slash and burn technique and uprooting of the vine are not only challenging or harmful to any eradication crew but are not effective prove as it is a stubborn plant and grows back quickly from broken roots left in the ground.

Current Management

Invasive species management in the CNMI is conducted by multiple governmental agencies acting independently according to organizational mandates and objectives. Within DLNR are DFW, DOA, CNMI Forestry, and the brown tree snake (BTS) Program, all of which are involved in invasive species management. Both U.S. Customs and Border Protection and the CNMI Department of Finance Division of Customs Services actively screen arriving passengers for potential invasive species.

CNMI Forestry's Cooperative Forest Health Protection Five-Year Plan 2015-2020 aims to "protect, promote, and maintain indigenous trees, and to educate CNMI's land managers and landowners [on] the value of a healthy forest. The plan was reviewed by the CNMI Forestry 2009 Advisory Council and the DLNR Secretary's representative for Natural Resources.

The BTS Program is focused on the CNMI's highest priority invasive threat and warrants its own program with dedicated staffing and funding. BTS works closely with the US Geological Survey (USGS) Brown Tree Snake Project to prevent the establishment of the brown tree snake in the CNMI. The BTS Program maintains snake traps at high-risk entry points, inspects arriving air and sea cargo, and conducts rapid-response searches for sighted snakes within the CNMI.

DFW addresses the impact of invasive species on marine and terrestrial species and their habitats in the Wildlife Action Plan for the CNMI 2015-2025. The plan, which was developed with broad community input and reviewed by the U.S. Fish and Wildlife Service, provides specific strategies and goals to manage invasive plants and animals that threaten species of greatest conservation need.

Wildfire

Wildfires are a reoccurring problem within the CNMI that pose a threat to both wildlife and people. Fire can burn habitat for the various species of the island, strip vegetation that holds soil facilitating erosion and damage private property while endangering people's lives. Almost all wildfires in the CNMI stem from human activities such as unattended fires, trash burning, cigarette littering or the intentional burning from hunters. Because of these events native habitat is lost, natural patterns of succession are broken and erosion is increased. Socially, homeowners face a greater risk of disruption due to the lack of defensible spaces around buildings, inadequate water supply system, lack of rural road access for emergency services. Management of fires will work to reduce the number and scale of wildfires through education, research and response preparation.

Table 5: The Number of fires By Island and Year (CNMI State Wildland Fire Plan 2014-2019)

Jurisdiction	Year	Number of Fires	Percent of Island Area Burned
Saipan	2016	41	1.4
Saipan	2017	10	0.9
Saipan	2018	14	2.5
Saipan	2019	10	1.5
Saipan	2020	8	1.2
Rota	2016	120	5.6
Rota	2017	6	0.3
Rota	2018	35	1.3
Rota	2019	60	8.1
Rota	2020	19	1.5
Tinian	2016	47	2.7
Tinian	2017	10	0.8
Tinian	2018	41	2
Tinian	2019	11	3.4
Tinian	2020	28	4.7

Wildfires on Saipan Island, 2016 to 2020

Fire Year - % of Island Area Burned
- 2020 - 1.2%
- 2019 - 1.5%
- 2018 - 2.5%
- 2017 - 0.9%
- 2016 - 1.4%

Wildfires on Tinian Island, 2016 to 2020

Fire Year - % of Island Area Burned
- 2020 - 4.7%
- 2019 - 3.4%
- 2018 - 2%
- 2017 - 0.8%
- 2016 - 2.7%
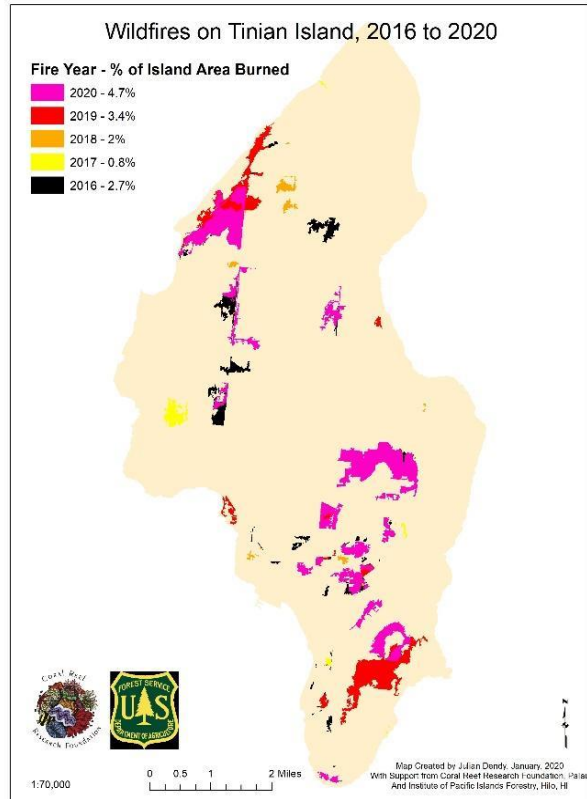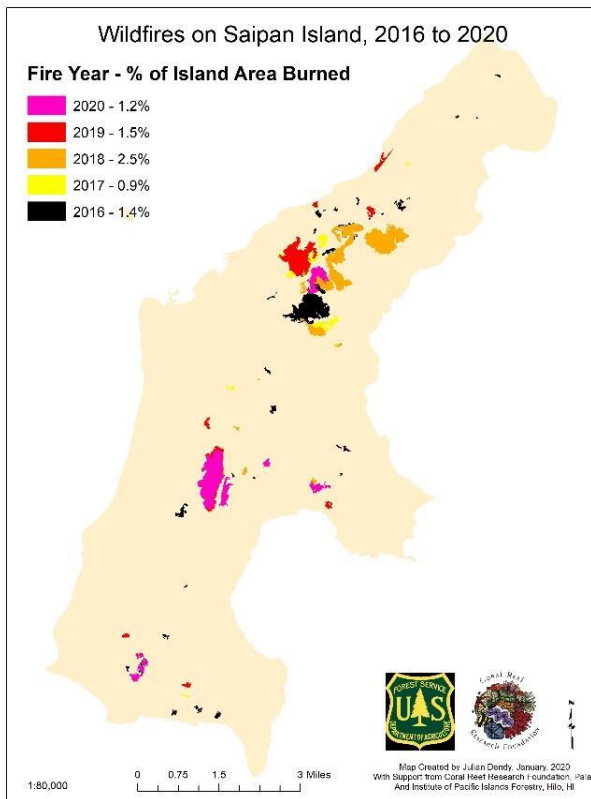
Figure 13: Wildfire prevalence on the islands of Saipan, Tinian, and Rota from 2016-2020 (Julian Dendy)
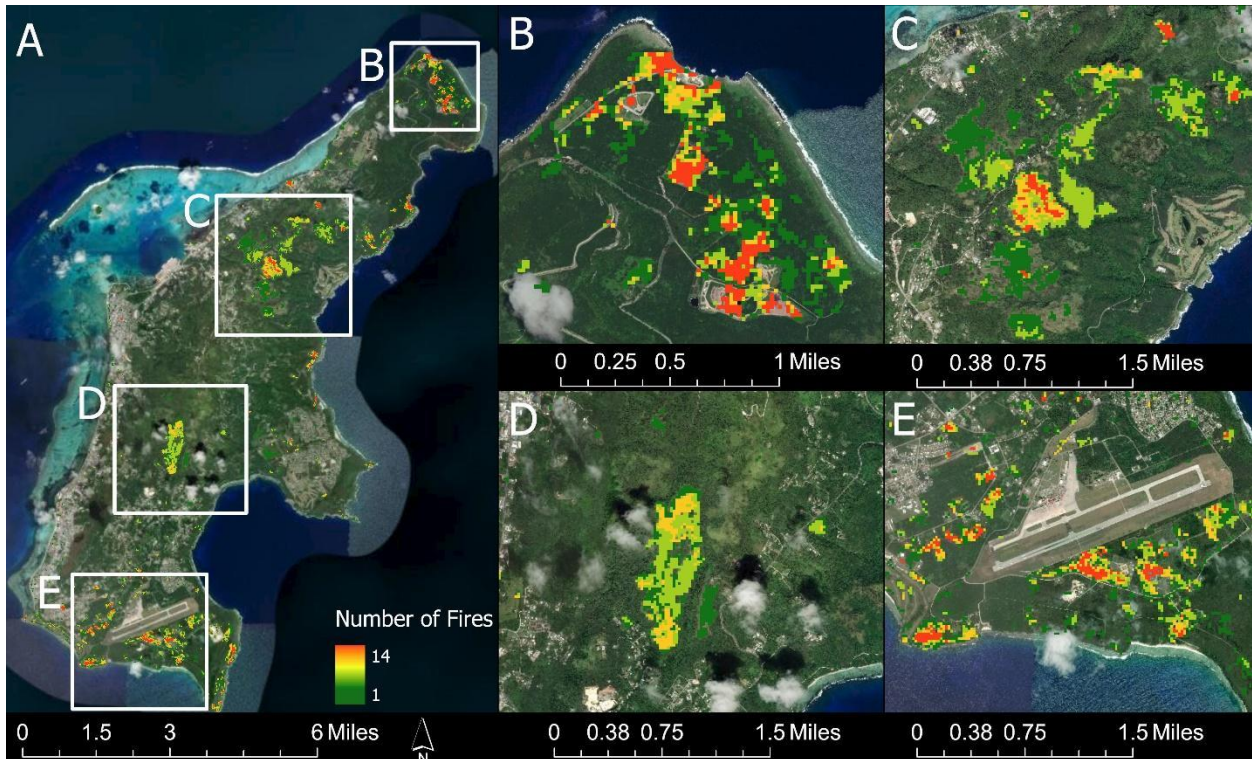
Figure 14: Fires identified on Saipan with pixel color indicating the total number times pixel was identified as burnt from 2013-2020. (A) Fires identified in Marpi (B) Wireless Ridge (C) Mt. Tapochau (D) and Naftan (E). (Bubb and Williams 2020, submitted for publication).

Causes

Fire is most likely not a natural part of the ecosystem in the CNMI. Core samples taken in the Susupe Wetland Complex indicate that charcoal particles were not present until 4860 years ago indicating that prior to human colonization there were no/very few natural fires on Saipan (Athens and Ward 2005). As such it is thought that the vast majority of fires that occur on the islands are now a direct result of human actions. Interagency discussions and unpublished data suggest that unattended cookouts, trash burning, cigarette littering and intentional burning by hunting are the dominate causes of wildfire island wide. The commonality of fires near public spaces including parks, parking lots, palapalas and picnic areas are evidence of the source (DCRM Watershed Website). Furthermore, the intentional fires set by hunters are done to clear vast amounts of grass temporarily, allowing for new shoots to grow. This fresh vegetation is a favorite food for deer allowing for easy take by local hunters. This practice is a common source of wildfire within the grasslands surrounding Wireless Ridge and on the southern slope of Mt. Tapachao (2010 FAP). These grassland areas are largely dominated by native sword grass, *Miscanthus floridulus*.

Wildfire Ecology

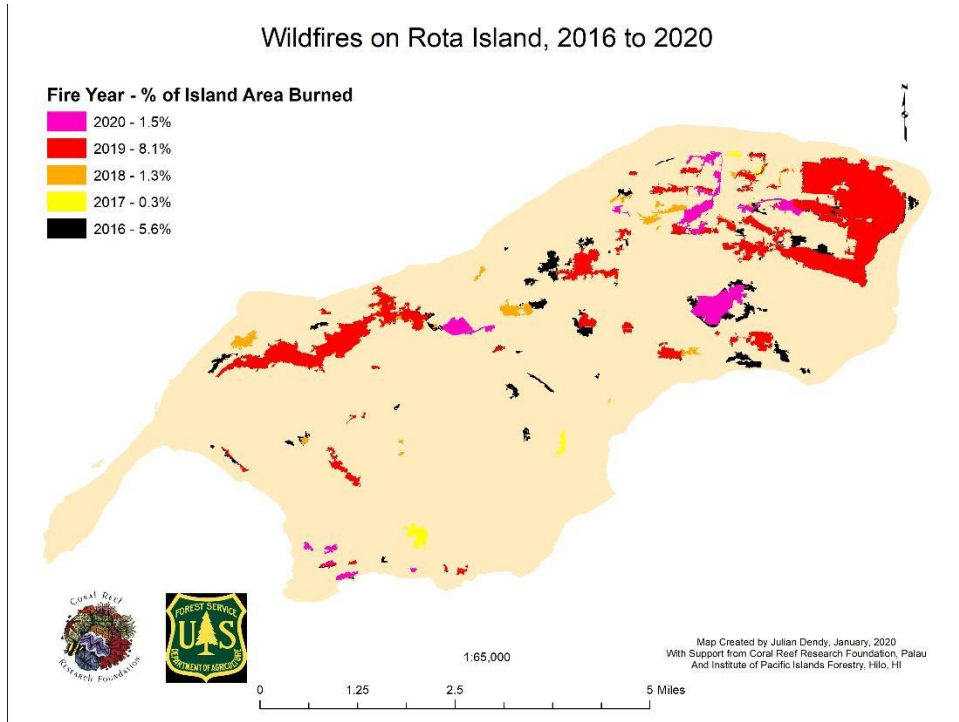Fire has adverse effects on the land by exposing bare soil to the effects of water erosion. Soil aggregates can be easily detached and moved by flowing rainwater after the vegetation has been stripped by fire. The steep slopes present on the islands aids in erosion by allowing water to build speed as it runs downward to the ocean. Erosion reduces soil fertility as it primarily impacts the topsoil that contains the majority of nutrients used by vegetation. Additionally, erosion impacts the coral reefs downslope as the resultant sediment egresses downslope and settles over the coral smothering them and blocking out sunlight (DCRM Watershed Website).

Fires also are thought to break the natural pattern of vegetation succession in the CNMI. New studies (Bubb, unpublished) are showing that grasslands will naturally transition into shrub land and eventually into forests as the grasses are outcompeted by native trees for shade and nutrients. When fire is introduced however it creates a more unstable landscape that only fast growing, hardy vegetation is able to survive. Grasses, with their quick growth and reproduction cycles, are perfectly suited to grow in a frequently disturbed area. Fires usually start in grasslands with the vegetation carrying flames until it reaches the grassland-forest border that acts as a fire break. When the flames reach this edge there is usually not enough vegetation to carry the fire farther, but it is typical for the edges of forests to burn this way. There is mounting evidence suggesting that when these forest edges are burned, grasses readily replace the more fire-resistant trees that were formally there. Over time repeat burns will then result in ever expanding grasslands and degrading forests. In the bigger grasslands such as on Wireless Ridge and Mt. Tapochau, many of the individual grasslands are separated by thin boundaries of forests. As these forests are burned away connections between the grasslands might form allowing for bigger and more expansive fires that were previously impossible due to the forest breaks (Bubb, unpublished). As such fires result in a cycle that reduces the amount of new forests and replaces them with expanding grasslands. Promoting the natural pattern of succession will result in fire suppression as reducing the dominance of grasses removes a vector for fire to spread and larger woody trees have a lower potential to ignite.

Recent field and remote sensing work have elucidated fires patterns on the lower three islands. Fire vulnerability modeling has shown that fires occur in grasslands at a much higher rate than other ecosystems. Remote sensing studies quantifying the number of acres burnt per year indicate that fires are occurring more often and at larger spatial scales. Seasons with more fire correlate to seasons that had overall less precipitation and more days between precipitation events. This suggest that small periodic

rainfall during the dry season is a major source of wildfire suppression. As droughts become more common due to climate change it is reasonable to assume that fires will also become larger and more expansive.
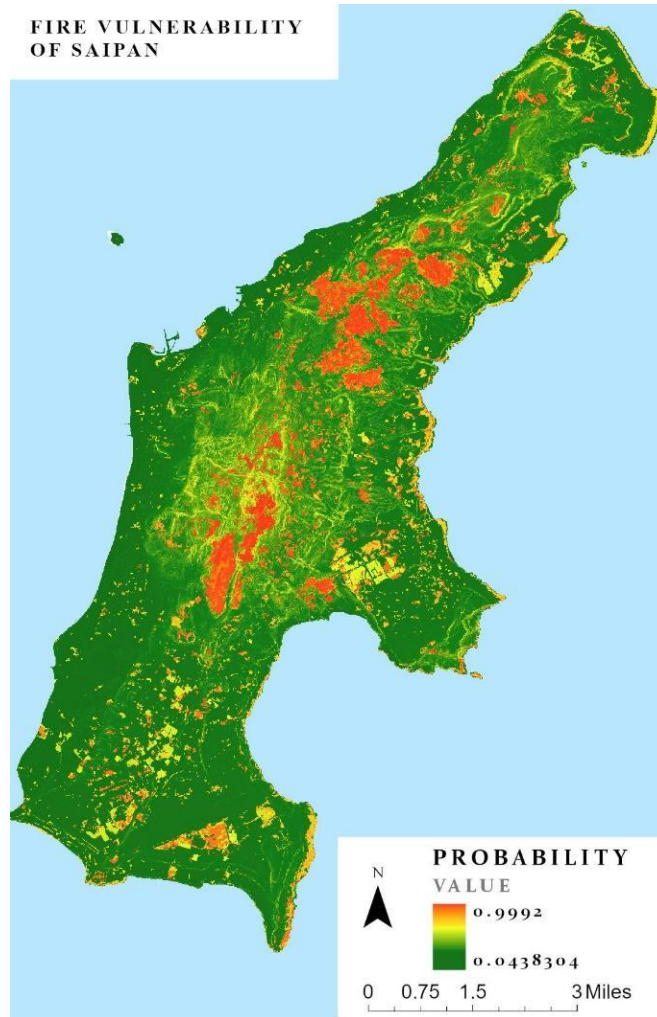
Figure 15: Fire vulnerability probability on Saipan. (Bubb, unpublished). Methodology for developing this map can be found at: https://dcrm.gov.mp/wp-content/uploads/crm/fire_writeup-1.pdf.

Current Management

Management is handled through multiple different agencies. DFEMS and CNMI Forestry have the responsibility for preventing and suppressing fires within the CNMI. DFEMS is tasked in managing federal grants addressing wildland fire risk. Under these grants forestry-fire programs are tasked to develop and implement an effective fire information, education and prevention for outreach into the general public, to implement fire protection and suppression activities, and to establish a fire incident reporting system (2006 Fire Grant Proposal). The Cooperative Fire Assistance Plan of 2006 was the initial plan drafted to enable the funding continuation. However, these documents are working documents, thus updates and further improvements will be incorporated for all available federal financial assistance under the State Fire Assistance Grant Program. The Forestry Section cooperates by participating in revegetation efforts and promoting fire prevention while providing technical assistance for forest restoration. BECQ manages watersheds and participates in revegetation efforts both of which

facilitate wildfire suppression. Federal financial assistance has been availed by the USFS to support the CNMI under the National Fire Capacity program, formerly known as the State Fire Assistance Program.

Under these different agencies, management takes two distinct forms. Short term management is the primary responsibility of DFEMS who are the first responders to control and put out wildfires that threaten people and property. Often though, due to the limited equipment, work force available, and the lack of road access to remote areas, wildfires are often left to burn. Long term management is evident in various management plans including the Watershed Management Plans under the Bureau of Environmental and Coastal Quality (BECQ). These plans call for revegetation of grasslands, the implementation of Best Management Practices and long-term education and outreach programs. BECQ's recent campaign 'Real Hunters Don't Burn' has been successful at reducing the spread of wildfires on Rota.

Revegetation of grasslands and badlands has been a component of CNMI Forestry's strategy in combating wildfires on Saipan and BECQ's strategy in Rota. Grasslands, as explained above, are areas that are dominated by grass and other perennials that are highly vulnerable to fire. Badlands are areas that due to soil chemistry and repeated burning are slow to become vegetated naturally and are especially prone to erosion due to lack of soil holding vegetation. Both the Talakhaya and Laolao watershed have undergone extensive revegetation efforts curbing the number of fires that have occurred in the area. Species selected for afforestation are fast growing and fire resistant and have the ability to grow deep roots preventing erosion. They can also provide additional benefits such as wildlife habitat or attractive flowers to improve scenery and honey production.

Existing Plans Related to Forest Resources in CNMI

Wildlife Action Plan for the CNMI 2015-2025

In order to be eligible for State and Tribal Wildlife Grants (SWG) through the USFWS, the CNMI DFW is required to review and revise the CNMI Wildlife Action Plan every ten years. The latest Wildlife Action Plan (Liske-Clarke 2015) was completed in 2015 and outlines species-specific ten-year objectives, including research and monitoring needs. Most of the strategies and objectives in the current WAP will complement activities implemented under this Forest Action Plan but are not directly related. One exception to this is the Strategies listed under "Invasive Species Prevention" (p. 7-1), including:

- Develop and implement a comprehensive biosecurity program…focusing on other invasive species present on Guam but not yet in the CNMI, such as little fire ant and coconut rhinoceros beetle.*
- Develop new regulations and enforce biosecurity measures for all expeditions to the northern islands.
- Educate boat owners about specific invasive species that could be spread among islands, and measures to take to prevent spread.
- Establish an invasive vine management program on Saipan to conserve ecological structure and function of important forest areas for SGCN.
- Develop protocols and capacity for early detection/rapid response to new invasive species arrivals.
- Develop program to allow for perpetration of nightingale reed-warbler in Kagman/other agricultural plot and by providing corridors and island of useable habitat within farm plots
- Improve habitat wetland metlars (moorhen) and swiftlet caves areas to assist in maintaining high quality habitat for these federally listed species.
- Rota Sabana - revegetate islands of fruit trees for bat foraging.

*It should be noted that the strategies under this WAP were developed in 2015, before the discovery of the coconut rhinoceros beetle on Rota in 2017. The CRB Action Plan is discussed in more detail below.

The Wildlife Action Plan also includes a call for increased inter-agency collaboration with the goal to "Enhance the capability of CNMI conservation agencies and organization to coordinate on proactive conservation efforts" (p. 7-4).

The full document can be access through USFWS website at:
https://www.fws.gov/pacific/images/feature/2017/highlights/CNMI%20SWAP%202015%20FINAL%20secured.pdf

Watershed Management Plans: Garapan, Laolao, Achugao, Talakhaya

The CNMI has four priority watersheds: Garapan, Laolao, and Achugao on the island of Saipan, and Talakhaya on Rota (Figure 16).
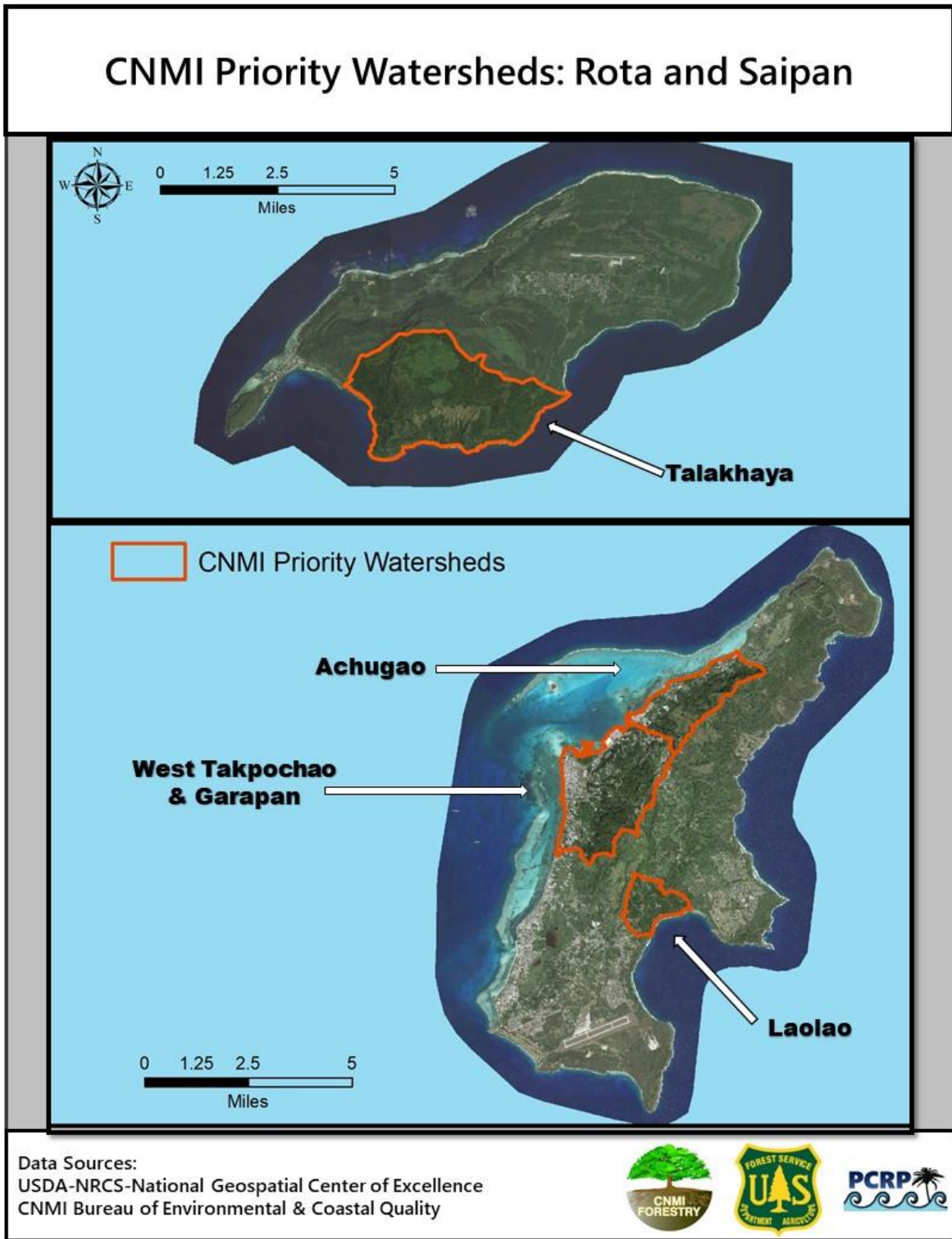
Figure 16: Priority watersheds in the CNMI.

Garapan, Laolao, and Talakhaya each have existing Conservation Action Plans (CAPs) that were developed and have been periodically updated over the last ten years. Achugao is a new priority watershed and therefore does not have an existing CAP. The BECQ Division of Coastal Resources

Management (DCRM), through funding from National Oceanic and Atmospheric Administration (NOAA) Coral Reef Conservation Program (CRCP) and assistance from The Nature Conservancy (TNC), is currently going through the process of developing comprehensive Watershed Management Plans (WMPs) following Environmental Protection Agency guidance for each of these four watersheds.

CNMI Priority Watersheds:
Garapan Watershed Management Area - Saipan
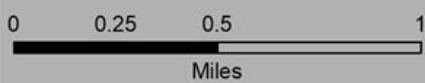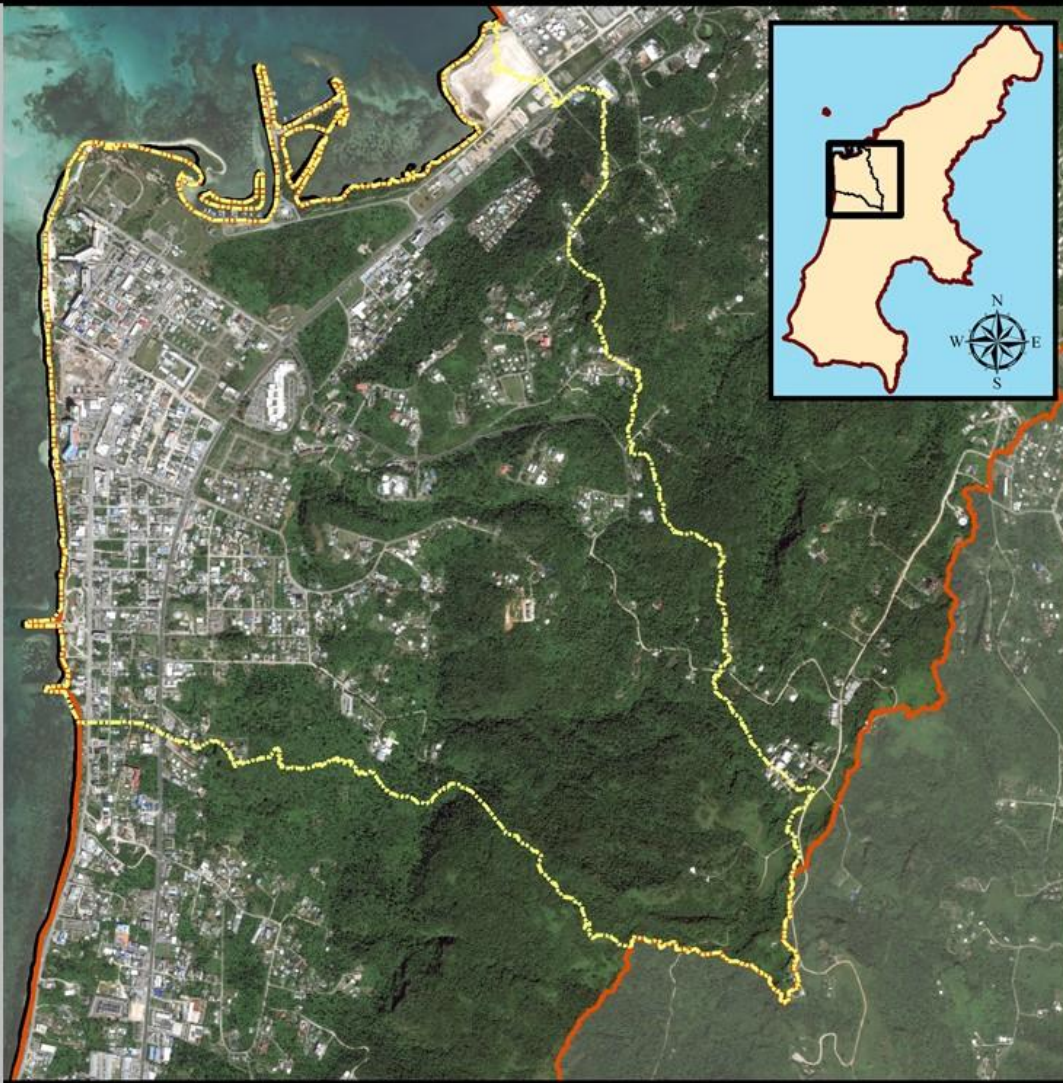
Garapan Watershed (Central-West Takpochao)

Saipan Priority Watersheds

0   0.25   0.5   1
Miles

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Bureau of Environmental & Coastal Quality

CNMI Priority Watersheds:
Laolao Watershed - Saipan

Laolao Bay Priority Management Area

Laolao Watershed

0   0.25 0.5   1
Miles

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Bureau of Environmental & Coastal Quality

CNMI Priority Watersheds:
Achugao Watershed - Saipan

0   0.25   0.5   1
Miles
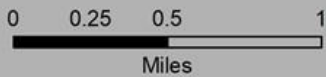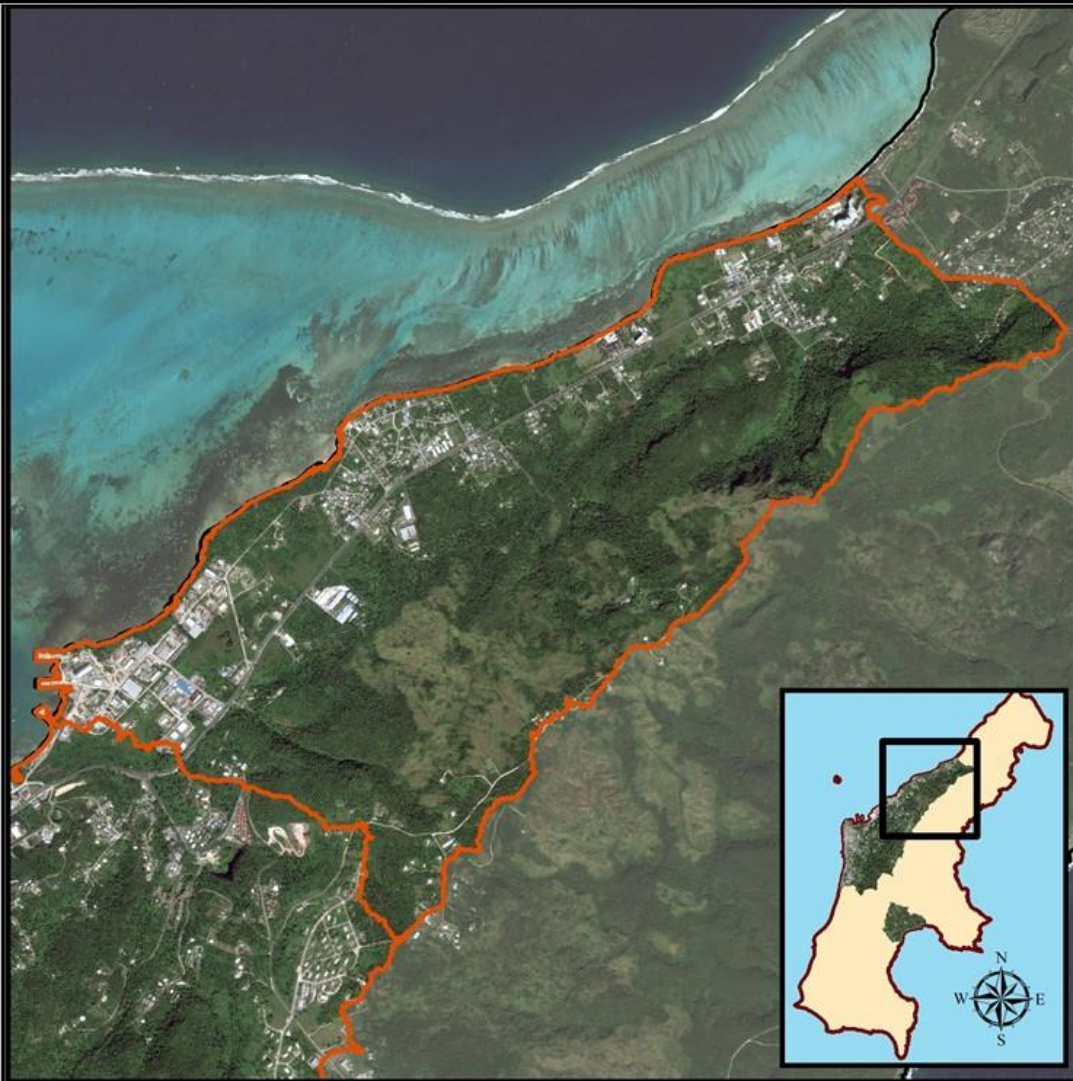
Achugao Watershed

Data Sources:
USDA-NRCS-National Geospatial Center of Excellence
CNMI Bureau of Environmental & Coastal Quality
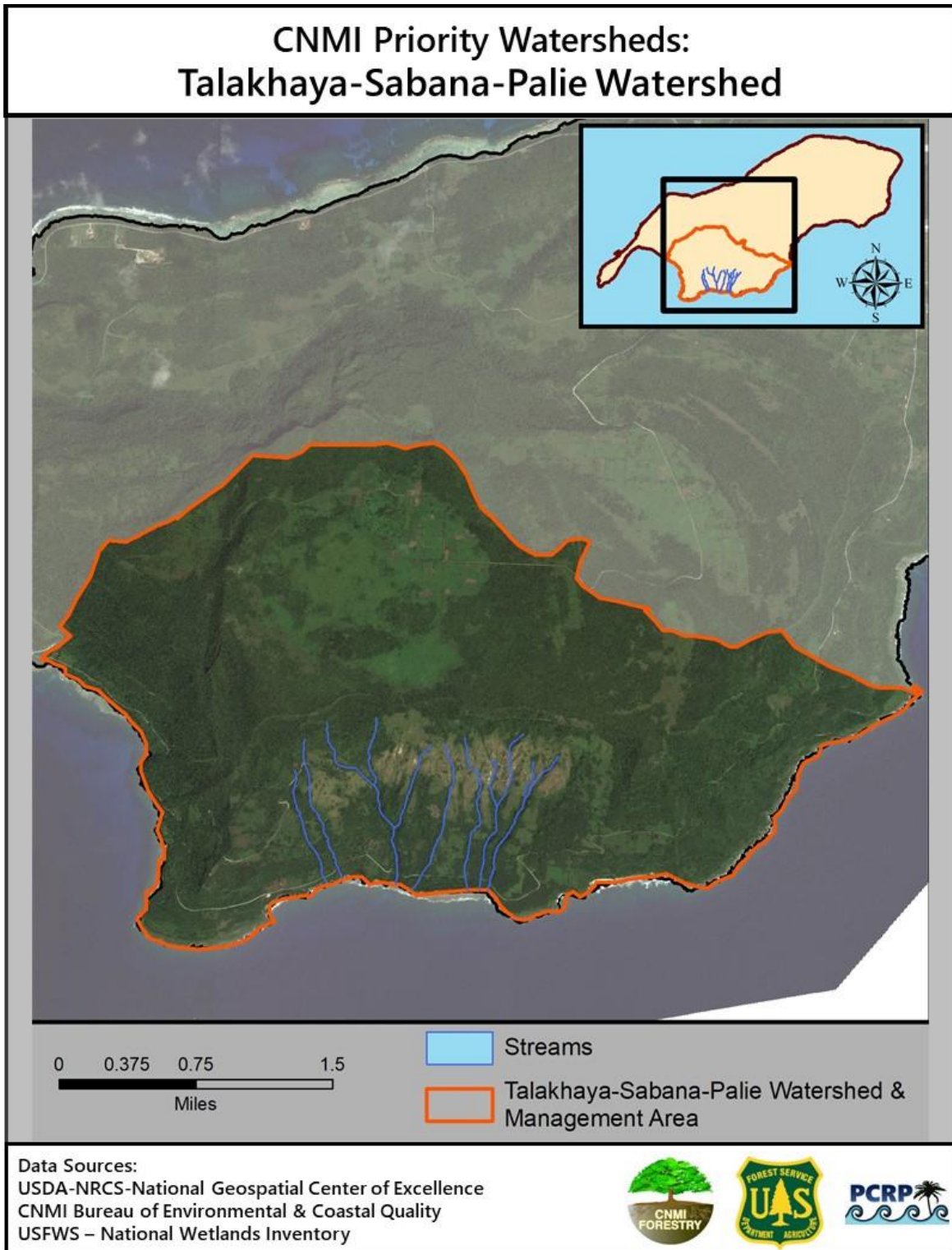
Figure 17: CNMI Priority watersheds (clockwise from upper left): Garapan/West Takpochao; Laolao; Achugao; and Talakhaya.

The final drafts of the Talakhaya and Garapan WMPs have been completed and submitted for approval by government authorities; Laolao and Achugao WMPs are still in development and are expected to be completed by the end of 2021. Once these WMPs are finalized and approved they will be available on the

BECQ-DCRM watershed management website https://dcrm.gov.mp/our-programs/water-quality-and-watershed-management/

Forest Health Plan

Forestry's vision with the CFHP is to have a thriving healthy sustainable island ecosystem for the well-being of its citizens and visitors. With such healthy ecosystem, comes the promotion and regeneration of native plant species, supporting a balanced synergy amongst all living organism while sustaining its multi-cultural value. For more information, please see the full strategy laid out in Appendix A.

Most of the discovered and recorded forest health issues are invasive weeds that out-compete forest plants species throughout the Marianas archipelagos and the more recent infestation by CRB on Rota. Invasive weeds have found means to adapt at an alarming rate thus capable to multiplying with minimal limitation due to the absence of its natural enemies. Disturbed areas become vulnerable at most places, whereas the removal of tree canopies allows other faster weed species to overcome.

Another issue is the introduction of exotic species for landscaping or agricultural purposes. These introduced species vary from a shrubby plant to climbing vines, brought by island residents or reoccurring visitors. Although interjected by our Quarantine inspectors, such plant species were not listed in the database to be noxious or threat to the island's ecosystem, thus were released and tagged as agricultural goods. This deficiency opens the ability for many plant species to be introduced from neighboring countries without difficulties.

Strategies:
1. Building and maintaining capacity:
   a. Strengthen national and regional level by establishing good communication, participation and action towards dealing with non-native invasive species.
   b. Maintain and be informed with current events and application of approved scientific approach towards dealing with invasive pest or pest of concerns.
   c. Designed and Establish a Rapid Response Mechanism when detection of invasive non-native species are present or as soon as they appear.
   d. Design or build educational and informational programs on a local and community level.
   e. Use appropriate projects that relates to the control of invasive pests with high priority or visibility, as model of scientific base practice.
   f. Support the establishment of an entomologist or pathologist position within the Departmental or collaborating agency level.
   g. To include all Quarantine and businesses that imports agricultural good following acceptable protocol in the developed Biosecurity Plan.
2. Promote sharing of Information:
   a. Develop an early warning system that would include notification of new and predicted occurrences of invasive species.
   b. Establish database of failure and success of different eradication and control methods for invasive species to ensure that all can be learn from the experience.
3. Develop Economic Policies and Tools for addressing problems of Invasive alien Species:
   a. User pays: make those responsible for the introduction of economically harmful invasive species liable for the costs they impose.

b. Full social cost pricing: ensure that the prices of goods and services whose production or consumption worsens the damage of invasive reflect their true cost to society.

c. Precautionary principle: because of the potentially irreversible and high costs of invasive intrusion, base management and policy on the precautionary principle.

d. Protection of the public interest: since the control of harmful invasive species yields benefits that are a public good, it requires public investment in prevention, eradication, control, mitigation and adaptation.

e. Subsidiarity: operate policies and management at the lowest level of government that can effectively deal with the problem.

4. Institute a system of Environmental Risk Analysis (if feasible):

a. Reviewing the WTO and IPPC risk analysis criteria to implement and ensure compatibility of national law with international criteria.

b. Building on work undertaken by the plant and animal protection community to develop a rigorous process of risk analysis in relation to any deliberate introduction of species (not just between countries, but within a country or region as well), including detailed analysis of the balance between benefits and costs.

c. Developing criteria to measure and classify impacts of alien species on natural ecosystems, including detailed protocols for assessing the likelihood of invasion in specific habitats or ecosystems.

d. Developing tools to factor invasive species into the decision-making processes regarding land use planning and development.

e. Investigating ways in which strategic and project-specific EIA can be applied to unintentional introductions.

5. Build Public Awareness and Engagement:

a. Developing public awareness campaigns to support invasive species management, including sharing information and coordinating messages as appropriate to avoid contradiction and maximize efficiency.

b. Engaging key stakeholders, communities and neighbors in invasive species solutions by linking invasive species strategies wherever, particularly when integrating and developing programs or other established societal priorities.

c. Building the capacity of local communities and groups to implement invasive species management measures where they live.

d. Prepare acceptable national Strategies and Plans

e. Sharing experience in this strategy with other states and organizations through documentation, staff exchanges, and other means of engagements.

Action Plan for *Oryctes rhinoceros* 2018-2023

As described above, the coconut rhinoceros beetle (*Oryctes rhinoceros*; *CRB*) was detected on Rota in October 2017 at the Tweksberry Beach Coconut Grove, a popular tourist attraction adjacent to the west harbor and marina. In response, CNMI DLNR developed an Action Plan to address this highly invasive species, which includes conducting surveys and eradication treatments, primarily with local and Office of Insular Affairs funding.

The CNMI strategy as laid out in the plan to combat the CRB includes the following strategies (for more information please see the full strategy laid out in Appendix A):

1. **Building and maintaining capacity**, including building local technical capacity, building and maintaining relationships between local and federal resources managers, and acquiring adequate funding to address and contain the CRB infestation.
2. **Promote sharing of information,** specifically linking to federal and international available databases on invasive species, facilitate the sharing of data, and establish an early warning detection system.
3. **Develop Economic Policies and Tools for addressing problems of Invasive alien Species:** Encourages legislature to incorporate economic principles into their national or state strategies for addressing Invasive Species, these should be built on five main principles: user pays; full social cost pricing; precautionary principle; protection of the public interest; and subsidiarity.
4. **Institute a system of Environmental Risk Analysis (if feasible):** Risk analysis measures should be used to identify and evaluate the relevant risks of a proposed activity regarding alien species and determine the appropriate measures that should be adopted. EIA plays an important role in the decisions to undertake specific processes or activities. Decision-makers should ensure the use of strategic and/or project specific EIA in assessing the impact, long-term and short-term, of species introductions.
5. **Build Public Awareness and Engagement,** including the development of a public awareness campaign, engaging key public and private stakeholders, building community capacity, and information sharing with other states and organization.

CNMI State Wildland Fire Plan 2014-2024

As described above, wildfires are a reoccurring problem within the CNMI that pose a threat to both wildlife and people. Almost all wildfires in the CNMI stem from human activities such as unattended fires, trash burning, cigarette littering or the intentional burning from hunters. The CNMI State Wildland Fire Plan for 2014-2024 outlines Objectives and Initiatives that will govern the Cooperative Fire Agreement between CNMI Forestry and the CNMI DFEMS.

In addition, DFEMS intends to identify priority communities to collaborative community wildfire protection plan (CWPP) development.

The Objectives and Initiatives found in the plan are outlined below. The full plan can be accessed at: https://opd.gov.mp/library/plans/2014-2024-state-wildland-fire-plan-draft/

The objectives of the state fire assistance in the CNMI:

1. Provide the community with an increased awareness on rural fire protection and safe burning practices.
2. Maintain and improve fire protection effectiveness and efficiency on federal and nonfederal lands.
3. Provide a consistent information and education campaign on an annual basis to homeowners relating to fire prevention.
4. Maintain and update the Commonwealth of the Northern Mariana Islands Fire Prevention Assessment Plan.
5. Enhance communication capabilities with other State Cooperators relating to program needs.
6. Provide homeowner assistance relating to hazard fuel reduction and implementation of defensible spaces around structures.

7. Provide adequate rural fire protection and suppression services to interface and intermix settings.
8. Establish a working relation with the general community such as fanners, ranchers, and outdoor users on the importance of safeguarding our natural resources specifically forested areas.
9. Achieve higher funding benefits that exceed regular funding level earmarked for the Commonwealth of the Northern Mariana Islands (CNMI).

The following are general areas of concern for the Commonwealth of the Northern Mariana Islands State Fire Program:

1. **Reduce losses with respect to Wildland Urban Interface (WUI)**
   a. Expand public awareness activities regarding hazards and risks associated with unmanaged fuel mitigation practices to homeowners, developers, and outdoor goers.
   b. Implement an effective management technique, development of strategies, and method when dealing with wildland fire emergencies.
   c. Increase or enhance training capabilities of wildland fire personnel in areas of WUI settings.
   d. Update of modern firefighting resources and technology relating to wildland urban interface.
   e. Establish an effective understanding between urban and rural fire protection services.
   f. Delineation of jurisdiction of fire agencies involved at fire incidents.
   g. Emphasis to individual communities of their responsibilities as a citizen in safeguarding our resources and forested areas.
   h. Work toward the introduction of legislation to enact laws or ordinances at all level of government with respect to conservation and protection of our forest.
2. **Training**: Building professional development and skills, particularly through training opportunities outside of the CNMI in jurisdictions such as California, Florida, and elsewhere.
3. **Vegetation Management**: Creating a healthy forest, reduce fuel accumulation and exposures, and create effective fuel breaks and fire protection measures in high-risk areas.
4. **Firefighting Asset Acquisition**: Continue the acquisition of firefighting equipment and fire apparatus to provide an effective and efficient fire protection and fire suppression services on the islands.
5. **Information and Education**: Conduct presentations relating to fire safety to residents, business establishments, fanners, and outdoor goers, with the goal of developing fire safety awareness among the public.
6. **Cost Effective through Analysis and Planning**: Identifying issues affecting rural and wildland fire protection and suppression programs as well as delineating areas for program improvement and effectiveness

CNMI Invasive Species Strategy and Action Plan

DOA's Invasive Species Strategy and Action Plan (ISSAP) 2015-2020 focuses on pests of Agriculture and includes specific management strategies and a formal action plan. The plan was developed under the direction of the Agricultural Advisory Committee (AAC) that is made up of resource professionals, state and federal agency, program managers, private landowners, and commercial businesses. The plan aims to identify "acceptable practices towards protection, promotion, and sustainability while maintain acceptable

cultural farming and ranching practices, promotion of economic development, and to edify land managers and landowners the value of farming". The final plan was reviewed by the AAC and by the DLNR Secretary's representative for Natural Resources. DOA also manages the import of animals into the CNMI including quarantine through its Animal Health and Industry Section.

The plan describes both established invasive species as well as potential pathways of introduction for other invasive species (such as the brown tree snake) that are well established in nearby jurisdictions but have not yet gained traction in the CNMI. The document also describes some ways forward for better management of invasive species, including active management and restoration of native forests. An expanded description of this Strategy and Action Plan can be found in Appendix A.

Strategies (in part from 2017 ISSAP):

- **Coordinate Regional Efforts**, specifically between CNMI, Guam, and Hawaii which all have Invasive Species Councils (ISC) with the same basic objectives, yet have historically acted independently from one another.
- **Be Knowledgeable**: To know which invasive species we should focus on, we need to understand their potential to cause damage, the cost in terms of both time and money to target them, and our potential for success.
- **Be Prepared and Proactive**: Plan and implement defensive actions early and in advance in order to respond to invasive species detections quickly and prevent an invasive species' ability to establish itself.
- **Plan for long-term invasive species management**: Extending short-term management plans into long-term and permanent management responses.
- **Build Resistance and Resilience:** Foster resistance and resilience in native environments through monitoring and encouraging native biological diversity.
- **Restore and Recover Damaged Forests**: Restore and recover forests where and to the extent possible, and remove or reduce the invasive species within them.
- **Involve the Community:** Educate the public to change behaviors and encourage the prevention and further spread of invasive species and to enlist their help is critical to our success.
- **Limit the U.S. Military's Environmental Damage in the Marianas**: Work with the US Military to reduce damage to the CNMI environment.

Actions:

- Identify, authorize and enable a lead agency to coordinate regional efforts. The CNMI ISC was formed in 2016. Continue to participate in the Regional Invasive Species Committee (RISC).
- Expand inspection and interception efforts to include all interisland travel in the CNMI
- Create an invasive species database committee under CISC
- Analyze Threats by Individual Invasive Species
- Inventory and survey the Northern Islands
- Establish Working Relationships with Guam and Hawaii
- Coordinate Local Agency/Stakeholder Activities
- Create a Funding Committee
- Create a Community Outreach Program

Forest Inventory Assessment

The forests of Rota, Tinian, and Saipan were systematically inventoried in 2004 and 2015 by the USDA Forest Service Forest Inventory and Analysis Program (FIA).

Fieldwork for this project was primarily conducted by foresters from the CNMI Forestry program with training and program management assistance from FIA foresters, the University of Guam, and the University of Hawaii. The data collected on these long-term research plots can be used to help meet the goals of the Micronesia Challenge.

In 2015, 37 FIA field plots were visited in a variety of forest types. High-resolution satellite imagery also was used to map five broad classes of land cover: forest, nonforest vegetation, urban, barren, and inland water.

CNMI is expanding the frequency and intensity of monitoring plots in identified conservation priority areas to further meet the goals laid out by the Micronesia Challenge Terrestrial Measures Working Group.

Commonwealth of the Northern Mariana Islands 2015 Data Summary
- Forest area: 60,206 acres
- Unreserved forest land: 45,371 acres; protected forest land 13,217 acres; mangrove forests 1,617 acres
- Number of live trees: 83,813,945
- 46 tree species recorded
- Net live tree volume: 32,616,103 cubic feet
- Live tree aboveground biomass: 1,645,957 tons
- Live tree aboveground carbon: 822,978 ton

Critical Forestry Issues Identified by Stakeholders

CNMI Forestry consulted with local experts, stakeholders and partners to identify critical issues related to CNMI's forests. These issues include: sustainability of urban forests, conservation of native flora and fauna, erosion control/protection of coral reefs, conservation of wetlands, and maintaining fresh water quality.

SUSTAINABILITY OF URBAN FORESTS

PROTECTION OF CORAL REEFS

CONSERVATION OF WETLANDS

CONSERVATION OF NATIVE FLORA AND FAUNA

MAINTAINING FRESHWATER QUALITY

Issue 1 – Sustainability of Urban Forests

CNMI's urban forests are comprised of native and non-native species planted and managed around commercial (including restaurants, hotels, entertainment, recreational businesses), residential (single-family and apartments) and public areas (including churches, government services, hospitals, schools, and social halls). The FIA program conducted a systematic inventory of the forests of Rota, Tinian, and Saipan in 2004 and in 2015 and reported that based on 75,407 acres on the three main islands, about twelve percent of the landscape were classified as urban land (Donnegan et al., 2004). Saipan has the largest urban forest area, which makes up 21 percent of total forest area. Majority of urban land in Saipan is concentrated in and around villages in the West Takpochao watershed. West Takpochao watershed, which covers 6.62 square miles (17.14km^2), contains the villages of Chalan Laulau, I Liyang, Gualo Rai, As Falipe, Takpochao, Garapan, China Town, Fananganam, Maturana Hill,Chalan Galaide, American Memorial Park, As Palacios, Navy Hill, As Rabagau, Puerto Rico, Lower Base, Sadog Tasi and Capitol Hill. The development within the area is also the heaviest scattered with family compounds, houses, apartment buildings, small farms, businesses, roads and parking infrastructure and major public institutions such as the Northern Marianas Housing Corporation, and the Commonwealth Healthcare Center.

CNMI's urban forested areas not only provide eye-catching aesthetics, they also provide social, ecological, cultural and economic services for residents, visitors, schools and businesses. These benefits including reduced energy costs through shading; improved water quality by removing pollutants; slowed storm runoff and costal stabilization; enhanced wildlife habitat, and increased human health and well-being.

The focus must be to increase urban greenspace while at the same time enhancing public benefits derived from this critical ecosystem service. Engaging the public and educating them about the benefits of urban forests could help improve public understanding of decisions related to the development of green infrastructure and minimize conflicts on the use and functions of urban forests. Increasing knowledge and fostering dialogue empowers local communities, not only in planting trees and fostering greater respect for CNMI's urban forests but in community collaboration, environmental education and public policies that will lead to a more beautiful, healthy and sustainable island.

Threats to Urban Forests
The care and management of CNMI's urban forests can be complicated by natural and social factors. As urban expansion continues, such challenges are likely to increase and new ones might emerge. The unprecedented rate of development and increase in population threatens CNMI's urban forests has resulted in urban forest areas being replaced with development projects such as hotels and condominiums. Urban greenspace requirements are not incorporated into any DPL leases, as well as all DEQ, DCRM, and zoning permits and regulations, or Qualifying Certificate requirements. This increase in impervious surfaces due to development make it difficult to promote green infrastructure and protect CNMI's urban forests. CNMI needs to proactively include green infrastructure and trees in the planning phase of project development. Important concerns include providing adequate space for trees, connecting green areas to the flow of water, and designing and maintaining plantings to maximize net benefits over the long term

Plants and mulch imported for the urban landscape can become invasive threats themselves as well as serving as pathways for the introduction of invasive pests and plant pathogens. Education and awareness

on these pests and diseases and tree damages from human and/or natural disturbances is critically needed both form government inspectors and the local public.

According to the publication entitled Catastrophic Storms and the Urban Forests, a storm's impact on the urban forest is a growing threat and its consequences affect our urban forests and all communities. The percentage of population living in coastal areas and the rising number of predicted high-intensity storms and typhoons has created highly vulnerable coastal areas. Planting the right tree in the right place and encouraged shoreline vegetation can help mitigate not only the effects of storm surge, flooding, but also mitigate larger impacts of climate change.

Saipan Landcover and Vegetation
USFWS 2016 Classification

USFWS 2016 Vegetation

Mixed Grass/Herb
Mixed Introduced
Native Limestone
Agriculture
Coastal Scrub
Developed
Developed-Vegetated
Emergent Wetland
Grassland
Leucaena Thicket
Scrub Shrub

Data Sources:
U.S. Fish and Wildlife Service – 2016
Amidon et. al, 2017

Tinian Landcover and Vegetation
USFWS 2016 Classification

USFWS 2016 Vegetation
- Native Limestone Forest
- Mixed Introduced Forest
- Mixed Grass/Herbaceous
- Leucaena Thicket
- Agriculture
- Coastal Scrub
- Developed
- Developed - Vegetated
- Emergent Wetland
- Scrub/Shrub

Data Sources:
U.S. Fish and Wildlife Service – 2016
Amidon et. al, 2017

Figure 18: Landcover and vegetation classifications for the islands of Saipan, Tinian, and Rota, as of 2016.

Native Limestone Forest

The following maps highlight the coverage of native limestone forest among Saipan, Tinian, and Rota, and are based on the most recent, comprehensive vegetation mapping effort for the Marianas Archipelago. This effort was led by the U.S. Fish and Wildlife Service, and included a primary objective to improve the delineation of native dominated forest. While other land cover maps have been previously developed for the Marianas, they have either aggregated distinct vegetation types into a single classification, such as "Evergreen Forest" to describe all forest types (NOAA 2016) or, if they are detailed, have not been completed for all islands or been updated within the last ten years (USFS, Liu and Fischer 2006). A breakdown of the USFWS land cover classes (23 in total), source data, remote-sensing, and field assessment methodology is detailed in Amidon, et. al 2017.

In the updated USFWS forest classification, "native limestone forest" is defined by forests of varying ages present on a limestone substrate, with a canopy dominated by native tree species. The dominant canopy species for this class in CNMI include *Elaeocarpus joga* (joga), *Pisonia grandis (umumu or umomo)*, *Hernandia labyrinthica* (oschal), *Hernandia Sonora* (nonak or nonag)*, Ficus prolixa* (nunu), *Macaranga thompsonii* (pengua), and *Intsia bijuga* (ifit). Dominant canopy species vary by each island, and in some cases by region of an island. Species composition for the forest classes in the following maps builds on a multi-decade lineage of vegetation classification work in the Marianas, with seminal efforts by Falanruw et. al (1989) and Raulerson and Rinehart (1991).

Urban Areas and Urban Forest

The following maps highlight the coverage of developed areas and "urban forest" coverage among Saipan, Tinian, and Rota, and are based on the most recent, comprehensive vegetation mapping effort for the Marianas Archipelago. This effort was led by the U.S. Fish and Wildlife Service, and a detailed breakdown of the USFWS land cover classes (23 in total), source data, remote-sensing, and field assessment methodology is detailed in Amidon, et. al 2017.

In the following maps, urban areas and urban forest landcover are defined by two specific classes: "Developed" and "Developed Vegetation". Developed vegetation includes lawns and mowed areas, as well as ornamental and shade trees and shrubs. Parks, golf courses, and residential open spaces are included in this category. The residential villages of Saipan, Tinian, and Rota are comprised largely of the Developed Vegetation type, while more densely populated villages with infrastructure, street grids, and higher concentrations of buildings are represented as "Developed". This class includes all buildings (concrete and other materials), paved surfaces, and roads. Gravel and unpaved roads are generally included in this category as well, as this landcover class is often used in conjunction with analytical tools to determine stormwater runoff and groundwater filtration potential. Given the interest in community stewardship of urban forest resources, it may be worthwhile for the CNMI to create a more nuanced delineation of "urban forest" in the future, to include not just the developed landscape, but also peripheral forest types and vegetated land fringing the urban space.

Native Limestone Forest

Native Limestone Forest
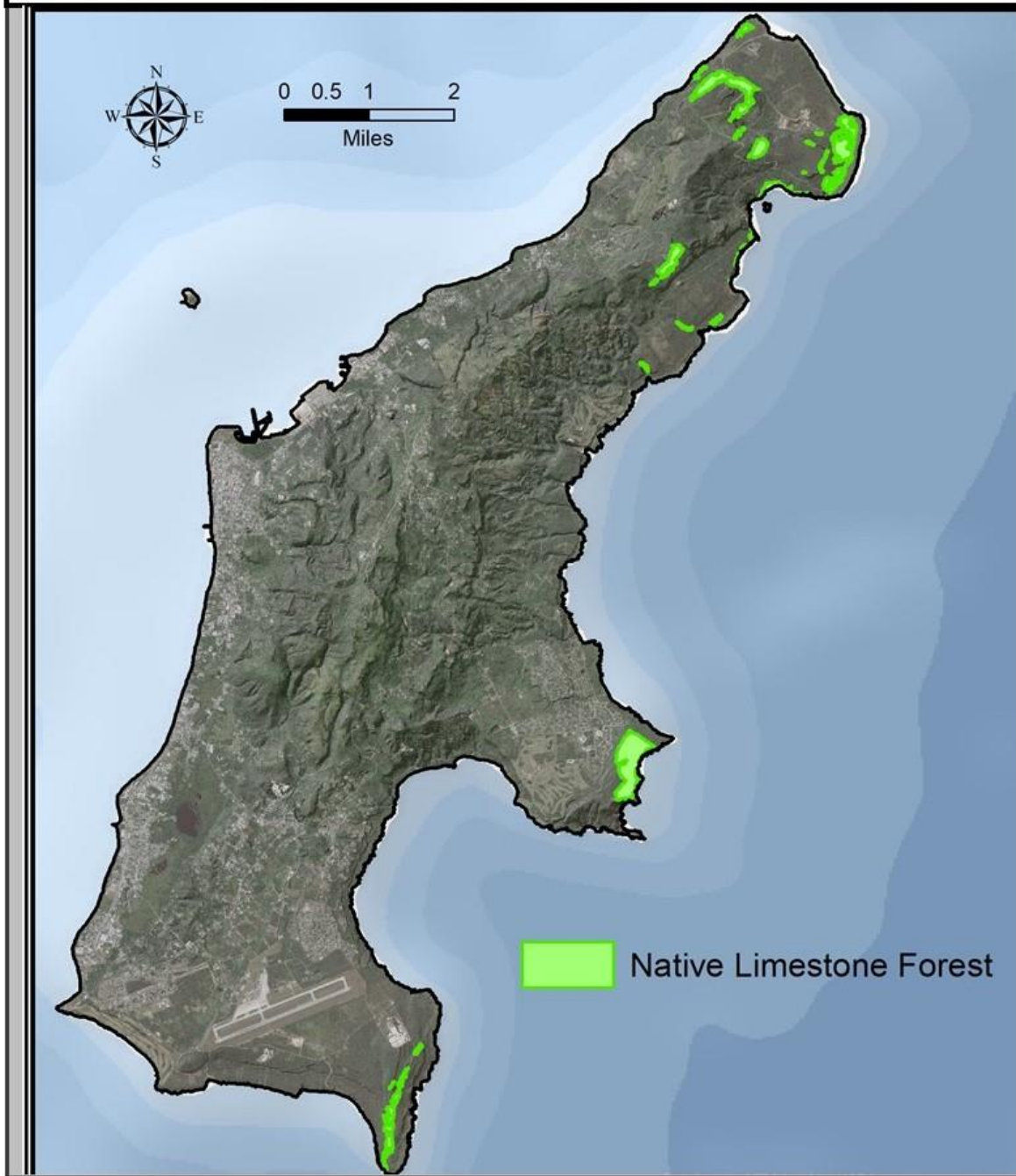
Data Sources:
U.S. Fish and Wildlife Service – 2016
Amidon et. al, 2017

Saipan Landcover and Vegetation:
Developed Areas (Urban & Impervious Surface)
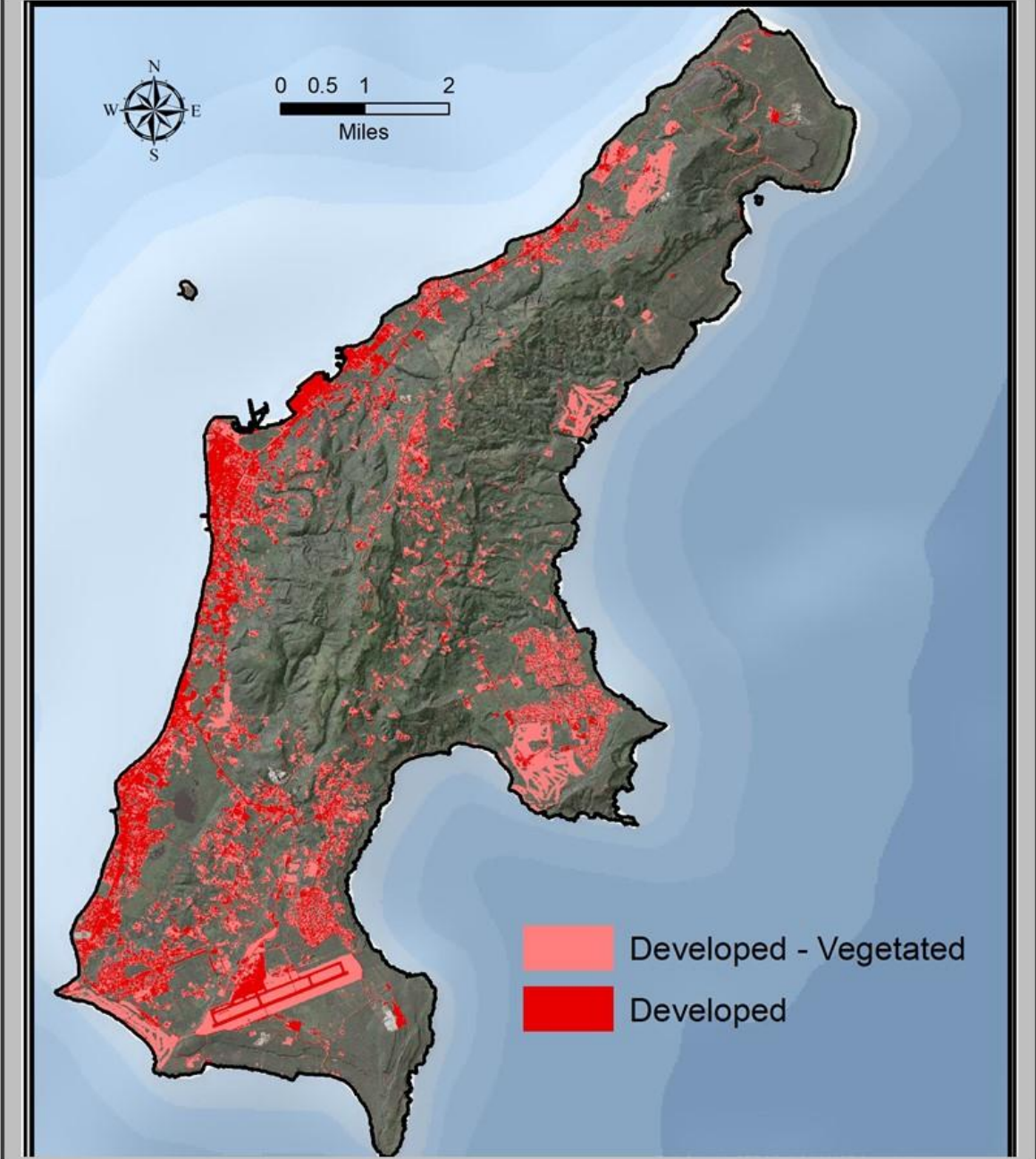
Developed - Vegetated

Developed

Data Sources:
U.S. Fish and Wildlife Service – 2016
Amidon et. al, 2017

Tinian Landcover and Vegetation: Native Limestone Forest

0 0.5 1   2
Miles

N
W   E
S

Native Limestone Forest

Data Sources:
U.S. Fish and Wildlife Service – 2016
Amidon et. al, 2017

Developed Areas (Urban & Impervious Surface)

Developed - Vegetated

Developed
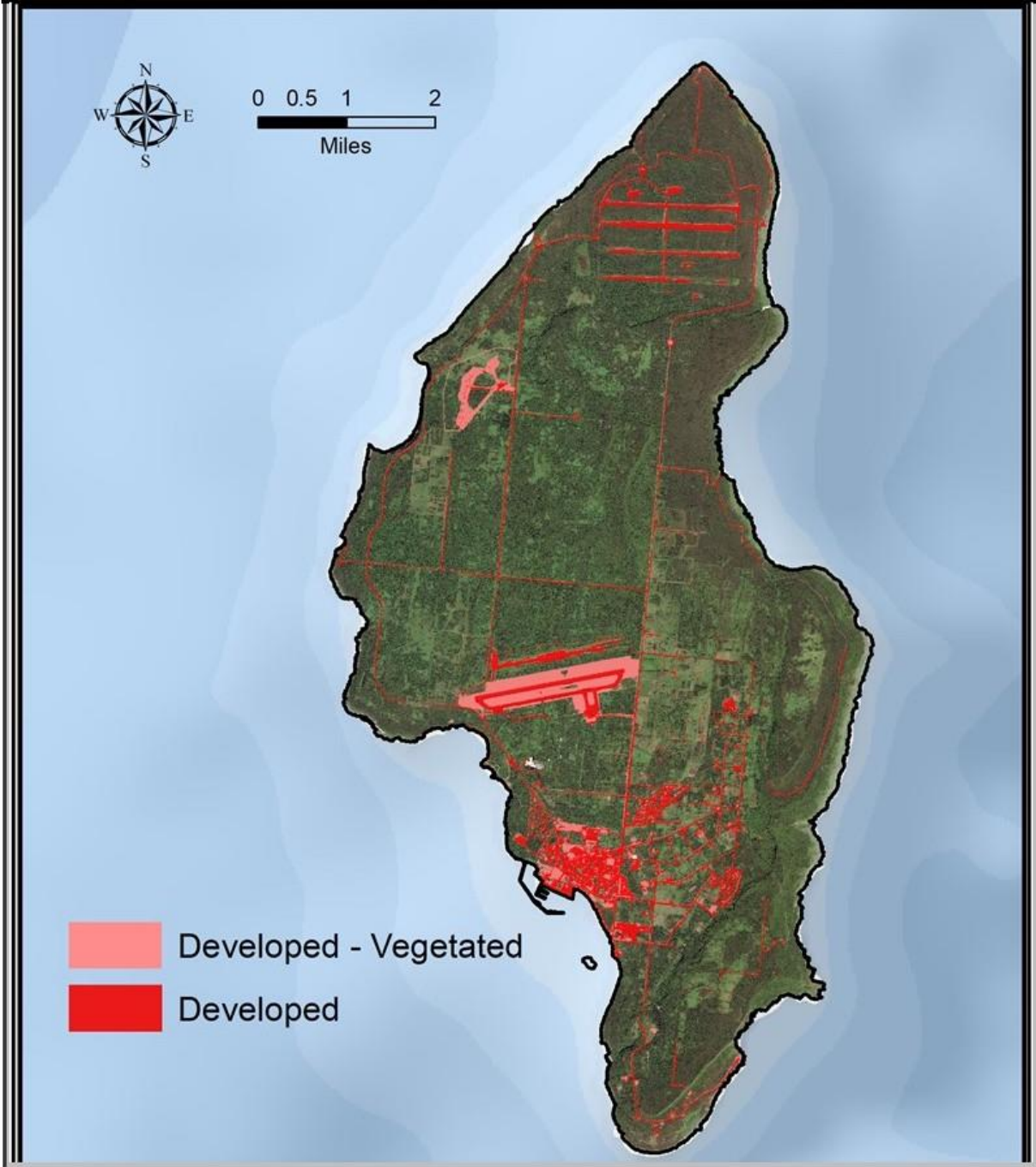
Data Sources:
U.S. Fish and Wildlife Service – 2016
Amidon et. al, 2017

Rota Landcover and Vegetation:
Native Limestone Forest

N
W E
S

0   0.5   1   2
Miles

Native Limestone Forest
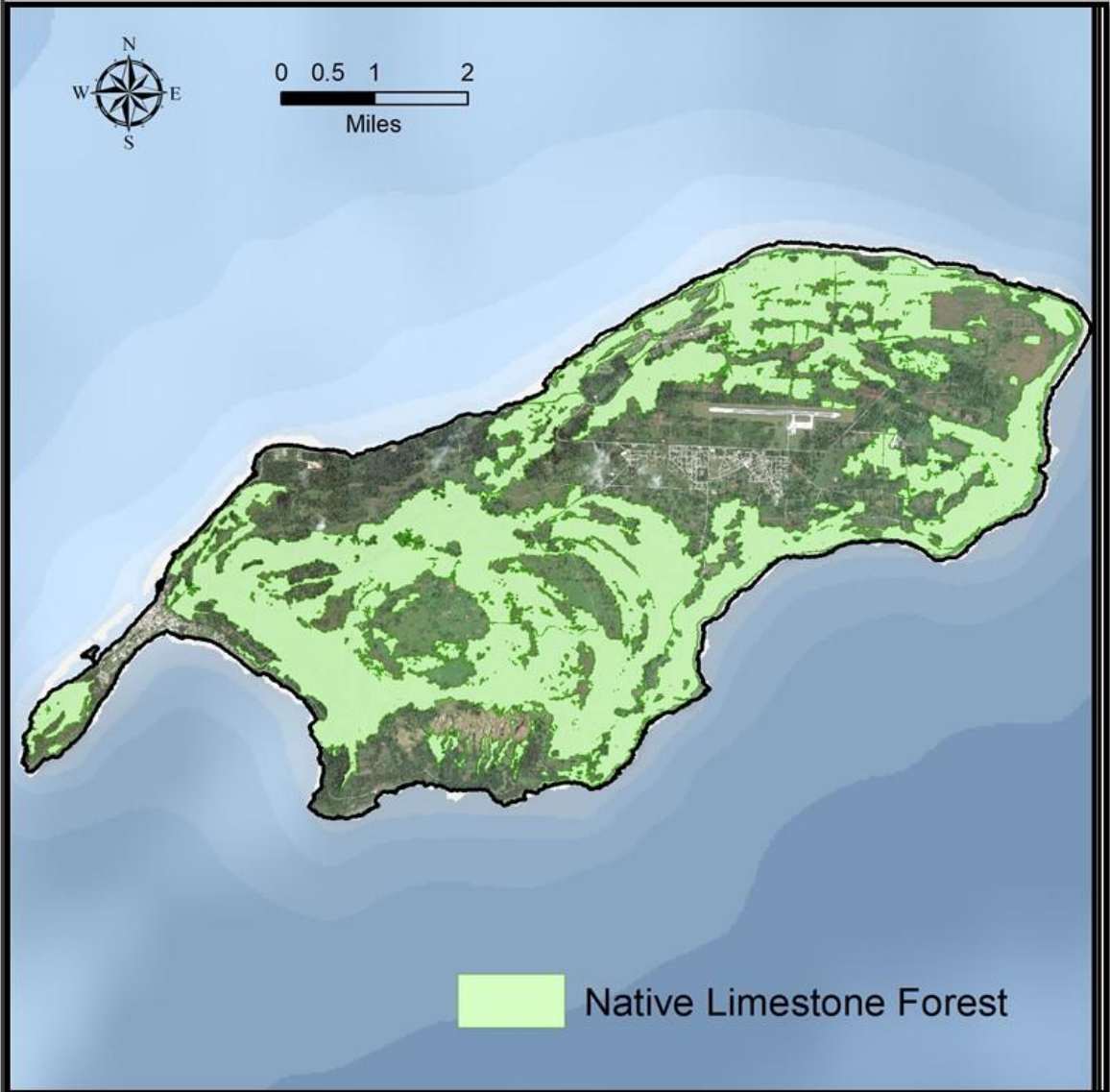
Data Sources:
U.S. Fish and Wildlife Service – 2016
Amidon et. al, 2017

Figure 19: Landcover and vegetation maps for Saipan, Tinian, and Rota, specific to Native Limestone Forest and Developed Spaces.

Priority Landscapes for Urban Forest Sustainability

Figure 20: Da'ok tree serves as a shade tree at the entrance of Marianas High School (Native Plant Guide, DCRM 2014).

The focus must be to increase urban greenspace in urban areas like the West Takpochao watershed while at the same time enhancing public benefits derived from this critical ecosystem service. Engaging the public and educating them about the benefits of urban forests improves public understanding of decisions related to the development of green infrastructure and minimize conflicts on the use and functions of urban forests. Increasing knowledge and fostering dialogue empowers local communities, not only in planting trees and fostering greater respect for CNMI's urban forests but in community collaboration, environmental education and public policies that will lead to a more beautiful, healthy and sustainable island.

These issue priorities overlap federal goals to:

- Mitigate and adapt to climate change;
- Protect and improve air and water quality;
- Conserve energy;
- Reduce the impacts of land use change, fragmentation, and urbanization on forest landscapes;
- Improve community health and well-being;
- Build urban forest resilience and mitigate the impacts of invasive pests and catastrophic events

Issue 2 - Protection of Coral Reefs

The people of the CNMI value coral reefs and are dedicated to their conservation. These diverse reef ecosystems provide traditional and subsistence uses, production of commercial food products, recreational opportunities for a healthy tourist economy, physical protection of the coastal zone from storms, unique educational opportunities, and novel research applications. Coral reefs are also integral to the CNMI's cultural heritage. The CNMI has some of the most beautiful and diverse marine ecosystems in the world. The CNMI is home to more than 1,000+ fish species and 256 coral species. Coral reefs are important to our islands because they provide us with food, protect our shorelines from typhoon damage and erosion, support our economy, and help maintain the environmental integrity of our oceans. Ancient Chamorros and Carolinians were expert fishermen with inherent knowledge of harvesting reef fish species such as tàtaga (unicornfish), mafute' (emperor), and palakse' (parrotfish). Traditional fishing methods such as spearfishing and talaya (throw-net) help preserve the cultural identity of the islands. The CNMI has seven Marine Protected Areas (MPAs), which are No-Take areas that prohibits fishing or harvesting of any marine species of plant or animal, prohibit take of coral (dead or alive), and prohibit all explosive or destructive activities to marine life. In Saipan, there are several marine protected areas such as Mañagaha Marine Conservation Area, Forbidden Island Marine Sanctuary, Bird Island Marine Sanctuary, Laolao Bay Sea Cucumber Sanctuary and Lighthouse Reef Trochus Sanctuary. In Rota, Sasanhaya Fish Reserve is adjacent to the Sabana Conservation area. The Tinian MPA is bounded from the Southwest Carolinas Point to Puntalan Diablo. Threatened coral species listed on the Endangered Species Act include the *Acropora globiceps*, *Acropora robusa*, and *Seriatopora aculeata*. Coral reefs are important to the people of CNMI because they provide traditional and subsistence uses, production of commercial food products, recreational opportunities for a healthy tourist economy, and physical protection from storms.

Threats to Coral Reef
Increased population and development over the past decade in the CNMI have exacerbated a number of threats to CNMI's coral reef ecosystems and has led to the destruction and reduced health of coral reefs and coral reef associated habitats. These effects are most noticeable on the island of Saipan, where approximately 90 percent of CNMI's population resides. Therefore, most coral reef management efforts have focused on Saipan. However, the other southern populated islands do have important coral reef ecosystems that are threatened by human impacts. 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. Additionally, this decline immediately impacts the CNMI's tourism and fisheries industries, and thus its economy. The CNMI government considers coral reef ecosystem conservation and management a high-priority concern.

Priority Landscapes for Coral Reef Protection

Figure 21: View of the Talakhaya watershed, Rota, CNMI.

Four local "priority" watersheds have been identified as the central focus of the CNMI Coral Reef Initiative's land-based coral conservation efforts: Garapan, Laolao, and most recently Achugao on Saipan, and Talakhaya on Rota (Figure 16 and Figure 17). These watersheds were selected for their economic, biological, and social significance because they are high-use areas with vital natural resources. They continue to be the highest priority areas in the CNMI due to having the most degraded coastal water quality. Integrated Watershed Management Plans for these watersheds and their recommendations for best management practices should be closely followed and prioritized. On Tinian, erosion control efforts in Carolinas and surrounding areas continue to be a priority. Sedimentation from unpaved roads, land clearing and development have destroyed roads and continue to harm nearshore marine environments.

Issue 3 - Conservation of Wetlands

Wetlands are extremely important ecosystems found throughout the CNMI. Wetlands in the CNMI include lakes, ponds, estuaries, marshes, swamps, streams, and mangrove forests that provide many essential services that contribute to the well-being of the local community. They help to control pollution and flooding, contain unique plant and animal species, provide habitat for wildlife, and offer recreational and educational opportunities for locals and tourists. In addition, wetlands provide nitrogen fixation and carbon sequestration. Wetlands have the ability to help control the amount of carbon dioxide in

our atmosphere. The plants and soils found in wetlands store carbon, preventing it from being released into the atmosphere as additional carbon dioxide. In Saipan, Tinian, and Rota, wetland ecosystem services are valued at $10.7 million each year. From land to sea, wetlands also play a critical role in filtering pollutants that may reach coral reefs, an ecosystem service valued at nearly $5 million (Wolfs Company 2019). At the federal level, Section 404 of the Clean Water Act helps to prevent individuals from unlawfully harming wetlands and regulates the discharge of dredged or fill material into waters of the United States unless the Army Corps of Engineers grants special permission. Wetlands in the CNMI have overlapping jurisdiction and are regulated and managed by local and federal agencies. Recognizing the importance of wetlands to the community, the DCRM classifies wetlands and mangrove areas as an "Area of Particular Concern" (APC). Development proposals within wetlands and mangrove areas must obtain APC permits to ensure that these areas are preserved or enhanced. Protecting and enhancing these critical ecosystems is crucial to preserving the health of CNMI residents and environment.

Threats to Wetlands
Wetlands in the CNMI continue to remain threatened by development, pollution, and invasive species. Increased pressure from development (landclearing and backfilling) and invasive species are the most common causes of wetland loss in the CNMI. Unpermitted fill of wetlands persists as an ongoing violation issue while development has the potential to encroach on wetland areas. Storm water runoff caused by heavy rainfall events make their way to wetland areas and reduce their water quality. MIHA and American Memorial Park (AMP) wetlands are impacted by the invasive pond apple (*Annona glabra*) and Indian fleabane (*Pluchea indica*) which not only outcompetes native wetland species but also changes their hydrological functions. Thus, wetland regulation and management are crucial to preserving these areas and ecosystem services for the future (DCRM 2019).

Priority Landscapes for Wetland Conservation
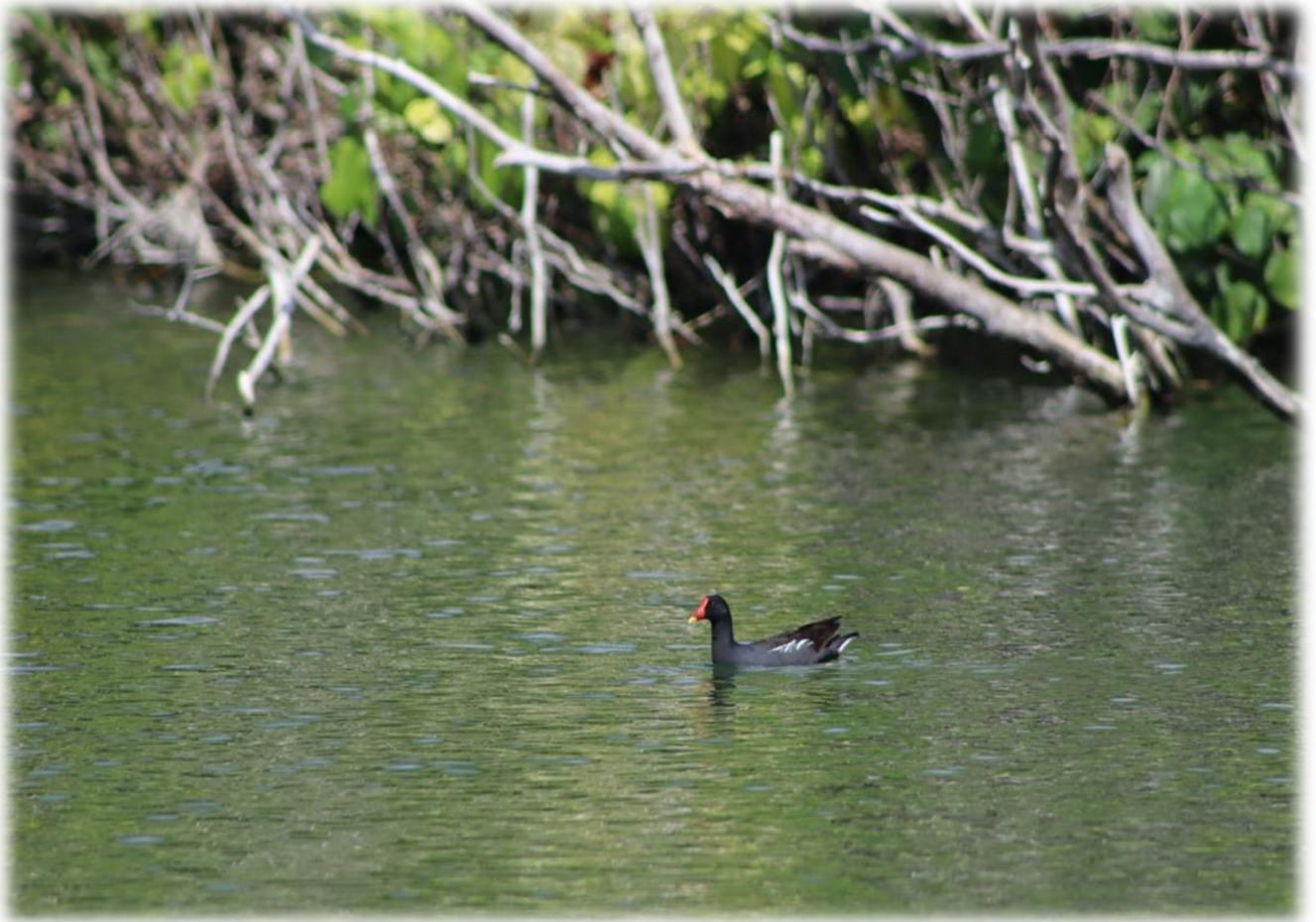
Figure 22: Kagman wetland serves as an important habitat for the endangered Marianas moorhen.

Wetland habitat includes lakes, natural and man-made ponds, estuaries, marshes, and swamps and are all priority landscapes for wetland protection and enhancement. In the CNMI, 642 acres of wetlands occur on the islands of Saipan, Tinian, and Pagan, with Rota having streams and associated riparian areas (BECQ 2018). Saipan has the most wetlands with Lake Susupe being the largest brackish-water lake. The 40-acre lake and 350 acres of palustrine emergent and forested freshwater wetland surrounding the lake comprise about 75 percent of Saipan's freshwater wetlands. Other wetlands include Lake Hagoi in Tinian, a freshwater lake that sits above an impervious surface or a perched water table surrounded by extensive marshes, and Marpo swamp. In the Northern Islands, there are two lakes on Pagan: Laguna Sanhiyon (Upper or Inner Lake) at 43 acres and Laguna Sanhalom (Lower or Outer Lake) at 40 acres. Perennial streams also occur on Saipan, such as the Talofofo Stream that feeds Jeffrey's Beach Estuary. Rota boasts a series of intermittent freshwater streams within the Talakhaya watershed. The only mangroves in the CNMI are found on Saipan. Mangroves in Sadog Tasi, American Memorial Park, Smiling Cove and stream mouths between Lower Base and Tanapag. There are extensive freshwater marshes on Saipan surrounding Lake Susupe, and extending north to Oleai and south to Chalan Kanoa and San Antonio. The most common ponds are found on golf courses provide important habitat for the endangered Mariana common moorhen (Figure 22). Wetlands purify and recharge groundwater and provide important wildlife

habitat. The Mariana common moorhen is completely dependent on wetland habitat, and wetlands are an important habitat for the nightingale reed-warbler.

Of particular concern for the CNMI are the few remaining mangrove forest habitats. Saipan hosts the only mangroves in the CNMI, most of which are located in the 30 acre American Memorial Park, the CNMI's only National Park, and are primarily comprised of the mangrove species *Bruguiera gymnorrhiza* (Greene et al 2019; Figure 23). As summarized in the 2019 National Resource Condition Assessment (NRCA) for the Park (Greene et al 2019), significant areas of Saipan's mangroves were cleared for sugarcane production during the Japanese administration (1919-1945). While most of the remaining mangrove habitat on Saipan was spared damage from wartime bombing (Perreault 2007), areas of these wetland were further cleared and later used as a landfill through 1978 (Cogan et al. 2013, Raulerson and Rinehart 1989). Resource managers are now working to restore these habitats. Most notably the Puerto Rico dump closure plan included the planting and continuous monitoring of 200 mangrove seedlings in the AMP wetland as mitigation for removal of wetlands during the creation of the Governor Eloy S. Inos Peace Park above the former Puerto Rico dump site (Greene et al 2019).
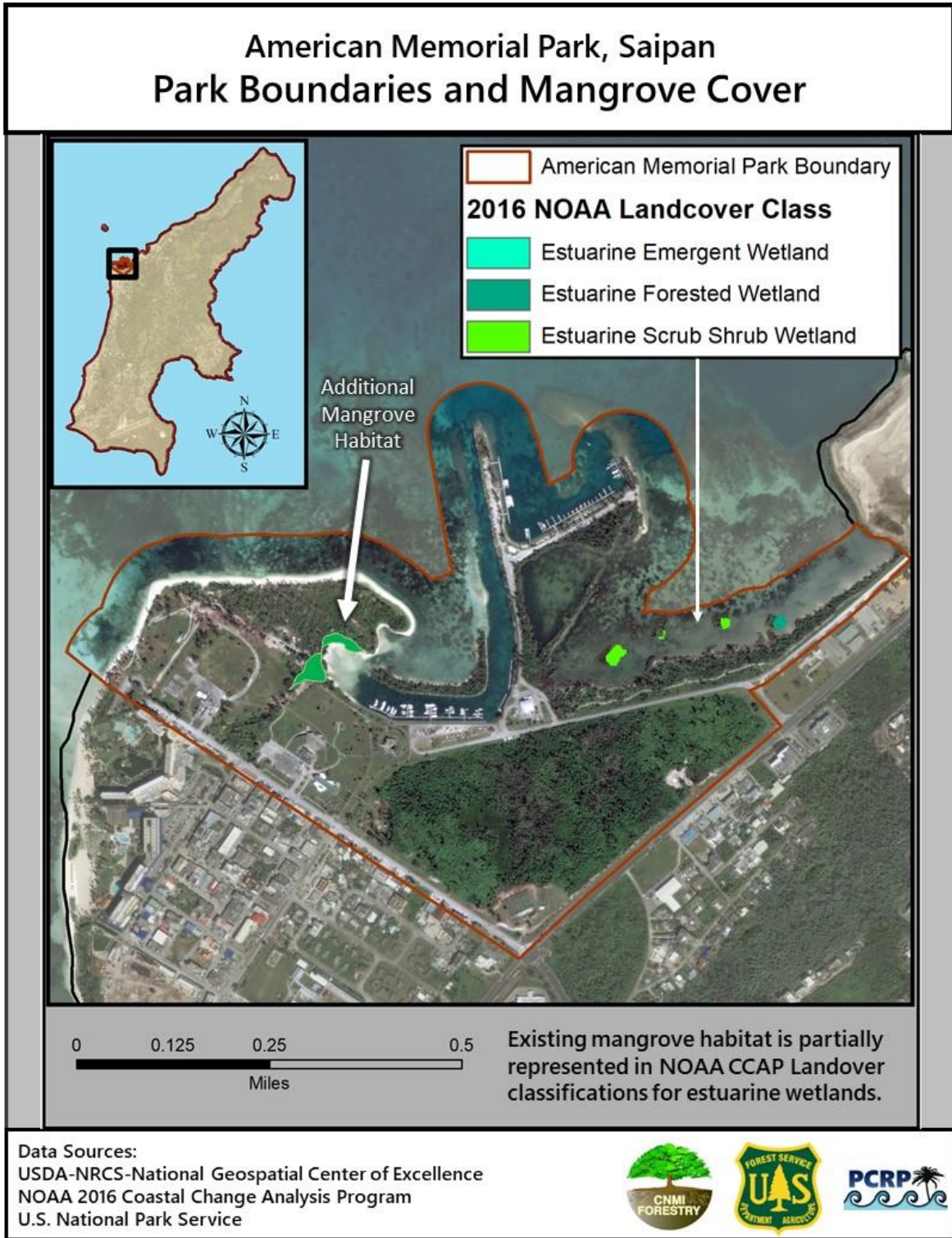
Figure 23: Mangrove cover in American Memorial Park.

Issue 4 - Maintaining Freshwater Quality

The main source of CNMI's freshwater comes from groundwater. On Saipan and Tinian, wells are used to take advantage of the natural underground water system. The primary source of water for the island of Saipan comes from 135 groundwater wells, the Donni Spring, and two Maui-type wells (Carruth, 2003). On Tinian, the primary water source comes from one Maui-type well. On Rota, springs, streams, and natural water caves occur and the islands major water source comes from this surface water supply. Freshwater on Rota also occurs in the form of seeps along the northern beach areas.

Threats to Fresh Water Quality
Unsustainable development, improper sewage waste systems of residences and businesses may affect the potential for ground water contamination. During heavy rainfall events, freshwater risks becoming contaminated with land-based sources of pollutants released from piggeries, agricultural fertilizers and pesticides from farms, and lack of maintenance of sewage waste systems.

Priority Landscapes for Maintaining Fresh Water Quality

Figure 24: Okgok freshwater stream within the Talakhaya Watershed, Rota.

High priority watersheds identified from the analysis include Laolao, Garapan, Achugao and Talakhaya. Within these watersheds, landscapes that pose the greatest threat of sediment and nutrient deposition into freshwater systems were delineated as high priority areas. These areas include landscapes with high

population growth, rapid development, steep slopes, stream corridors, and agriculture. Native forests were deemed important because of their role in absorbing excess nutrients and sediment, recharging aquifers, stabilizing soil, and moderating water flow.

Issue 5 - Conservation of Native Flora and Fauna

The CNMI is rich in diversity, both marine and terrestrial. CNMI's forests are home to many bird and plant species. Humans have inhabited the Mariana Islands for around 2,000 years, although the majority of change to CNMI's environment came in the last century with conversion to agriculture. The majority of remaining native forest is found on the northern uninhabited islands, although Rota and Aguigan have large stands of native old growth limestone forest. The variety of islands and habitats in CNMI has allowed for a high level of endemism to develop. CNMI's lush forest makes it a home for our native birds to nest and feed establishing their territories there. The CNMI has 150 species of birds, 12 of which are endemic to the CNMI. CNMI's forest is also home to a wide variety of plant species. Of over 220 native plant species, almost 40% are endemic. In addition to patches of native limestone forest, most of CNMI is covered by a mix of non-native forests, grasslands, plantations, and urban areas. Medicinal plants can also be found in native limestone forest areas. The leaves and bark of *Erythrina variegata*, known as Gaogao in the native tongue, are used medicinally for diabetes and other ailments, naturally occurring in native forests. *Morinda citrifoliais* a widely used medicinal plant. It is generally used as a cure all and to increase strength. The leaves are used to make tea or juice, commonly known as Noni juice. Preserving these diverse habitats, and the livelihoods and cultures of the people who depend on them, has required the collaboration between diverse collection of partners. The preservation and protection of CNMI's forests is imperative for conservation of endangered local flora and fauna and our indigenous heritage.

Threats to Native Flora and Fauna
The majority of forests on Rota, Tinian and Saipan have been disturbed continuously over time. Natural and human-caused disturbances, unsustainable development encroaching native forests, and invasive species are the biggest threats to CNMI's native flora and fauna. Effective management of our forestry programs can help to restore these habitats. The forests of the CNMI have been strongly influenced by a long history of disturbance, both human-caused and climatic disturbance. Deliberate forest fires set by hunters have been a challenge and over time have diminished critical forest habitats, endangering rare plant and animal species, and freshwater resources. Human populations and land use on the CNMI have changed, resulting in differing influences on forest vegetation. Land degradation and uncontrolled agricultural for economic development have been a common practice with private landowners and the government. Within the last century, the most important land use changes have involved the conversion of forests to agriculture and urban uses. The changes have been rapid. In addition to loss of forest to urbanization, invasive weeds have also become a threat to forests in the CNMI. Smothering invasive vines have been widespread throughout the CNMI. Continued development and implementation of strong invasive species programs to educate the public, assess threats and current status, and to eradicate or control several pests threatening forest sustainability are needed over the life of this FAP and beyond.

Priority Landscapes for Conservation of Native Flora and Fauna

Figure 25: Native limestone forest in the Laolao Watershed, Saipan.

All areas of CNMI's native limestone forests and undisturbed areas are considered priority landscapes including CNMI's terrestrial conservation areas. High priority landscapes determined from their native vegetation include priority watershed areas like Laolao, West Takpochau, and Achugao on Saipan and Talakhaya on Rota. All of CNMI's wetlands are important priority landscapes. West Carolinas native limestone forests in Tinian, Kastiyu and the east side of the island are also considered to be high priority landscape areas. All forested areas, including agroforests and urban trees across all islands are considered high priority areas for invasive species detection, eradication, control and management.

3. CNMI Forest Resource Assessment

Goals	STRATEGIES	Priority Issues						PROGRAMS THAT CONTRIBUTE	RESOURCES REQUIRED	NATIONAL THEME	PERFORMANCE MEASURE
		Conservation of Wetlands	Maintaining Fresh Water Quality	Sustainability of Urban Forests	Erosion Control/ Protection of Coral Reefs	Invasive Species	Conservation of Native Flora and Fauna				
Goal 1: Knowledge (Education and Outreach)	**1.1:** Extend the wide range of information and tools necessary for effective stewardship and specific actions they can take to protect CNMI's forest resources from ridge to reef	X	X	X	X	X	X	Department of Public Land (DPW), Bureau of Environmental and Coastal Quality (BECQ), Micronesia Islands Nature Alliance (MINA), National Park Service (NPS), US Fish and Wildlife Service (USFWS), NMC Crees, Marianas Visitors Authority (MVA), Office of Planning and Development (OPD), and Private Nurseries.	Forest Stewardship Program (FSP),	1, 2, 3	**1.1.1:** Number of community presentations regarding forest resources, conservation areas and health **1.1.2:** Number of people who attend community presentations **1.1.3** Number of printed communication materials distributed to landowners, developers and farmers
	1.2: Educate community on endemic, non-				X		X	Department of Public Land (DPW),	Forest Stewardship	1,3	**1.2.1:** Number of

	native and introduced, endangered and invasive plant species in the Marianas							Bureau of Environmental and Coastal Quality (BECQ), Micronesia Islands Nature Alliance (MINA), National Park Service (NPS), US Fish and Wildlife Service (USFWS), NMC Crees, Marianas Visitors Authority (MVA), Office of Planning and Development (OPD), and Private Nurseries.	Program (FSP), Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).		community presentations **1.2.2:** Number of printed guides given **1.2.3:** Number of participants at community presentation -Pre and Post Quizzes
	1.3: Partner with key agencies to provide information and technical support on agroforestry, soil conservation and agricultural best practices to farmers, landowners and		X		X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES),	Forest Stewardship Program (FSP)	1,3	**1.3.1:** Number of participants at community training **1.3.2:** Number of trainings provided

	community members.							Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources			**1.3.3:** Number of participants who sign up
	1.4: Develop and design a behavior change campaign on forest health and destructive land practices like burning.						X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, Department of Fire and Emergency Medical	Forest Stewardship Program (FSP), and Cooperative Health: Forest Health Management and Monitoring (FH).	1, 2, 3	**1.4.1:** Percentage of farmers and landowners who receive information on best practices. **1.4.2:** Number of participants at forest health meetings/forum **1.4.3:** Number of meetings held with farmers and landowners

								Services (DFEMS)			
	1.5 Provide native plant guides for landowners and developers	X	X	X	X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources	Forest Stewardship Program (FSP), Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).	1,3	**1.5.1:** Number of guides given out
	1.6: Conduct outdoor education programs like native tree planting, stream stabilization, watershed hikes, invasive vine control and wetland restoration.	X	X	X	X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture	Forest Stewardship Program (FSP), Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management	1,2,3	**1.6.1:** Number of participants who attend activities **1.6.2:** Percentage of activities where community

| | | | | | | | (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW). | and Monitoring (FH). | | feedback is requested

1.6.3: Number of trees planted

1.6.4: Development and implement a management strategy for vine control 0 including prioritizing treatment areas –

1.6.5: Percentage of area for vine control

1.6.7: Percentage of wetland area restored |

| | | Priority Issues | | | | | | | | |
CNMI	STRATEGIES	Conservation of Wetlands	Maintaining Fresh Water Quality	Sustainability of Urban Forests	Erosion Control/ Protection of Coral Reefs	Invasive Species	Conservation of Native Flora and Fauna	PROGRAMS THAT CONTRIBUTE	RESOURCES REQUIRED	NATIONAL THEME	PERFORMANCE MEASURE
	2.1: Empower communities to	X	X	X	X	X	X	-Micronesia Islands	Urban and Community	1,3	**2.1.1:** Number of

								Partners	Program		Measures
Goal 2: Community Stewardship	participate in community planting events and forest health efforts. Support native tree giveaways and promote community tree planting events							Nature Alliance (MINA), Department of Agriculture (DOA), USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW).	Forestry Program (U&CF) -Forest Health Management and Monitoring (FH).		trees given to landowners **2.1.2:** Number of planting events **2.1.3:** Number of participants at planting events **2.1.4:** Number of trees planted
	2.2: Implement incentive programs for private landowners to engage in resource	x	x	x	x	x	x	USDA-Natural Resource Conservation Service (USDA-NRCS),	Forest Stewardship Program (FSP),	1,3	**2.2.1:** Establish incentive programs for landowners

	conservation & management							NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW).	Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).		to participate in conservation **2.2.2:** Number of participants in forestry stewardship program, forestry advisory council, forest stewardship efforts. **2.2.3:** Number of farmers and private landowners signed up to NRCS Environmental Quality Incentive Program
	2.3: Continue annual re-vegetation efforts with stakeholder participation and community involvement	X	X		X		X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and	Forest Stewardship Program (FSp), Urban and Community Forestry Program	1,3	**2.3.1:** Number of volunteers enrolled in planting program

CNMI	STRATEGIES	Conservation of Wetlands	Maintaining Fresh Water Quality	Sustainability of Urban Forests	Erosion Control/ Protection of Coral Reefs	Invasive Species	Conservation of Native Flora and Fauna	PROGRAMS THAT CONTRIBUTE	RESOURCES REQUIRED	NATIONAL THEME	PERFORMANCE MEASURE
								Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW).	(U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).		**2.3.2:** Percentage of area reforested
		Priority Issues									
Goal 3: Invasive Species Control	**3.1:** Develop an invasive species detection, prevention, removal, and monitoring plan for all priority forests and wetland areas	x	X	X	X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),),	Forest Stewardship Program (FSP), Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management and	1,2,3	**3.1.1:** # of acres treated **3.1.2:** Plan developed and implemented by CNMI Forestry and key implementing partners

								Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW).	Monitoring (FH).		
	3.2: Minimize spread of pests into healthy tree stands		X	X	X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS),	Forest Stewardship Program (FSP), Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).	1,2,3	**3.2.1:** # of acres surveyed, treated and monitored;

CNMI	STRATEGIES	Priority Issues						PROGRAMS THAT CONTRIBUTE	RESOURCES REQUIRED	NATIONAL THEME	PERFORMANCE MEASURE
		Conservation of Wetlands	Maintaining Fresh Water Quality	Sustainability of Urban Forests	Erosion Control/ Protection of Coral Reefs	Invasive Species	Conservation of Native Flora and Fauna				
								Division of Fish and Wildlife (DFW).			
	3.3: Improve biological, mechanical, and chemical control of invasive species through implementation of the Invasive Species Action Plan	X	X			X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW).	Forest Health Management and Monitoring (FH).	2	**3.3.1:** Biosecurity plan; number of acres treated; # of acres treated for CRB, *Mucuna pruriens*, etc.

Goal	Objective							Partners	Program	Priority	Outputs
Goal 4: Fire Prevention /Control and Suppression	**4.1:** Increase awareness and education of the community about how wildfires are affecting the watershed in schools, businesses and villages.	X		X			X	Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW), and Department of Fire and Emergency Medical Services (DEFMS)	Forest Stewardship Program (FSP), Cooperative Health: Forest Health Management and Monitoring (FH). Cooperative Fire Program	1,2,3	**4.1.1:** Number of school visits - **4.1.2:** Number of community presentations **4.1.3:** Number of students reached **4.1.4:** Pre and post surveys **4.1.5:** Number of villages visited
	4.2: Engage DFEMs with developing a comprehensive wildfire mitigation and post disturbance response plan.	x	x	x	x	x	x	Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW), and Department of Fire and	Cooperative Health: Forest Health Management and Monitoring (FH). Cooperative Fire Program	1,2,3	**4.2.1:** Number of coordination meetings held between DFEMS, CNMI Forestry and relevant agencies. **4.2.2:** Number of fire prevention, pre-suppression,

								Agency	Partner		Indicator
								Emergency Medical Services (DEFMS)			hazard mitigation and suppression activities performed **4.2.3:** Number of staff trained in fire risk
	4.3: Provide training opportunities for DFEMS and CNMI Forestry to mutually assist each other in wildfire suppression activities.	x	x	x	x	x	x	Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW), and Department of Fire and Emergency Medical Services (DEFMS)	:	1,2,3	**4.3.1:** Number of staff trained in wildfire suppression activities.
	4.4: Reduce fires in priority landscapes through citizen reporting and increase patrol/post fire	X	X		X		X	Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and	Cooperative Health: Forest Health Management and Monitoring (FH) and	1,3	**4.4.1:** Percentage of schools and percentage of public school system student

| | watch during the fire peak season | | | | | | | Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW), and Department of Fire and Emergency Medical Services (DEFMS) | Cooperative Fire Program | | population reached by fire prevention presentations. **4.4.2:** Percentage of activities where community feedback is requested **4.4.3:** Number of reported violations at conservation areas **4.4.4:** Number of community presentations regarding forest resources and protection **4.4.5:** Number of people who attend |

											community presentations
	4.5: Seek technical assistance in Geographic Information Systems (GIS) platforms for restoration and revegetation in fire prone areas			X		X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW) and Department of Fire and Emergency Medical Services.	Forest Stewardship Program (FSP), Cooperative Health: Forest Health Management and Monitoring (FH) and Cooperative Fire Program	1,2, 3	**4.5.1:** Number of areas mapped through GIS **4.5.2:** Number of staff who are trained in GIS to conduct rapid and accurate damage assessment and rehabilitation requirements after a wildfire.

	4.6: Secure funding support/resources for wildfire mitigation to restore sites after fire disturbance		X		X		X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA,), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW) and Department of Fire and Emergency Medical Services.	Forest Stewardship Program (FSP), Cooperative Health: Forest Health Management and Monitoring (FH) and Cooperative Fire Program	1,2,3	**4.6.1:** Amount of funding secured for restoration **4.6.2:** Percentage of area restored after fire disturbance
	4.7: Explore opportunities to develop Community Wildfire Protections Plans	x	x	x	x	x	x	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC	Forest Stewardship Program (FSP),	1,2,3	**4.7.1:** Number of stakeholder meetings

| | | | | | | | | Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW) and Department of Fire and Emergency Medical Services. | Cooperative Health: Forest Health Management and Monitoring (FH) and Cooperative Fire Program | | **4.7.2:** Number of community volunteers involved in the development of Community Wildfire Protections Plans (CWPPs). **4.7.3:** Number of volunteer opportunities developed for community **4.7.4:** Number of volunteers participating in community wildfire opportunities |

		Priority Issues									
CNMI	STRATEGIES	Conservation of Wetlands	Maintaining Fresh Water Quality	Sustainability of Urban Forests	Erosion Control/ Protection of Coral Reefs	Invasive Species	Conservation of Native Flora and Fauna	PROGRAMS THAT CONTRIBUTE	RESOURCES REQUIRED	NATIONAL THEME	PERFORMANCE MEASURE
Goal 5: Native Forest Restoration	**5.1:** Expand native seedlings inventory and restore affected areas with native vegetation.	X	X	X	X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative	Forest Stewardship Program (FSP), Urban and Community Forestry	1,3	**5.1.1:** Number of native tree seedlings inventory

							Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW) and Department of Fire and Emergency Medical Services (DFEMS).	Program (U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).		**5.1.2**: Number of native plant species propagated **5.1.3**: Number of community tree plantings **5.1.4**: Number of participants at planting events **5.1.5**: Number of native trees planted in affected priority areas
	5.2: Work with local nurseries to propagate native plants for ornamental and wildlife use	X	X	X	X	X	X	Private local nurseries, NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture	Forest Stewardship Program (FSP), Urban and Community Forestry Program (U&CF	1, 3	**5.2.1**: Number of local nurseries propagating native plants **5.2.2**: Number of

								(DOA), and Micronesia Islands Nature Alliance (MINA).		native plant giveaways
	5.3: Distribute native plants and shrubs to local residents, schools, and businesses	X	X		X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA,), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW)	Forest Stewardship Program (FSP), Urban and Community Forestry Program (U&CF		**5.3.1:** Number of seedlings distributed to communities, businesses, and schools
	5.4: Work with DLNR **to** enforce existing laws protecting native		X	X	X	X	X	Department of Lands and	Forest Health Management and	1,3	**5.4.1:** Number of

							Partners	Program	#	Objectives
and endangered plant species like Nigas							Natural Resources	Monitoring (FH).		regulations passed
5.5: Implement forest monitoring plan including updated forest trends and maps to compare vegetation change	X		X	X	X	X	Department of Lands and Natural Resources (DLNR), Bureau of Environmental and Coastal Quality (BECQ), and USDA-Natural Resource Conservation Service (NRCS).	Forest Health Management and Monitoring (FH); FIA program	1,3	**5.5.1:** Review recent FIA data for trends in forest inventory and forest health. Use FIA and other data to develop a forest health monitoring plan as needed. **5.5.2:** Tree surveys conducted at priority areas and reference sites; including observations for pests on urban trees
5.6: Develop guidance on succession plantings and areas of replanting badland areas in priority watersheds	X	X		X	X	X	Department of Lands and Natural Resources (DLNR), Bureau of Environmental and Coastal Quality (BECQ), and	Forest Stewardship Program (FSP), Forest Health Management and Monitoring (FH).	1,3	**5.6.1:** Percentage of barren areas revegetated **5.6.2:** Number of seedlings planted

Strategy							Lead Agencies	Program	#	Measure
							USDA-Natural Resource Conservation Service (NRCS).			**5.6.3:** Number of areas replanted replicating efforts from succession plantings.
5.7: Work with permitting agencies to provide native plants and shrubs for restoration as development mitigation measures						X	Department of Lands and Natural Resources (DLNR), Bureau of Environmental and Coastal Quality (BECQ),Division of Fish and Wildlife and Saipan Zoning Office.	Forest Health Management and Monitoring (FH). Forest Stewardship Program (FSP)	2	**5.7.1:** Establish guide for developers on best management practices
5.8: Support native wetland and limestone forest plant nursery at Forestry to propagate wetland and native plant species for site restoration and mitigation projects.	X	X	X	X		X	Department of Lands and Natural Resources (DLNR), Bureau of Environmental and Coastal Quality (BECQ),Division of Fish and Wildlife and Saipan Zoning Office.	Forest Health Management and Monitoring (FH). Forest Stewardship Program (FSP)	2	**5.8.1:** Number of native plants propagated and given away

CNMI	STRATEGIES	Conservation of Wetlands	Maintaining Fresh Water Quality	Sustainability of Urban Forests	Erosion Control/ Protection of Coral Reefs	Invasive Species	Conservation of Native Flora and Fauna	PROGRAMS THAT CONTRIBUTE	RESOURCES REQUIRED	NATIONAL THEME	PERFORMANCE MEASURE
						X	X	Department of Lands and Natural Resources (DLNR), Bureau of Environmental and Coastal Quality (BECQ),Division of Fish and Wildlife and Saipan Zoning Office.	Forest Health Management and Monitoring (FH). **Forest Stewardship Program (FSP)**	2	**5.9.1:** Tree surveys and monitoring plan implemented **5.9.2:** Number of fences installed
	5.9: Establish exclusion fences for protection of endangered trees from feral animals										
		colspan_priority									

CNMI	STRATEGIES	Conservation of Wetlands	Maintaining Fresh Water Quality	Sustainability of Urban Forests	Erosion Control/ Protection of Coral Reefs	Invasive Species	Conservation of Native Flora and Fauna	PROGRAMS THAT CONTRIBUTE	RESOURCES REQUIRED	NATIONAL THEME	PERFORMANCE MEASURE
Goal 6: Capacity Building	**6.1:** ID other critical habitat / forest areas	X	X	X	X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and	Forest Health Management and Monitoring (FH).	1,3	**6.1.1:** Increase percentage of critical habitat identified and protected **6.1.2:** Increased cultural awareness. Acres of forest made more resilient. **6.1.3:** Number of protected

								Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW) and Department of Fire and Emergency Services.			areas monitored
	6.2: Provide regular training for CNMI Forestry staff in community engagement techniques. (Need for frequent training opportunities on multiple subjects—stakeholder engagement, communications, forest health, native and non-native tree species, invasive species, and tree planting	x	x	x	x	x	x	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and	Forest Stewardship Program (FS), Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).	1,2, 3	**6.2.1:** Number of staff trained in community engagement techniques **6.2.2:** Number of community activities implemented

								Wildlife (DFW).		
	6.3: Support the development of community management programs to increase public knowledge of, support for and participation in native tree planting activities.	x	x	x	x	x	x	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW).	Forest Stewardship Program (FSP), Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).	1,2, 3	**6.3.1:** Number of community programs available **6.3.2:** Number of community members who participated in tree planting **6.3.3:** Number of community members who participated in tree education presentations
	6.4: Provide opportunities for community members to participate in field-based restoration	x	x	x	x	x	x	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC	Forest Stewardship Program (FSP), Urban and Community	1,2, 3	**6.4.1:** Number of community members who participate in

								Partners	Programs		Metric
	activities and tree planting certification.							Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW).	Forestry Program (U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).		field-based restoration activities **6.4.2:** Number of community members trained to be certified arborists.
	Inhouse training to strengthen resource capabilities	X	X	X	X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environment	Forest Stewardship Program (FSP), Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management and	1,2, 3	**6.5.1:** Number of staff trained and participated in professional development

								al and Coastal Quality (BECQ), and Department of Lands and Natural Resources, National Park Service (NPS), Division of Fish and Wildlife (DFW) and Department of Fire and Emergency Services.	Monitoring (FH).		
	6.6: Secure funding to hire more forestry staff to implement this Forest Action Plan	X	X	X	X	X	X	USDA-Natural Resource Conservation Service (USDA-NRCS), NMC Cooperative Research Extension and Education Services (NMC CREES), Division of Agriculture (DOA),), Bureau of Environmental and Coastal Quality (BECQ), and Department of Lands and Natural Resources,	Forest Stewardship Program (FSP), Urban and Community Forestry Program (U&CF), and Cooperative Health: Forest Health Management and Monitoring (FH).	1,2, 3	**6.6.1:** Number of staff hired and positions filled

								National Park Service (NPS), Division of Fish and Wildlife (DFW) and Department of Fire and Emergency Services.			

4. Stakeholder Groups Coordinated with for the Statewide Assessment and Strategy

State Forest Stewardship Coordinating Committee -The State Forest Stewardship Coordinating Committee is referred to as the CNMI Forestry Advisory Council**. The CNMI Forestry Advisory Council** will play a role in the coordination and assistance of the implementation of the FAP with communities across the CNMI. The Advisory Council will serve as an advisor, facilitator and reviewer of projects and proposals that address priority CNMI FAP strategies, especially those that can best be implemented by or with other agencies and communities.

State Technical Committee- The Natural Resource Conservation Service (NRCS) serves as the State Technical Committee through support from their district conservationist who is an active CNMI Forestry Advisory Council Member. In addition, a new State Forester based out of Hawaii will be offering support to CNMI Forestry through NRCS.

State Wildlife Agency- The CNMI Division of Fish & Wildlife is one of several agencies under the Department of Lands and Natural Resources of the Commonwealth of the Northern Mariana Islands government. The Division endeavors to conserve fish, game and wildlife, and to protect endangered and threatened species. Through research, monitoring, regulation, enforcement, planning and management, the Division seeks to ensure the long-term survival and sustainability of the CNMI's natural resources for present and future generations. CNMI Forestry works closely with DFW's wildlife section incorporating CNMI's Wildlife Action Plan.

Applicable Federal land management agencies (required) – The USFWS has responsibility for implementing the requirements of the Endangered Species Act, which is designed to protect habitats and ecosystems for species in danger of becoming extinct. The Fish and Wildlife service implements the law for all land animals and plants. Species that have been listed by the government as either threatened or endangered are protected from harmful activities like development and land clearing. If threatened or endangered species are located on any property, public or private, landowners or developers must obtain a federal permit prior to undertaking any activities that could adversely affect the species. Any development must go through the permitting process, which involve clearance from the BECQ, DFW, Historic Preservation Office (HPO), and the Zoning office. Through these agencies, CNMI Forestry can provide technical assistance in implementing best management practices of preservation, conservation and mitigation. In addition, CNMI Forestry provides assistance in replanting and mitigation efforts.

The National Park Service (NPS) in partnership with the CNMI government manages the American Memorial Park. American Memorial Park honors the American and Marianas people who gave their lives during the Marianas Campaign of World War II. The 133-acre park is a "living memorial" with beaches, sports fields, picnic areas, boat marinas, playgrounds, bike and walking paths, amphitheater, and a 30-acre wetland and mangrove forest. The park offers residents and visitors many opportunities to observe wildlife as well as numerous species of plants.

Military installations (as appropriate and feasible) - The U.S. leased land deemed surplus included 1,245 acres (504 acres) on Tinian, south of West Field, and also designated the "Exclusive Military Use Area." The Exclusive Military Use Area is used for military training. The area covers approximately the northern third of Tinian and comprises 7,574 acres (3,065 hectares) of land (DoN 2010). It is mostly

forested, providing a realistic combat environment for maneuvers and amphibious training (DoN 2010). In the Exclusive Military Use Area some simulated munitions and live-fire small arms are employed.

Stakeholder Engagement

Stakeholder coordination and engagement occurred during August through November 2020. Due to the ongoing COVID-19 pandemic and related "social distancing" measures, the traditional use of workshops and larger stakeholder meetings was not allowed. Therefore, stakeholder engagement was conducted through two methods: 1) One-on-one meetings with members of the key stakeholder groups; and 2) Surveys distributed to other relevant resource management agencies, decision makers, and task forces.

Stakeholder Group One-on-One Meetings

One-on-one meetings were held with members from the key stakeholder groups including:

- CNMI Forestry
- BECQ's Watershed Coordinator and Coral Reef Fellow
- Department of Fire and Emergency Medical Services
- Office of Planning & Development (OPD)

Stakeholder Survey

In addition to the individual meetings described above, a survey was developed and made available to relevant resource management agencies, decision makers, task forces, and other stakeholders.

A total of 23 surveys were filled out and returned, representing ten different stakeholder groups.

The CNMI Forestry together with the Pacific Coastal Resources Planning fostered dialogue and involvement with local stakeholders to gather input on challenges and opportunities for improvement regarding critical forest issues in the CNMI. This was conducted through in-phone key informant interviews, direct distribution of CNMI Forest Survey Assessments, an online google survey link posted on the Office of Planning and Development Website, and a google survey link sent to all key implementing partners. A copy of this survey is included in Appendix B of this FAP.

The CNMI Forest Resource Assessment surveys were designed to inform CNMI's top forestry issues, critical problems affecting priority landscapes, and opportunities CNMI Forestry has to better address those problems. The questionnaire required stakeholders to rank and explain problems and opportunities with their selected forest issue. The surveys also offered an area for additional commentary, and requested the stakeholders' contact and identifying information.

The surveys were sent to the following stakeholders (see stakeholder matrix):

- CNMI Forestry Advisory Council
- Department of Lands and Natural Resources -CNMI Forestry
- Division of Environmental Quality (DEQ)
- Division of Fish and Wildlife (DFW)
- Department of Fire and Emergency Medical Services (DFEMS)
- Historic Preservation Office (HPO)
- Mariana Islands Nature Alliance (MINA)
- National Oceanic and Atmospheric Administration-Office for Coastal Management (NOAA-OCM)

- Northern Marianas College -Aquaculture & Natural Resources (A&NR) Program at Cooperative Research, Extension, & Education Service (NMC- CREES)
- Office of the Mayor of Tinian and Aguigan
- Office of Planning & Development (OPD)
- Office of the Mayor of Saipan (MOS)
- National Park Service - American Memorial Park (NPS-AMP)
- USDA-Natural Resource Conservation Service
- Soil Water Conservation District
- Jess's Multi-Farms (Private landowner)
- YAS Farms (Private Landowner)

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Appendix A: Existing Plans related to Forest Resources

Action Plan for Oryctes rhinoceros 2018-2023

1. Building and maintaining capacity:

   Invasive species should be addressed successfully through local and federal capacity. This approach will require adequate funding and collaboration between agencies. A vigorous response to building these efforts should include these administrative elements along with the identified key elements when dealing with invasive species issues:

   a. Strengthen national, regional and local level relationships by establishing good communication, participation and action towards dealing with non-native invasive species. This could mean bringing together appropriate agencies, entomologists, pathologists and conservationist or partaking in the Regional Invasive Species discussion to address pest concerns.

   b. Maintain and be informed with current events and application of approved scientific approach towards dealing with invasive pest or pest of concerns. This should include state, regional and national level.

   c. Design and Establish a Rapid Response Mechanism when detection of invasive non-native species are present or as soon as they appear. Issues that should be taken into an account:

      i. Access to funds for emergency actions

      ii. Regulatory support for rapid action; and

      iii. Interdepartmental coordination that can quickly identify and give authority to a lead agency (Dept. Lands and Natural Resources).

   d. Design or build educational and informational programs on a local and community level. This should include all possible and applicable avenues to reach local communities and agencies, to solicit for their support in address invasive pest throughout CNMI.

   e. Use appropriate projects that relates to the control of invasive pests with high priority or visibility, as model of scientific base practice.

   f. Support the establishment of an entomologist or pathologist position within the Departmental or collaborating agency level.

   g. To include all Quarantine and businesses that import agricultural goods following acceptable protocols in the developed Biosecurity Plan.

2. Promote sharing of Information:

   Considerable information about Invasive Species are available globally and electronically. Even so, the information that could alert management agencies to the potential dangers of new introductions are frequently missed or is not widely shared or available to appropriate agencies. This cripples government agencies from taking prompt action. In addition, the lack of appropriate resources and training is another key factor that impede proper action. Information sharing and preparation is therefore essential.

   a. Build an informational system to link into available databases on invasive alien species and other sources of information. The system should be coordinated by the responsible agencies i.e., DLNR, RISC, NISC, and PILN, to facilitate the sharing of data. It should work on multiple languages and promote widespread distribution of information to all interested parties using available technologies.

      b.   Develop an early warning detection system that would include notification of new and predicted occurrences of invasive species.

      c.   Establish a database of failures and successes of different eradication and control methods for invasive species to ensure that all can be learned from the experience. This should also be linked into the information database.

3.   Develop Economic Policies and Tools for addressing problems of Invasive alien Species: Species invasions are a consequence of economic decisions and have economic impacts. However, the costs of invasions are seldom reflected in market prices or market demand. Moreover, while prevention, eradication, control, mitigation and adaptation all yield economic benefits, they are public goods. If left only to the market, the control of invasive species or any communicable human diseases, will be underprovided. Because biological invasions often indicate market failure, an important part of any strategy to manage invasive species are to make markets work for conservation wherever possible, and to provide alternate solutions if markets do not exist and cannot be created. Therefore, appropriate agencies should encourage legislature to incorporate economic principles into their national or state strategies for addressing Invasive Species, these should be built on five main principles:

      a.   User pays:
           i.   Make those responsible for the introduction of economically harmful invasive species liable for the costs they impose.

      b.   Full social cost pricing:
           i.   Ensure that the prices of goods and services whose production or consumption worsens the damage of invasive species reflect their true cost to society.

      c.   Precautionary principle:
           i.   Because of the potentially irreversible and high costs of invasive species intrusion, base management and policy on the precautionary principle.

      d.   Protection of the public interest:
           i.   Since the control of harmful invasive species yields benefits that are a public good, it requires public investment in prevention, eradication, control, mitigation and adaptation.

      e.   Subsidiarity:
           i.   Operate policies and management at the lowest level of government that can effectively deal with the problem.

4.   Institute a system of Environmental Risk Analysis (if feasible):
Risk Analysis and Environmental Impact Assessment (EIA) procedures have already been adopted in many countries and mandated by certain international instruments. The challenge now is to apply these to address the prevention, eradication and control of invasive species. This should involve shifting the burden of proof to those individuals proposing the intentional introduction of a potentially invasive species. Risk analysis measures should be used to identify and evaluate the relevant risks of a proposed activity regarding alien species, and determine the appropriate measures that should be adopted.   EIA plays an important role in the decisions to undertake specific processes or activities. Decision-makers should ensure the use of strategic and/or project specific EIA in assessing the impact, long-term and short-term, of species introductions. To ensure the effective use of EIA procedure, decision-makers should consider:

    a. Reviewing the risk analysis criteria to implement and ensure compatibility of national law with international criteria.

    b. Building on work undertaken by the plant and animal protection community to develop a rigorous process of risk analysis in relation to any deliberate introduction of species (not just between countries, but within a country or region as well), including detailed analysis of the balance between benefits and costs. This assessment would allow more informed decision-making in relation to invasive alien species introduction, control and management.

    c. Developing criteria to measure and classify impacts of alien species on natural ecosystems, including detailed protocols for assessing the likelihood of invasion in specific habitats or ecosystems. Where prediction protocols exist for landscapes comprising mosaics of ecosystems, predictions for the most vulnerable system in the landscape should dictate management decisions.

    d. Developing tools to factor invasive species into the decision-making processes regarding land use planning and development.

    e. Investigating ways in which strategic and project-specific EIA can be applied to unintentional introductions. For instance, assess large engineering projects, such as canals, tunnels and roads that cross biogeographically zones, which might have the effect of mixing previously separated flora and fauna.

5. Build Public Awareness and Engagement:
Active public engagement is critical to successful invasive species management. This strategy is intended to help states and organizations engage the public successfully and coordinate their efforts for greatest global benefit, leading to an informed public that supports ongoing actions to reduce the threat of invasive species, and key stakeholders who are actively engaged in implementation of invasive species solutions. Attaining these desired outcomes will require:

    a. Developing public awareness campaigns to support invasive species detection and management, including sharing information and coordinating messages as appropriate to avoid contradiction and maximize efficiency.

    b. Engaging key stakeholders, communities and neighbors in invasive species solutions by linking invasive species strategies wherever, particularly when integrating and developing programs or other established societal priorities.

    c. Building the capacity of local communities and groups to implement invasive species management measures where they live.

    d. Prepare acceptable national Strategies and Plans

    e. Sharing experience in this strategy with other states and organizations through documentation, staff exchanges, and other means of engagements.

CNMI Invasive Species Strategy and Action Plan

DOA's Invasive Species Strategy and Action Plan (ISSAP) 2015-2020 focuses on pests of Agriculture and includes specific management strategies and a formal action plan. The plan was developed under the direction of the Agricultural Advisory Committee (AAC) that is made up of resource professionals, state and federal agency, program managers, private landowners, and commercial businesses. The plan aims to identify "acceptable practices towards protection, promotion, and sustainability while maintain acceptable cultural farming and ranching practices, promotion of economic development, and to edify land managers and landowners the value of farming". The final plan was reviewed by the AAC and by the DLNR Secretary's representative for Natural Resources. DOA also manages the import of animals into the CNMI including quarantine through its Animal Health and Industry Section.

The plan describes both established invasive species as well as potential pathways of introduction for other invasive species (such as the brown tree snake (BTS)) that are well established in nearby jurisdictions but have not yet gained traction in the CNMI. The document also describes some ways forward for better management of invasive species, including active management and restoration of native forests.

Invasive species management in the CNMI is conducted by multiple governmental agencies acting independently according to organizational mandates and objectives. Within DLNR are DFW, DOA, CNMI Forestry, and the BTS Program, all of which are involved in invasive species management. Both U.S. Customs and Border Protection and the CNMI Department of Finance Division of Customs Services actively screen arriving passengers for potential invasive species.

CNMI Forestry's Cooperative Forest Health Protection Five-Year Plan 2015-2020 aims to "protect, promote, and maintain indigenous trees, and to educate CNMI's land managers and landowners [on] the value of a healthy forest. The plan was reviewed by the CNMI Forestry 2009 Advisory Council and the DLNR Secretary's representative for Natural Resources.

The BTS Program is focused on the CNMI's highest priority invasive threat and warrants its own program with dedicated staffing and funding. BTS works closely with the U.S. Geological Survey (USGS) Brown Tree Snake Project to prevent the establishment of the Brown Tree Snake in the CNMI. The BTS Program maintains snake traps at high-risk entry points, inspects arriving air and sea cargo, and conducts rapid-response searches for sighted snakes within the CNMI.

DFW addresses the impact of invasive species on marine and terrestrial species and their habitats in the Wildlife Action Plan for the CNMI 2015-2025. The plan, which was developed with broad community input and reviewed by the U.S. Fish and Wildlife Service, provides specific strategies and goals to manage invasive plants and animals that threaten species of greatest conservation need.

In addition to invasive species already established in the CNMI, numerous species are positioned to invade. While a potentially invasive species can be introduced through air or ship travel from anywhere, with the high frequency of travel between Guam and the CNMI, and the similarity of climate, we are particularly at risk to receive new invasive species introductions from Guam.

Guam has several invasive species that have yet to invade the CNMI, but pose a serious threat to our native wildlife, ecosystem, economy, and public health. These include:

- Brown Treesnake (Boiga irregularis) – Arrived around 1945 on Guam, killed most of Guam's birds and small mammals. Caused 7 bird extinctions
- Little Fire Ant (Wasmannia auropunctata) – Detected in 2011 on Guam, threatens ecosystem and agroforestry sustainability in Guam's forests

We need to recognize and acknowledge that while much of what we do today to combat invasive species is certainly effective, it has not been enough to turn the tide. We will need to make fundamental changes in how we approach the problem if we are to be successful.

Strategies (in part from 2017 ISSAP)

- Coordinate Regional Efforts
  Guam, Hawaii and the CNMI all have Invasive Species Councils (ISC) with the same basic objectives and with members drawn from local government agencies and stakeholders. They are all also invasive species pathway neighbors. Yet Guam, Hawaii and the CNMI have historically acted independently to block the movement of invasive species. The three ISCs can realize profound benefits by working together to develop a coordinated regional strategy.
- Be Knowledgeable
  To effectively prevent the arrival of invasive species we must know what species have the potential to become invasive, where they are, what pathways they may take to get here, and what they require to survive. To prevent them from becoming established, we also need to understand their lifecycles, what biotic and environmental factors favor or limit their success, and we need to survey to detect and assess them. To know which invasive species we should focus on, we need to understand their potential to cause damage, the cost in terms of both time and money to target them, and our potential for success. Lack of knowledge can cause us to waste time and money, to miss early opportunities to prevent, detect or eradicate invasive species, and to make costly mistakes. We must gather and utilize quality data if we are to be successful.
- Be Prepared and Proactive
  One requirement of every invasive species is time – time to reproduce, to travel, to grow, etc. The more time an invasive species goes unopposed, the better its chances to become established. Likewise, time is a requirement for any preventative action or response, and the earlier that an action is taken the more effective it will be. We must plan and implement defensive actions early and we must be well prepared, in advance, to respond to invasive species detections quickly and appropriately.
- Plan for long-term invasive species management
  Invasive species represent a permanent long-term threat to the CNMI. We need to treat it as such and provide a permanent and long-term response. Short-term management gains can easily be lost through lack of follow-through.
- Build Resistance and Resilience
  Healthy native habitat, in which native species are abundant and occupy niches that they have evolved into and successfully occupied for millennia, is naturally resistant to invasion by non-native species. On the other hand, native habitat that has been disrupted or damaged, or where native species have vanished or are struggling, are particularly vulnerable to invasion. We need to foster resistance and resilience in our native marine and terrestrial environments by monitoring and fostering their good health and by encouraging native biological diversity.

● Restore and Recover Damaged Forests
Damaged and invasive species infested forests are sources of invasive species seeds and spoors, insects and animals that spread to adjacent areas or even distance ones via victors such as wind, birds and animals. We need to restore and recover forests where and to the extent possible, and remove or reduce the invasive species within them.

● Involve the Community
Human activities are largely responsible for the invasive species crisis through a combination of environmental damage, including the loss of healthy native environments and habitat, and the creation of new pathways for invasive species introduction. We need to educate the public to change behaviors and encourage the prevention and further spread of invasive species and to enlist their help is critical to our success.

● Limit the U.S. Military's Environmental Damage in the Marianas
The U.S. military has caused and continues to cause extensive environmental damage in the Marianas, including the introduction of invasive species and catastrophic physical damage to natural habitats. This damage has both ecological and social-economic consequences and deprives the CNMI of much needed natural resources. This must change to avoid additional environmental catastrophes on our land and in our waters including the introduction of extremely destructive invasive species.

Actions

● Identify, authorize and enable a lead agency to coordinate regional efforts. The CNMI ISC was formed in 2016. Continue to participate in the Regional Invasive Species Committee (RISC).
● Expand inspection and interception efforts to include all interisland travel in the CNMI
● Create an invasive species database committee under CISC
● Analyze Threats by Individual Invasive Species
● Inventory and survey the Northern Islands
● Establish Working Relationships with Guam and Hawaii
● Coordinate Local Agency/Stakeholder Activities
● Create a Funding Committee
● Create a Community Outreach Program

Forest Health Plan

VISION:

Forestry's vision with the CFHP Program is to have a thriving healthy sustainable island ecosystem for the well-being of its citizens and visitors. With such healthy ecosystem, comes the promotion and regeneration of native plant species, supporting a balanced synergy amongst all living organism while sustaining its multi-cultural value.

MISSION STATEMENT:

The mission of the Forestry Section with CFHP is to: Conserve Working Forest Land, Protect Forests from Harm and Enhance Public Benefits from Trees and Forests. This mission is highlighted in the approved Farm Bill of 2008 and still carries through for many years to come.

CURRENT SITUATION:

Most of the discovered and recorded forest health issues are invasive weeds that out-compete forest plants species throughout the Marianas archipelagos and the more recent infestation by CRB on Rota. Invasive weeds have found means to adapt at an alarming rate thus capable to multiplying with minimal limitation due to the absence of its natural enemies. Disturbed areas become vulnerable at most places, whereas the removal of tree canopies allows other faster weed species to overcome.

Another issue is the introduction of exotic species for landscaping or agricultural purposes. These introduced species vary from a shrubby plant to climbing vines, brought by island residents or reoccurring visitors. Although interjected by our Quarantine inspectors, such plant species were not listed in the database to be noxious or threat to the island's ecosystem, thus were released and tagged as agricultural goods. This deficiency opens the ability for many plant species to be introduced from neighboring countries without difficulties.

DIFINITION OF INAVASIVE SPECIES:
*(*https://www.google.com/?gws_rd=ssl#q=what+is+invasive+species*)*

What is Invasive Species? An invasive species is defined as an organism (plant, animal, fungus, or bacterium) that is not native and has negative effects on the economy, the environment, or health. Not all introduced species are invasive. Invasive plants and animals are the second greatest threat to biodiversity after habitat loss.

IMPACT OF INVASIVE SPECIES

Invasive species and encroachment on forest conservation areas are real issues that have influenced adversely on the health and sustainability of our forests and its bionetwork. The *Coccinia grandis*, commonly referred to as scarlet gourd, is the most invasive and a serious threat to the health of our forests and urban vegetative mosaic. The scarlet gourd was introduced in the early 1990s and was first observed in the "I Denne" area near Capitol Hill and has spread covering approximately about 90% of the island of Saipan's, according to a survey conducted by Forestry and its GIS staff in 2004.

The proposed solution is to contain the spread of the scarlet gourd. This will require establishing buffer zones and using mechanical (cut, bare root, bag and burn), herbicidal (Garlon 3a), and biological agent as means to make certain that the scarlet gourd does not spread further. These methodologies were implemented but the release of bio-control agents such as the *Acythopeus cocciniae* (Leaf mining weevil),

and *Militia oedipus* (Stem boring larvae) proves to be the longest standing and self-sustaining approach. The *Militia oedipus*, however, has been barely reported due to its limited discovery since its release. Nonetheless, the occasional discovery indicated that *Militia oedipus* is still around hosting on targeted vine.

In addition, the introduction of forest product, poses much treats of introducing new forest pest if not treated properly. An example would be the accidental introduction of *Quadrastichus erythrinae (Eulophidae)*, where presumably was brought in by landscapers of major golf resorts. This pest has dramatically reduced *Erythrina variegata var. orientalis* ability to reproduce viable seed, loss of photosynthesis' and ultimately death of the parent tree.

In the Northern Islands, feral ungulates such as goats, pigs, and cows have had a very negative impact on the environment denuding large expanses of the forest. The Fish and Wildlife Division have taken up reduction in population on Sarigan and Anatahan. These proofs to be effective, but expensive approach towards conservation of Forests. Other means such as fencing and securing sections to protect vegetation further proofs another strategy of conservation practice.

Invasive species also threaten the bio-security of the CNMI through various means. Such threat imposes impact on natural resources, burdening the economic growth, tourism and the health of the CNMI. This includes the inconveniences of all agricultural goods, because of the focus towards resolving issues rather than production increase will be prioritized. More training and education will be required to be provided to the Forestry staff, the Quarantine Officers at our Airports and Seaports and to all forestry volunteers in-order to combat these concerns. Furthermore, CNMI-Forestry is hopeful in establishing a more rigorous and thorough interdiction programs for invasive species throughout our ports of entry and project sites.

CNMI's current top terrestrial Invasive Alien Species Lists: This list are set by priority

Plant Species:

Scientific Name Common Name	Common Name English	Common Name Chamorro	Habitat	Current Management Plan
Coccinia grandis	Scarlet gourd / Ivy Gourd	Pipi'non maka	Vine	C
Mikania scandens	Mile a minute	Mala'it	Vine	C
Lantana camara	Lantana	Lantana	Shrub	C
Mucuna prurien	Sea bean	Akang'kang dan'kulu	Vine	C
Antigonon leptopus	Mexican creeper / Chain of love	Ka'dena	Vine	C
Spathodea companulata	African tulip	Flores guafi	Tree	C
Mimosa diplotricha	Giant mimosa / wit-a-bit	Subet'biun chosa	Shrub	C
Chromolaena odorata	Bitter bush	Masigsig	Shrub	C
Operculina ventricosa	Paper rose / Wood rose	Ala'lag	Vine	C
Biden pilosa	Beggars tick / Guam daisy	Flores Guahan	Shrub	C

Invasive Terrestrial Non-Plant Species:

Scientific Name Common Name	Common Name English	Common Name Chamorro	Habitat	Current Management Plan
Oryctes rhinoceros	Coconut Rhino Beetle	Gaga Niyok	Insect	P; E for Rota
Wasmannia auropuntata	Little Fire Ant	Odot aga'ga (Di'kiki)	Insect	P
Eleutherodactylus coqui	Common cuqui	Kai'ru	Frog	P
Darna pallivitta	Nettle caterpillar	Ulu gangochi	Caterpillar	N
Solenopsis invicta	Red imported Fire-ant	Odot aga'ga	Insect	N
Puccinia psidii	Eucalyptus rust	Ga'ga Tina'ke	Fungus	N
Quadrastichus erythrinae	Erythrina gall wasp	Sasa'tan Gaogao	Insect	N
Aulacaspis yasumatsui	Asian cycad scale	Ga'ga fading	Insect	C
Veronicella cubensis	Cuban slug	Ta'gula	Slug	C
Phellinus noxious	Black sock / Brown root rot	Chot'nut atbot	Fungus	N

Column that describes the current management such as: ((P)) prevention/education (not yet here); ((E)) eradication (just arrived or just discovered, ((S)) small populations); ((C)) control (management to contain or reduce but not eliminate); ((N)) no management at this time (lack of resources, or too extensive)

Key elements in approaching Invasive Species:
(http://www.invasivespeciesinfo.gov/council/actionb.shtml)

1. **Prevention:** The first-line of defense and, over the long term, the most cost-effective strategy against invasive species is preventing them from becoming established. Prevention is two-pronged because some species are intentionally introduced for a specific purpose, whereas others arrive unintentionally as "hitchhikers" on a commodity, conveyance, or person.

2. **Detection:** Preventing the introduction of invasive species is the first line of defense against invasions. However, even the best prevention efforts will not stop all invasive species introductions. Early detection and rapid response (ED&RR) efforts increase the likelihood that invasions will be addressed successfully while populations are still localized and population levels are not beyond that which can be contained and eradicated. Once populations are widely established, all that might be possible is the partial mitigation of negative impacts. In addition, the costs associated with ED&RR efforts are typically far less than those of long-term invasive species management programs.

3. **Control and Management:** Control and management objectives may include: eradication within a local area, population suppression, limiting dispersal, reducing impacts, and other diverse objectives. Control and management of invasive species populations is accomplished using an integrated pest management (IPM) approach. The IPM approach considers best available scientific information, updated target population monitoring data, and the environmental effects of control methods in selecting a range of complementary technologies and methods to implement to achieve a desired objective.

4. **Restoration and Rehabilitation:** Restoration is an integral component of comprehensive prevention and control programs for invasive species that may keep invasive species from causing greater environmental disturbances. Although restoration efforts have certain elements in common, each invasion and area is unique. Restoration projects need to be based both on general principles and site-specific considerations and analysis. Resource managers need the research community to provide them with information for the development of a wide range of

environmentally sound management strategies and tools, including detailed site assessments and information on the inter-relationships of the species involved. These assessments can help identify the key factors that will affect the success of restoration projects. In addition, monitoring programs are needed to track the success of control and restoration efforts and to ensure that the area is not reinvaded.

STRATEGIES:

Building and maintaining capacity: Invasive species should be addressed successfully through local and federal capacity. This approach will require adequate funding and collaboration. A vigorous response to building these efforts should include these administrative elements along with the identified key elements when dealing with invasive issues:

a) Strengthen national and regional level by establishing good communication, participation and action towards dealing with non-native invasive species. This could mean bringing together appropriate agencies, entomologists, pathologists and conservationist or partaking in the Regional Invasive Species discussion to address pest concerns.

b) Maintain and be informed with current events and application of approved scientific approach towards dealing with invasive pest or pest of concerns. This should include state, regional and national level.

c) Designed and Establish a Rapid Response Mechanism when detection of invasive non-native species are present or as soon as they appear. Issues that should be taken into an account:
  (1) Accessible of funds for emergency actions

  (2) Regulatory support for rapid action; and

  (3) Interdepartmental coordination that can quickly identify and give authority to a lead agency (Dept. Lands and Natural Resources).

d) Design or build educational and informational programs on a local and community level. This should include all possible and applicable avenues to reach local communities and agencies, to solicit for their support in address invasive pest throughout CNMI

e) Use appropriate projects that relates to the control of invasive pests with high priority or visibility, as model of scientific base practice.

f) Support the establishment of an entomologist or pathologist position within the Departmental or collaborating agency level.

g) To include all Quarantine and businesses that imports agricultural good following acceptable protocol in the developed Biosecurity Plan.

Promote sharing of Information: Considerable information about Invasive Species are available globally and electronically. Even so, the information that could alert management agencies to the potential

dangers of new introductions are frequently missed or is not widely shared or available to appropriate agencies. These crippled government agencies from taking prompt action. In addition, the lack of appropriate resources and training is another key factor that impede proper action. Information sharing and preparation is therefore essential.

    a. Build an informational system that would links into available database on invasive alien species and other source of information. The system should be coordinated by the responsible agencies i.e., DLNR, RISC, NISC, and PILN, to facilitate the sharing of data. It should work on multiple languages and promote wide spread distribution of information to all interested parties using available technologies.

    b. Develop an early warning system that would include notification of new and predicted occurrences of invasive species.

    c. Establish database of failure and success of different eradication and control methods for invasive species to ensure that all can be learn from the experience. This should also link into the information database.

Develop Economic Policies and Tools for addressing problems of Invasive alien Species: Species invasions are a consequence of economic decisions and have economic impacts. However, the costs of invasions are seldom reflected in market prices or market demand. Moreover, while prevention, eradication, control, mitigation and adaptation all yield economic benefits, they are public goods. If left only to the market, the control of invasive species or any communicable human diseases, will be underprovided. Because biological invasions often indicate market failure, an important part of any strategy to manage invasive species are to make markets work for conservation wherever possible, and to provide alternate solutions if markets do not exist and cannot be created. Therefore, appropriate agencies should encourage legislature to incorporate economic principles into their national or state strategies for addressing Invasive Species, these should be built on five main principles:

    a. User pays: make those responsible for the introduction of economically harmful invasive species liable for the costs they impose.

    b. Full social cost pricing: ensure that the prices of goods and services whose production or consumption worsens the damage of invasive reflect their true cost to society.

    c. Precautionary principle: because of the potentially irreversible and high costs of invasive intrusion, base management and policy on the precautionary principle.

    d. Protection of the public interest: since the control of harmful invasive species yields benefits that are a public good, it requires public investment in prevention, eradication, control, mitigation and adaptation.

    e. Subsidiarity: operate policies and management at the lowest level of government that can effectively deal with the problem.

Institute a system of Environmental Risk Analysis (if feasible): Risk Analysis and Environmental Impact Assessment (EIA) procedures have already been adopted in many countries and mandated by certain international instruments. The challenge now is to apply these to address the prevention, eradication and control of invasive species. This should involve shifting the burden of proof to those individuals proposing the intentional introduction of a potentially invasive species. Risk analysis measures should be used to identify and evaluate the relevant risks of a proposed activity regarding alien species and determine the appropriate measures that should be adopted. EIA plays an important role in the decisions to undertake specific processes or activities. Decision-makers should ensure the use of strategic and/or project specific EIA in assessing the impact, long-term and short-term, of species introductions. To ensure the effective use of EIA procedure, decision-makers should consider:

    a. Reviewing the WTO and IPPC risk analysis criteria to implement and ensure compatibility of national law with international criteria.

    b. Building on work undertaken by the plant and animal protection community to develop a rigorous

process of risk analysis in relation to any deliberate introduction of species (not just between countries, but within a country or region as well), including detailed analysis of the balance between benefits and costs. This assessment would allow more informed decision-making in relation to invasive alien species introduction, control and management.

c. Developing criteria to measure and classify impacts of alien species on natural ecosystems, including detailed protocols for assessing the likelihood of invasion in specific habitats or ecosystems. Where prediction protocols exist for landscapes comprising mosaics of ecosystems, predictions for the most vulnerable system in the landscape should dictate management decisions.

d. Developing tools to factor invasive species into the decision-making processes regarding land use planning and development.

e. Investigating ways in which strategic and project-specific EIA can be applied to unintentional introductions. For instance, assess large engineering projects, such as canals, tunnels and roads that cross biogeographically zones, which might have the effect of mixing previously separated flora and fauna.

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a. Developing public awareness campaigns to support invasive species management, including sharing information and coordinating messages as appropriate to avoid contradiction and maximize efficiency.

b. Engaging key stakeholders, communities and neighbors in invasive species solutions by linking invasive species strategies wherever, particularly when integrating and developing programs or other established societal priorities.

c. Building the capacity of local communities and groups to implement invasive species management measures where they live.

d. Prepare acceptable national Strategies and Plans

e. Sharing experience in this strategy with other states and organizations through documentation, staff exchanges, and other means of engagements.

Appendix B: Stakeholder Survey

CNMI FOREST RESOURCE ASSESSMENT SURVEY

WHY A CNMI FOREST ACTION PLAN IS IMPORTANT?

Forest Action Plans offer a practical and comprehensive roadmap for investing federal, local and private resources where they can be most effective in achieving three national conservation goals:

1. **Conserve and manage working landscapes**
2. **Protect forests from threats**
3. **Enhance public benefits from trees and forests**

GET INVOLVED!

KEEPING THE PLANS CURRENT

Help protect, conserve and enhance CNMI's forests we all rely on by participating in the CNMI Resource Assessment Survey, which will help to inform our CNMI Forest Action Plan. Your input is important to us! Download attachment to complete survey and please send responses back to **jihan.younis@pacificcrp.org.**

CONTACT US:

PACIFIC COASTAL RESOURCES PLANNING

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CNMI Forest Resource Assessment

(Statewide Forest Resource Assessment & Strategy 2020)

Purpose:

Every 10 years, the Department of Lands and Natural Resources -CNMI Division of Forestry is required to conduct a CNMI Statewide Resource Assessment & Strategy to help inform CNMI's Forest Action Plan, which includes in-depth analysis of CNMI's forest conditions and trends. Future five-year reviews are conducted within the ten-year comprehensive assessment. The first step of the process is to identify challenges and opportunities that exist within critical issues identified by stakeholders through key informant interviews.

Part of this assessment is gathering input from our key implementing partners and local stakeholders. Please provide us feedback on the attached questionnaire on what the CNMI's top forestry issues are, what critical problems are affecting priority landscapes, and what opportunities CNMI Forestry has to better address those problems.

NATIONAL THEMES AND OBJECTIVES

4.1　1. Conserve Working Forest Landscapes
1.1. Identify and conserve high priority forest ecosystems and landscapes
1.2. Actively and sustainably manage forests

4.2　2. Protect Forests from Harm
2.1. Restore fire-adapted lands and reduce risk of wildfire impacts
2.2. Identify, manage, and reduce threats to forest and ecosystem health

4.3　3. Enhance Public Benefits from Trees and Forests
3.1. Protect and enhance water quality and quantity
3.2. Improve air quality and conserve energy
3.3. Assist communities in planning for and reducing wildfire risks
3.4. Maintain and enhance the economic benefits and values of trees and forests
3.5. Protect, conserve, and enhance wildlife and fish habitat
3.6. Connect people to trees and forests, and engage them in environmental stewardship activities
3.7. Manage and restore trees and forests to mitigate and adapt to global climate change

Partner & Stakeholder Questionnaire

Name:

Date:

Agency/Organization:

Contact number:

Email:

1) Which of the following critical forest issues do you feel are the highest priority for CNMI? Please rank your top three 1-3 in order of priority (1 being the highest):

____ Conservation of Wetlands

____ Maintaining Freshwater Quality

____ Conservation of Native Flora and Fauna

____ Sustainability of Urban Forests

____ Erosion Control / Protection of Coral Reefs

____ Other: _____

____ Other: _____

____ Other: _____

For each of your identified priority critical forest issues, on the following pages please describing each issue's challenges/threats, priority landscapes, and potential strategies to address the challenges/threats.

Additional Comments:

_____
_____
_____
_____
_____

Issue #1: _____

    1) What do you feel are the biggest challenges/threats for this critical forest issue?

    2) What are the priority forest landscapes for this critical forest issues (please include priority landscapes on Saipan, Tinian, and Rota where applicable, not limited to existing conservation areas)?

    3) What are potential strategies to overcome these challenges?

Issue #2: _____

    1) What do you feel are the biggest challenges/threats for this critical forest issue?

    2) What are the priority forest landscapes for this critical forest issues (please include priority landscapes on Saipan, Tinian, and Rota where applicable, not limited to existing conservation areas)?

    3) What are potential strategies to overcome these challenges?

Issue #3: _____

1) What do you feel are the biggest challenges/threats for this critical forest issue?

2) What are the priority forest landscapes for this critical forest issues (please include priority landscapes on Saipan, Tinian, and Rota where applicable, not limited to existing conservation areas)?

3) What are potential strategies to overcome these challenges?