

# Habitat Status Assessment Methods— Guam and the Marianas Islands

Current Condition Summaries

Mari K. Reeves and Fred Amidon

USFWS, Pacific Islands Fish and Wildlife Office, Honolulu, HI

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## Background

The Pacific Islands Fish and Wildlife Office (PIFWO) is evaluating the status of the 580 threatened and endangered (listed) terrestrial species it manages. If a habitat is degraded (e.g., by invasive species) or lost entirely (e.g., due to development) then the listed species that live there are less likely to survive into the foreseeable future than those species whose habitats are extant and functioning ecologically. Self-perpetuating populations of plants and animals cannot exist outside of their habitats, so PIFWO staff is evaluating the condition of Pacific Island Habitats as a first step towards evaluating the status of each of these individual 580 terrestrial listed species.

## Habitat Descriptions

The biological staff at PIFWO met to decide on the unit of analysis for the Habitat Status Assessments, the Habitat. Each Habitat type had to be internally consistent enough to support a similar suite of species within it, yet broad enough to limit the analysis to a scope manageable within the timeframe allotted, approximately five months. During these meetings, biologists identified the habitats in Table 1 as their core units of analysis in Guam and the Commonwealth of the Northern Marianas Islands (CNMI). Each habitat includes several different land cover categories (Table 1).

This report outlines the methods used to create the geospatial representation of the Habitats used in the Pacific Islands Fish and Wildlife Office's Habitat Status Assessments (HSAs). We identified the following Habitats for the Mariana Islands HSAs: Developed, Wetlands, Streams, Coastal, Caves, Savanna/Swordgrass, Forest: Native, Forest: Leucaena, Forest: Secondary/Mixed, and Forest: Monoculture (Table 1, Figure 1, Figure 2, Figure 3, **Error! Reference source not found.**, Figure 5, Figure 6).

# Current Habitat Asuncion, Maug, and Uracus, Mariana Islands

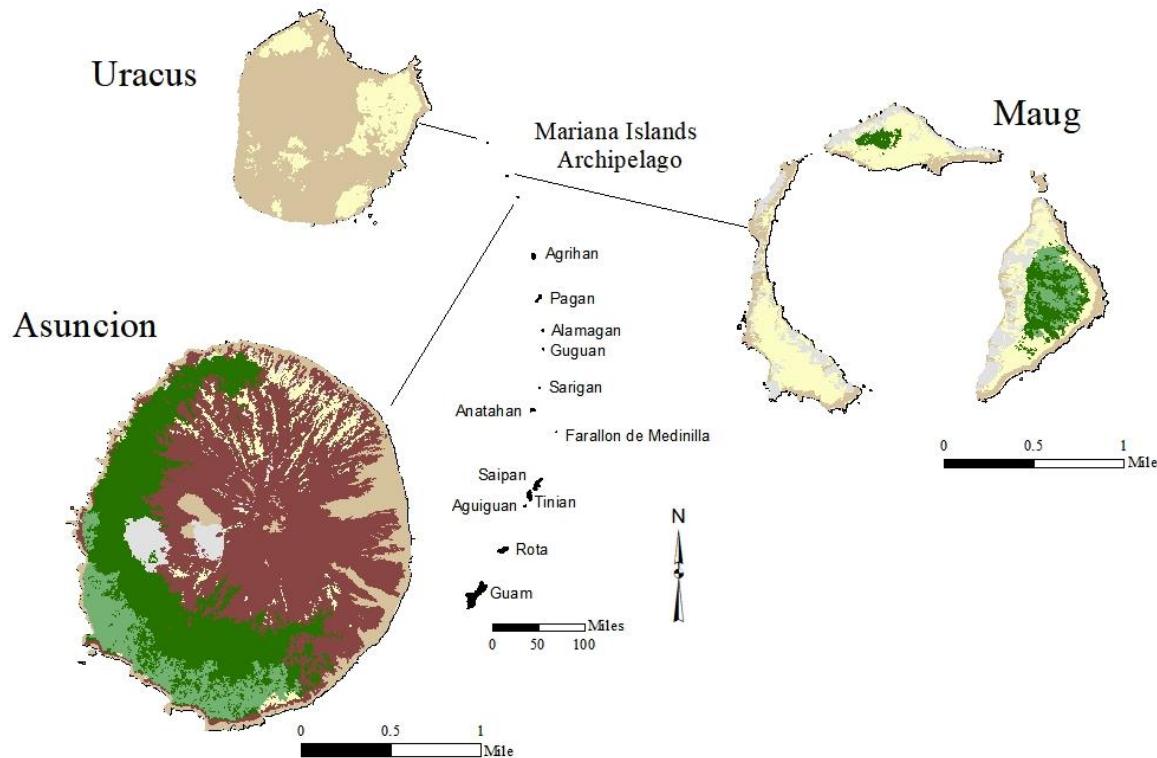


Figure 1. Habitats of Asuncion, Maug, and Uracus.

## Legend

Habitat Type
Barren
Coastal
Developed
Leucaena Forest
Monoculture Forest
Native Forest
Savanna/Swordgrass
Scrub/Herbaceous
Secondary/Mixed Forest
Unknown
Wetland

# Current Habitat Alamagan, Pagan, and Agrihan, Mariana Islands

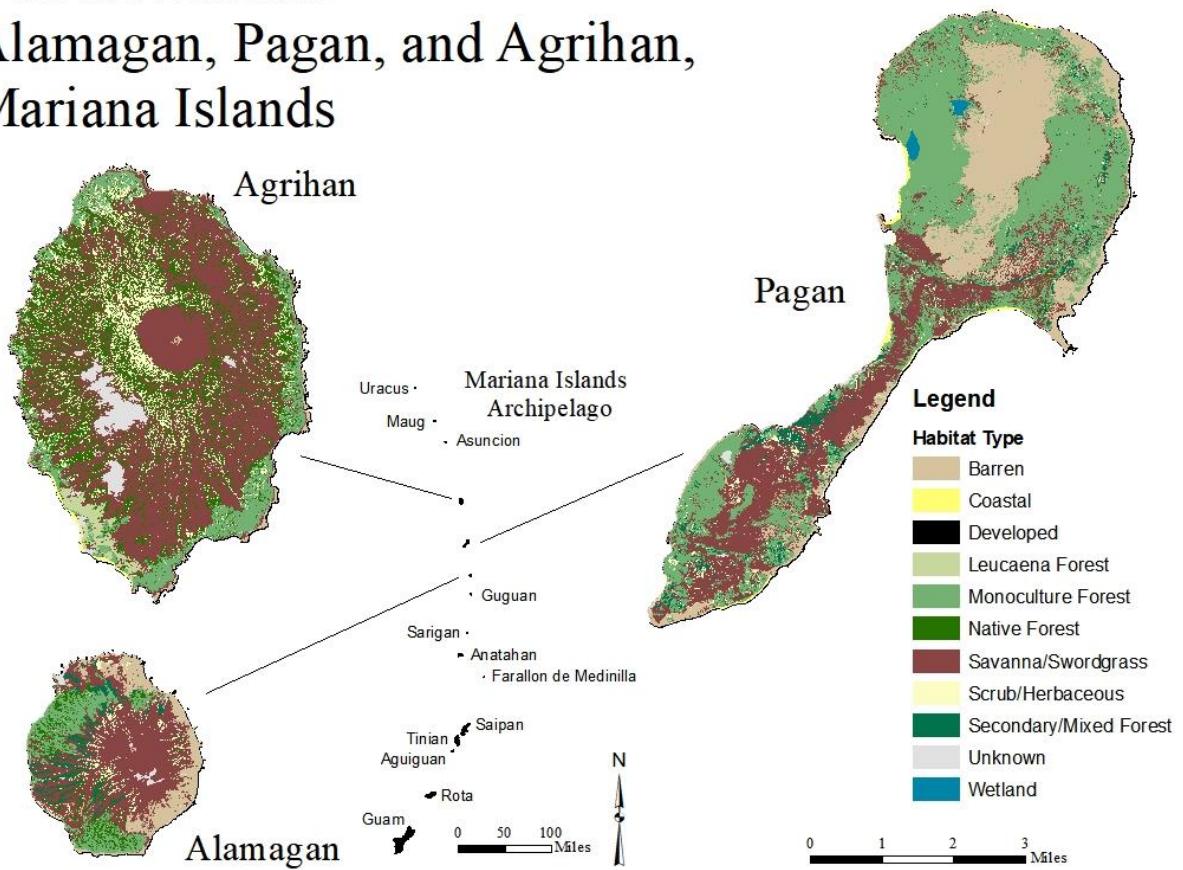


Figure 2. Habitats of Alamagan, Pagan, and Agrihan.

## Current Habitat

### Aguiguan, Farallon de Medinilla, Anatahan, Sarigan, and Guguan, Mariana Islands

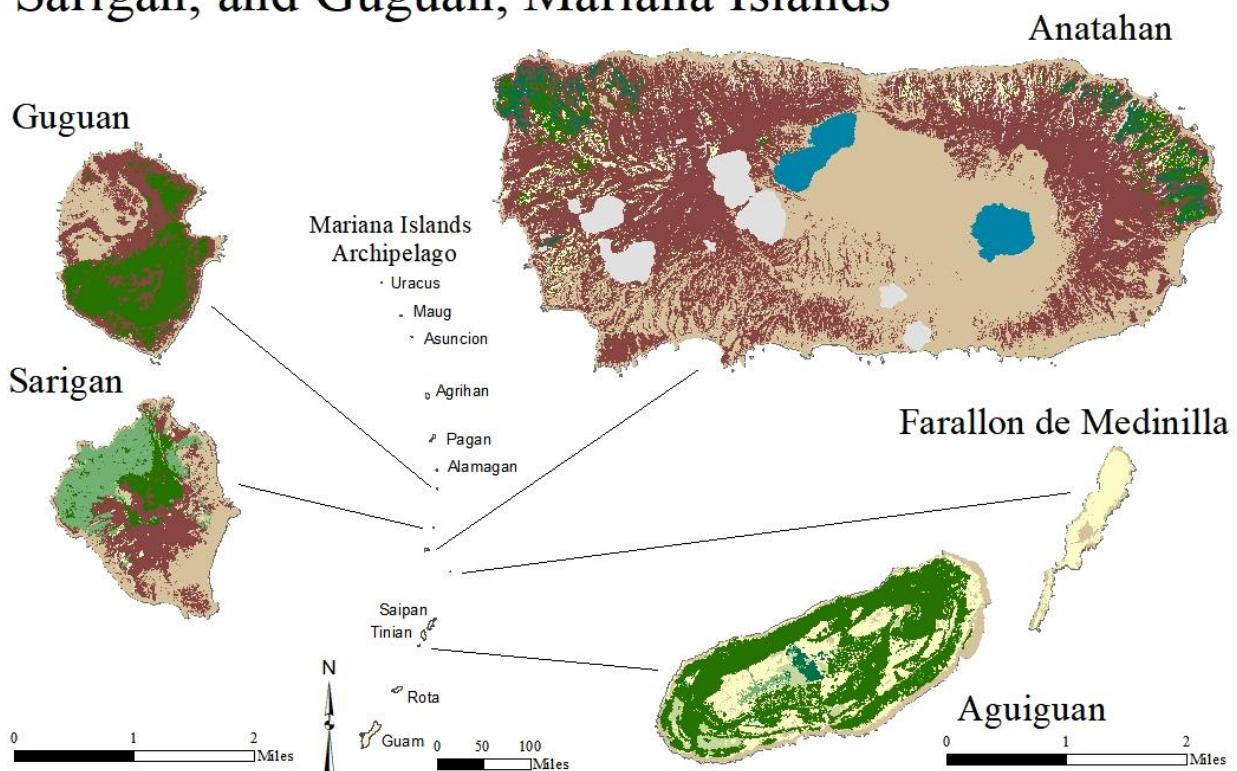


Figure 3. Habitats of Aguiguan, Sarigan, Farallon de Medinilla, Anatahan, and Guguan

#### Legend

Habitat Type
Barren
Coastal
Developed
Leucaena Forest
Monoculture Forest
Native Forest
Savanna/Swordgrass
Scrub/Herbaceous
Secondary/Mixed Forest
Unknown
Wetland

## Current Habitat Tinian and Saipan, Mariana Islands

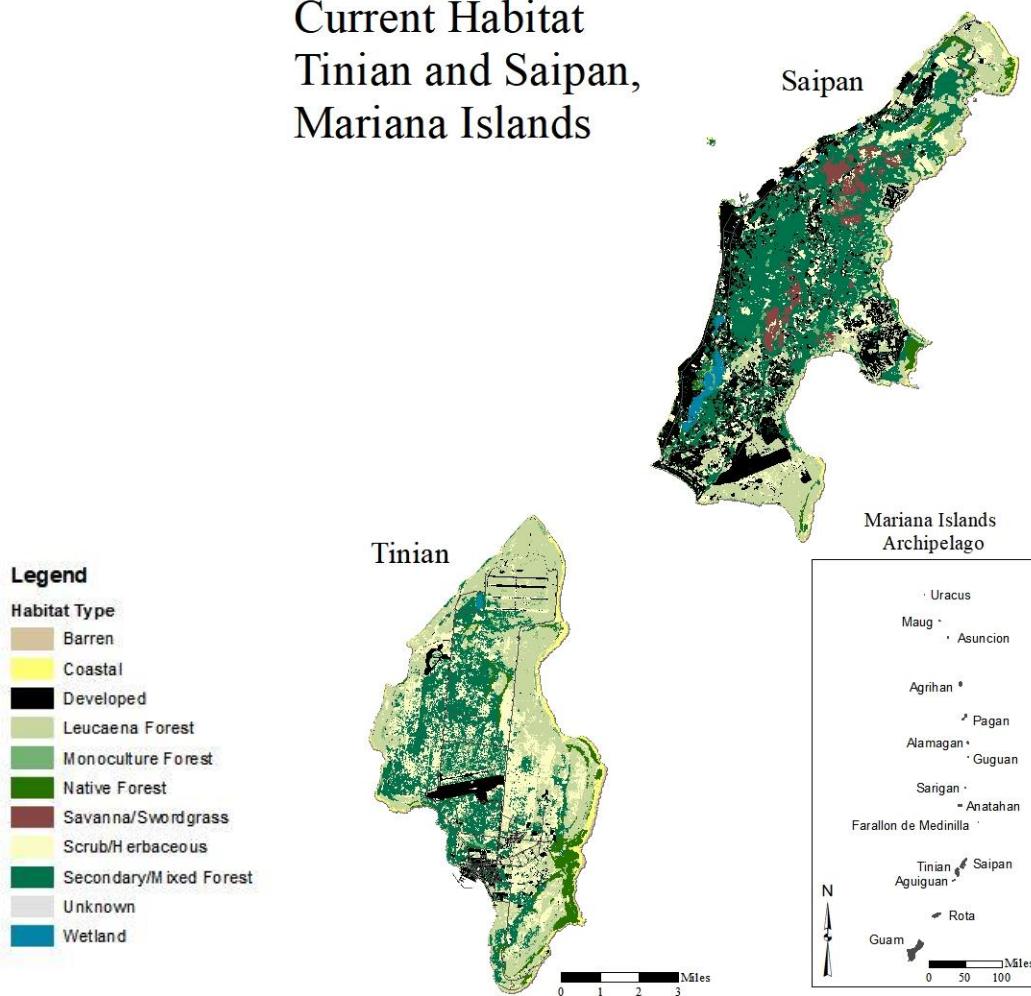


Figure 4. Habitats of Saipan and Tinian

## Current Habitat Rota, Mariana Islands

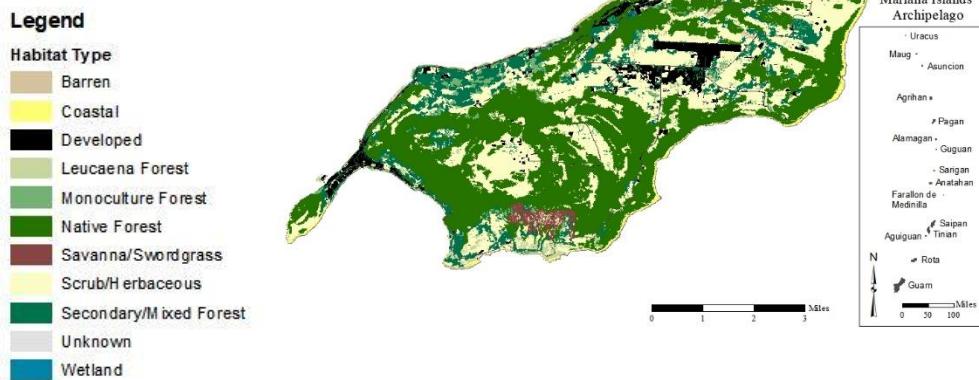


Figure 5. Habitats of Rota.

# Current Habitat Guam, Mariana Islands

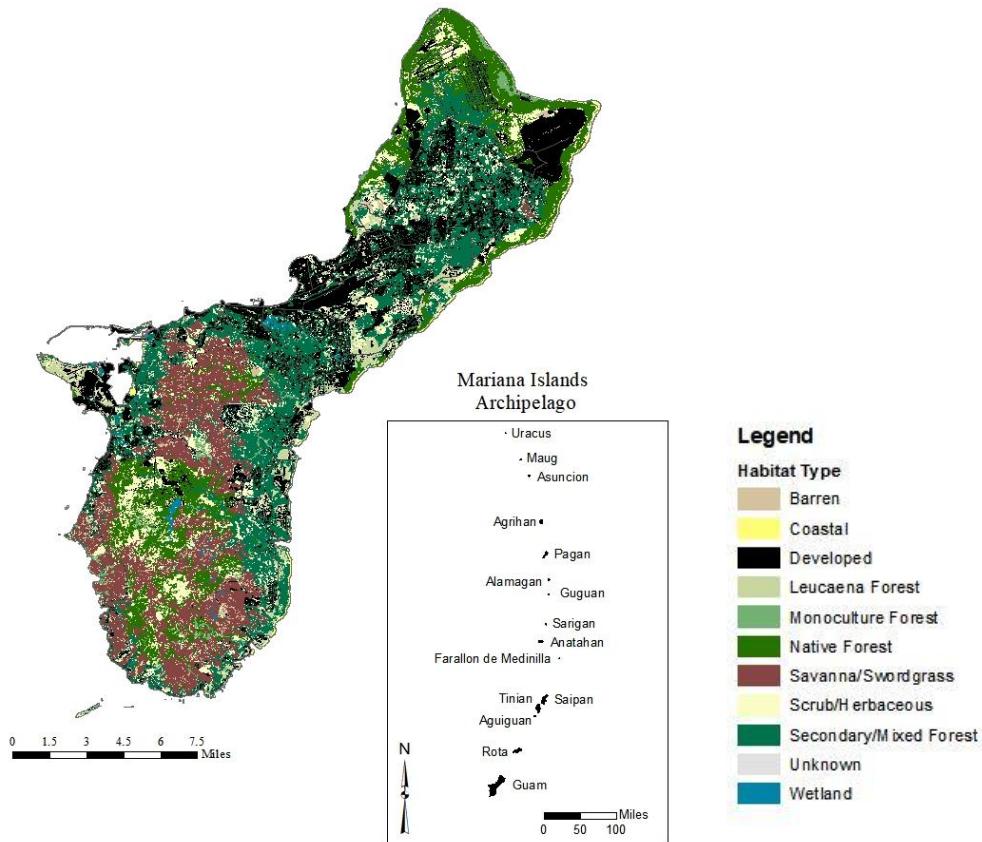


Figure 6. Habitats of Guam.

## Methods and Approach

The Habitat Status Assessment (HSA) process included review and synthesis of literature to describe the current ecological condition of each habitat and its historic extent, dating to before human settlement. In addition to literature review, we summarized geospatial datasets describing landcover, property ownership, and conservation status of the habitats. PIFWO Biologists have summarized the literature in each individual Habitat Status Assessment Report. The Strategic Habitat Conservation team has summarized the methods of geospatial analysis in this document.

### Landcover Layers for the Mariana Islands

Several geospatial datasets represent the current condition of the Mariana Islands Habitats. We describe these in the sections below.

#### Vegetation and Land Cover

We used the 2017 land cover layer for the Mariana archipelago to quantify areas of each habitat (Amidon et al. 2017). This data layer identifies 26 landcover types on the islands (Table 1). The Coastal Change Analysis Program (CCAP) administered by the National Oceanic and Atmospheric Association

(NOAA) has done several land cover classifications for the Marianas Islands (NOAA, 1945–2016). For the northern islands, the NOAA-CCAP layers are older than the Amidon et al. (2017) layers—from the mid-2000s—and do not summarize the vegetation in as much detail as the Amidon et al. (2017) layers. We used the NOAA-CCAP layers for the land cover change, assessment of land area in pasture, and Future Scenarios analysis (Amidon and Reeves, 2018) but not for the current condition summaries in this report. A final dataset that informed this analysis was the United States Forest Service (USFS) LANDFIRE layers. Like the Amidon et al. (2017) layers, the LANDFIRE (2011 and 2014) layers contain detailed classification of vegetation types, yet for the Marianas Islands, these layers were not as current as the Amidon et al. (2017) layers.

*Table 1. Habitat Units Analyzed for Guam and the Commonwealth of the Northern Marianas Islands with Vegetation and Land Cover Sub-Types. Derived from Amidon et al. (2017).*

Habitat	Vegetation Type	Area (ha)
<b>Barren</b>	Bare Soil/Gravel	2889
<b>Barren</b>	Bare Rock	1905
<b>Barren</b>	Sand	1
<b>Coastal</b>	Coastal Scrub	728
<b>Coastal</b>	Sand	233
<b>Coastal</b>	Mangrove Wetland	74
<b>Developed</b>	Developed Vegetation	8088
<b>Developed</b>	Developed	6939
<b>Developed</b>	Agriculture	400
<b>Developed</b>	Bare Soil/Gravel	89
<b>Developed</b>	Bare Rock	4
<b>Developed</b>	Sand	2
<b>Developed</b>	Open Water	1
<b>Leucaena Forest</b>	Leucaena Thicket	7768
<b>Monoculture Forest</b>	Coconut Forest	2180
<b>Monoculture Forest</b>	Casuarina Forest	2179
<b>Monoculture Forest</b>	Bamboo Thicket	242
<b>Monoculture Forest</b>	Acacia Forest	88
<b>Native Forest</b>	Native Limestone Forest	10258
<b>Native Forest</b>	Native Volcanic Forest	4904
<b>Native Forest</b>	Hibiscus Thicket	332
<b>Savanna/Swordgrass</b>	Grassland	9384
<b>Scrub/Herbaceous</b>	Mixed Grass/Herbaceous	13901
<b>Scrub/Herbaceous</b>	Scrub/Shrub	6669
<b>Secondary/Mixed Forest</b>	Mixed Introduced Forest	20325
<b>Secondary/Mixed Forest</b>	Vitex Forest	907
<b>Unknown</b>	Cloud	324
<b>Unknown</b>	Shadow	146
<b>Wetland</b>	Emergent Wetland	458

### Habitat Quality

We evaluated habitat quality in terms of degree of invasiveness of the species comprising each of the land cover types. In some cases, such as Monoculture Forest, these determinations were somewhat circular. Fred Amidon in the Strategic Habitat Conservation branch made these determinations based on his familiarity with the land cover and vegetation types of the Marianas Islands due to his work generating the land cover classification layers (Table 2). Several habitat assignments from the land cover layers provoked team discussion, captured in the comments columns of this table (Table 2). The Final Habitat column captures how we ultimately used the land cover types from Amidon et al. (2017) in the Habitat Assessments. In some cases the “translation” from the land cover type to a Habitat Quality or Final Habitat varied by island. For example, the Grassland land cover type was native dominated on some of the islands, but non-native dominated on others.

## Current Habitat Quality Asuncion, Maug, and Uracus, Mariana Islands

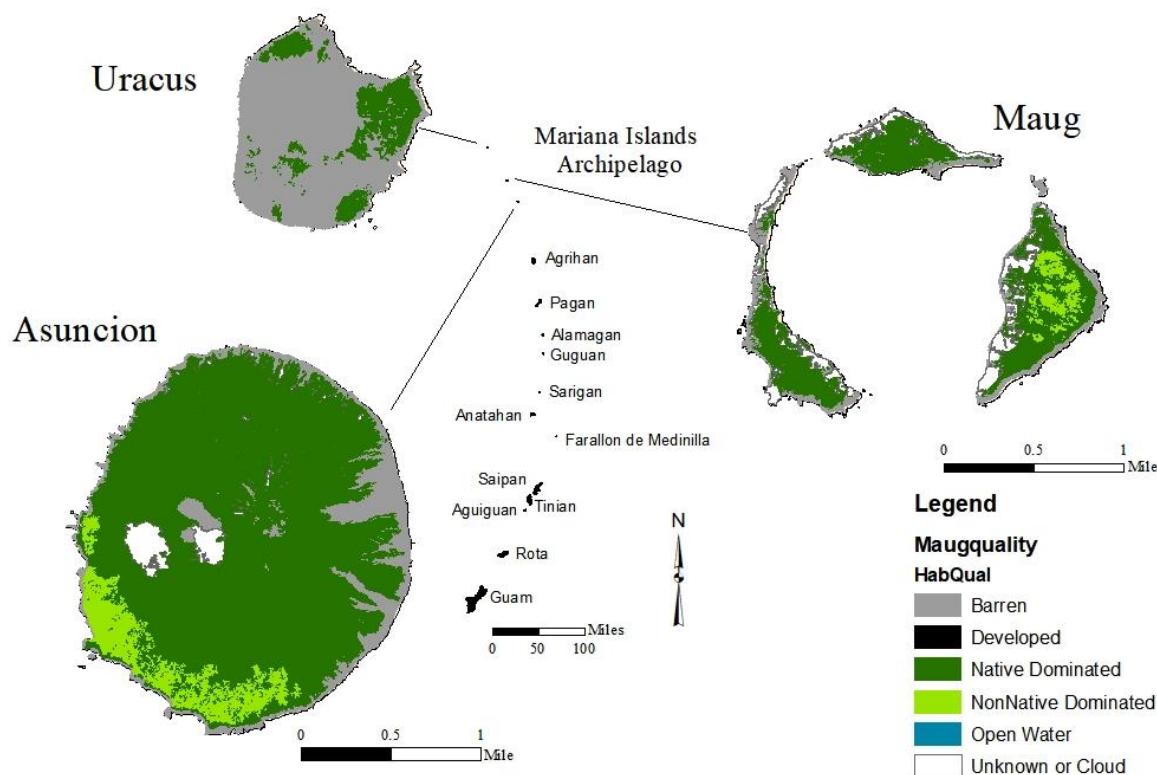


Figure 7. Habitat Quality of Asuncion, Uracus, and Maug

# Current Habitat Quality Alamagan, Pagan, and Agrihan, Mariana Islands

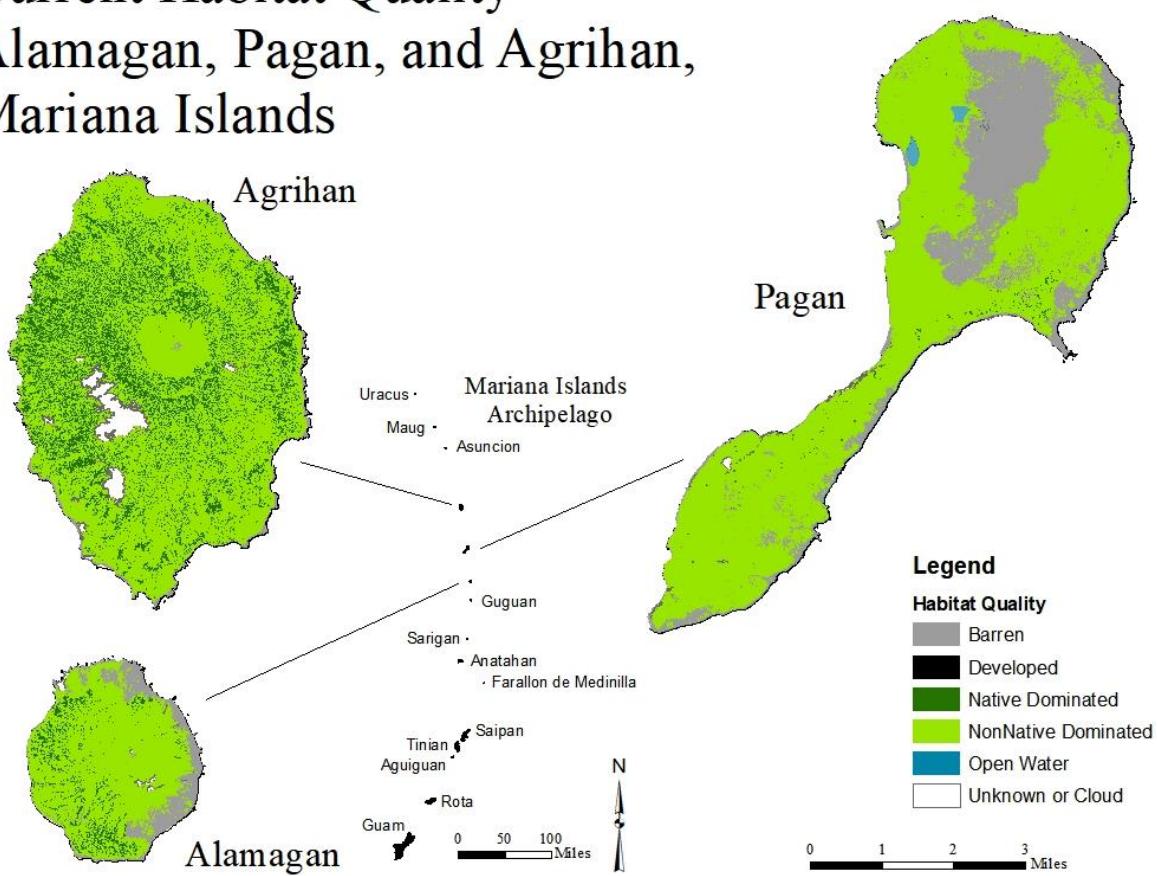
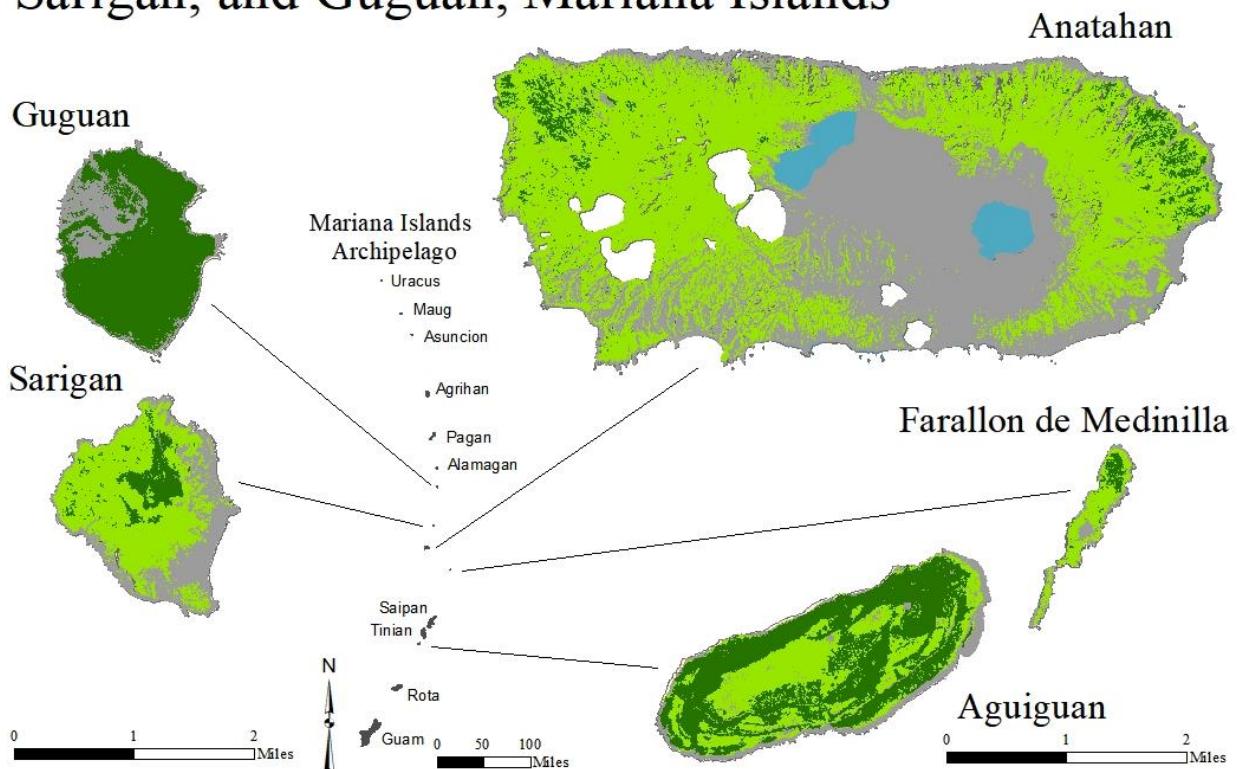


Figure 8. Habitat Quality of Agrihan, Pagan, and Alamagan.

# Current Habitat Quality

## Aguiguan, Farallon de Medinilla, Sarigan, Anatahan, and Guguan, Mariana Islands



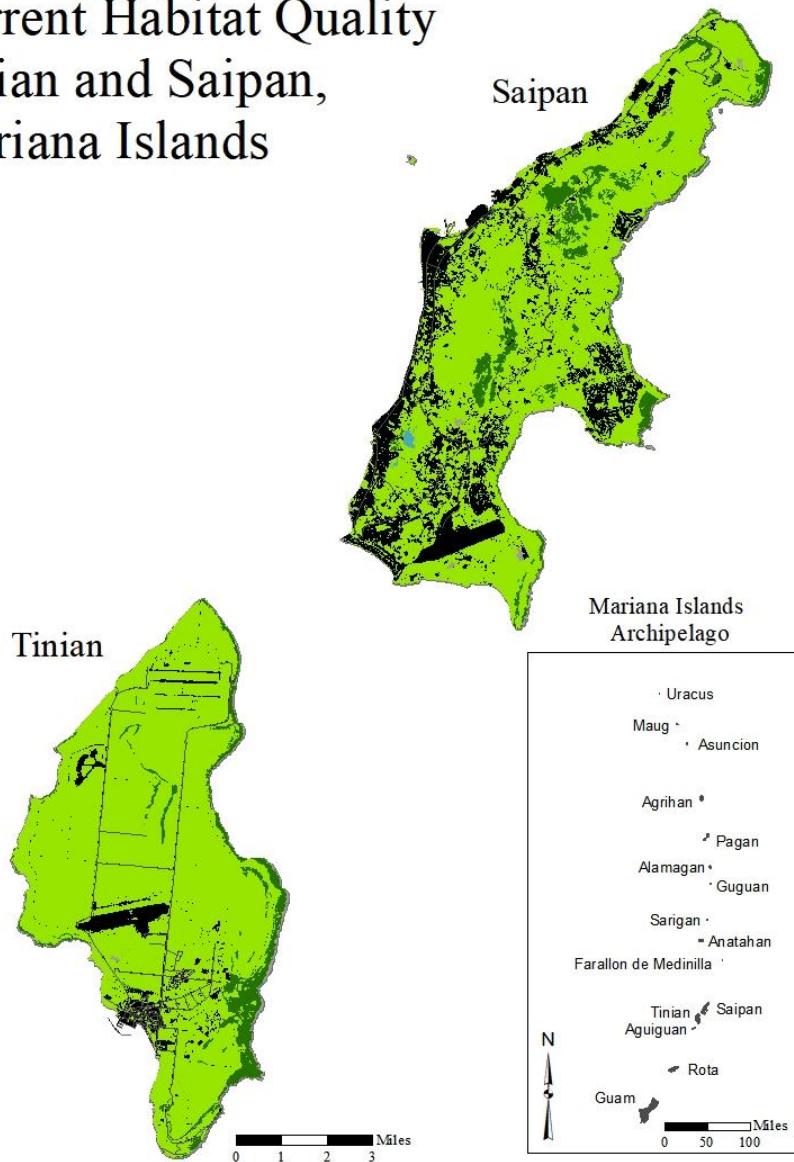
### Legend

#### HabQual

- Barren
- Developed
- Native Dominated
- NonNative Dominated
- Open Water
- Unknown or Cloud

Figure 9. Habitat Quality of Aguiguan, Farallon de Medinilla, Sarigan, Anatahan, and Guguan

# Current Habitat Quality Tinian and Saipan, Mariana Islands



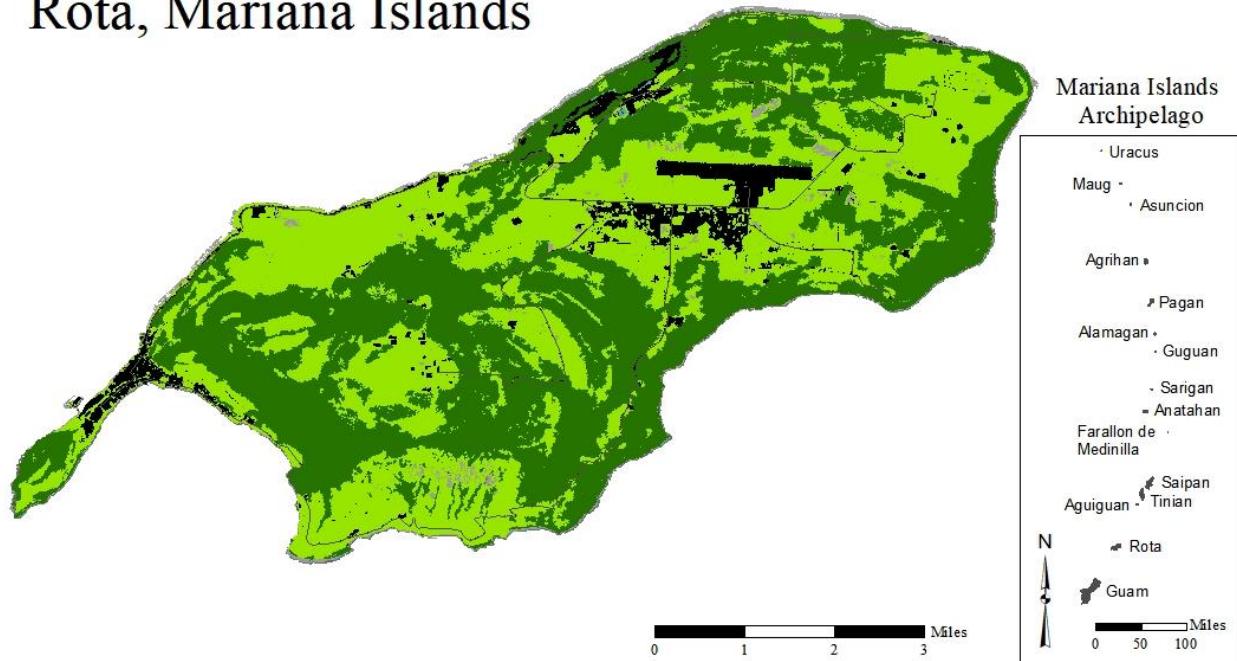
## Legend

### HabQual

- [Grey Box] Barren
- [Black Box] Developed
- [Dark Green Box] Native Dominated
- [Light Green Box] Non Native Dominated
- [Blue Box] Open Water
- [White Box] Unknown or Cloud

Figure 10. Habitat Quality of Saipan and Tinian

# Current Habitat Quality Rota, Mariana Islands



## Legend

HabQual
Barren
Developed
Native Dominated
NonNative Dominated
Open Water
Unknown or Cloud

Figure 11. Habitat Quality of Rota.

# Current Habitat Quality Guam, Mariana Islands

## Legend

### Habitat Quality

- Barren
- Developed
- Native Dominated
- NonNative Dominated
- Unknown or Cloud
- Major Roads

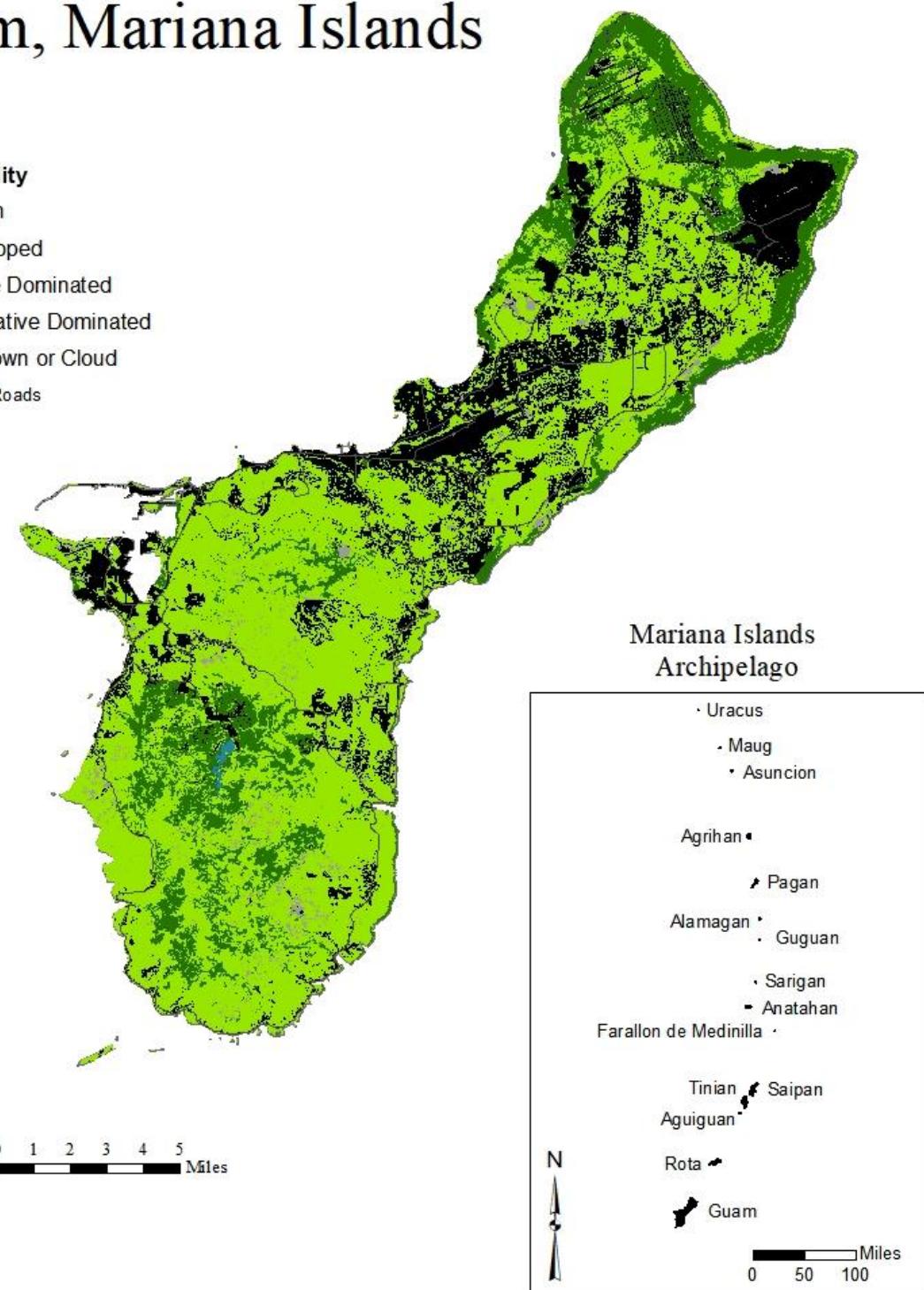


Figure 12. Habitat Quality of Guam

Table 2. Crosswalk between Land Cover Types (Amidon et al. 2017), Habitat Quality, and Draft and Final Habitat Assignments

Island	Land Cover Type	Habitat Quality	SHC Habitat	Marianas Island Team Habitat	Final Habitat	SHC Comment	SHC Response	MITComments
<b>Agrihan</b>	Mixed Grass/Herbaceous	NonNative Dominated	Savanna/Grassland	Mixed Grass/Herbaceous	Savanna/Swordgrass	Just checking if consistent. They don't seem consistent?	changed	June 26th, change to savanna
<b>Anatahan</b>	Mixed Grass/Herbaceous	NonNative Dominated	Savanna/Grassland	Mixed Grass/Herbaceous	Savanna/Swordgrass	Just checking if consistent. They don't seem consistent?	good	June 26th, change to savanna
<b>Asuncion</b>	Mixed Grass/Herbaceous	Native Dominated	Savanna/Grassland	Mixed Grass/Herbaceous	Savanna/Swordgrass	Just checking if consistent. They don't seem consistent?	good	June 26th, change to savanna
<b>Guguan</b>	Mixed Grass/Herbaceous	Native Dominated	Savanna/Grassland	Mixed Grass/Herbaceous	Savanna/Swordgrass	Just checking if consistent. They don't seem consistent?	good	June 26th, change to savanna
<b>Pagan</b>	Mixed Grass/Herbaceous	NonNative Dominated	Savanna/Grassland	Mixed Grass/Herbaceous	Savanna/Swordgrass	Just checking if consistent. They don't seem consistent?	good	June 26th, change to savanna
<b>Sarigan</b>	Mixed Grass/Herbaceous	NonNative Dominated	Savanna/Grassland	Mixed Grass/Herbaceous	Savanna/Swordgrass	Just checking if consistent. They don't seem consistent?	good	June 26th, change to savanna
<b>Alamagan</b>	Mixed Grass/Herbaceous	NonNative Dominated	Savanna/Grassland	Savanna/Swordgrass	Savanna/Swordgrass	Just checking if consistent. They don't seem consistent?	good	June 26th, change to savanna
<b>Agrihan</b>	Bare Rock	Barren	Barren	Barren	Barren			
<b>Aguiguan</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren			
<b>Aguiguan</b>	Bare Rock	Barren	Barren	Barren	Barren			
<b>Alamagan</b>	Bare Rock	Barren	Barren	Barren	Barren			
<b>Alamagan</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren			
<b>Anatahan</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren			
<b>Asuncion</b>	Bare Rock	Barren	Barren	Barren	Barren			
<b>Asuncion</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren			
<b>Farallon de Medinilla</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren			
<b>Farallon de Medinilla</b>	Bare Rock	Barren	Barren	Barren	Barren			

<b>Guam</b>	Bare Rock	Barren	Barren	Barren	Barren				
<b>Guam</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren				
<b>Guam</b>	Sand	Barren	Barren	Barren	Barren				
<b>Guguan</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren				
<b>Guguan</b>	Bare Rock	Barren	Barren	Barren	Barren				
<b>Maug</b>	Bare Rock	Barren	Barren	Barren	Barren				
<b>Pagan</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren				
<b>Pagan</b>	Bare Rock	Barren	Barren	Barren	Barren				
<b>Pagan</b>	Sand	Barren	Barren	Barren	Barren				
<b>Rota</b>	Bare Rock	Barren	Barren	Barren	Barren				
<b>Rota</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren				
<b>Rota</b>	Sand	Barren	Barren	Barren	Barren				
<b>Saipan</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren				
<b>Saipan</b>	Bare Rock	Barren	Barren	Barren	Barren				
<b>Saipan</b>	Sand	Barren	Barren	Barren	Barren				
<b>Sarigan</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren				
<b>Sarigan</b>	Bare Rock	Barren	Barren	Barren	Barren				
<b>Tinian</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren				
<b>Tinian</b>	Sand	Barren	Barren	Barren	Barren				
<b>Tinian</b>	Bare Rock	Barren	Barren	Barren	Barren				
<b>Uracus</b>	Bare Rock	Barren	Barren	Barren	Barren				
<b>Uracus</b>	Bare Soil/Gravel	Barren	Barren	Barren	Barren				
<b>Guam</b>	Coastal Scrub	Native Dominated	Coastal	Coastal	Coastal				
<b>Rota</b>	Coastal Scrub	Native Dominated	Coastal	Coastal	Coastal				
<b>Saipan</b>	Coastal Scrub	Native Dominated	Coastal	Coastal	Coastal				
<b>Tinian</b>	Coastal Scrub	Native Dominated	Coastal	Coastal	Coastal				
<b>Uracus</b>	Mixed Grass/Herbaceous	Native Dominated	Coastal	Coastal	Coastal	Just checking if consistent. They don't seem consistent?	good		
<b>Agrihan</b>	Developed	Developed	Developed	Developed	Developed				
<b>Alamagan</b>	Developed	Developed	Developed	Developed	Developed				
<b>Guam</b>	Agriculture	Developed	Developed	Developed	Developed				
<b>Guam</b>	Developed	Developed	Developed	Developed	Developed				
<b>Guam</b>	Developed Vegetation	Developed	Developed	Developed	Developed				
<b>Rota</b>	Agriculture	Developed	Developed	Developed	Developed				

<b>Rota</b>	Developed	Developed	Developed	Developed	Developed				
<b>Rota</b>	Developed Vegetation	Developed	Developed	Developed	Developed				
<b>Saipan</b>	Agriculture	Developed	Developed	Developed	Developed				
<b>Saipan</b>	Developed	Developed	Developed	Developed	Developed				
<b>Saipan</b>	Developed Vegetation	Developed	Developed	Developed	Developed				
<b>Tinian</b>	Developed	Developed	Developed	Developed	Developed				
<b>Tinian</b>	Developed Vegetation	Developed	Developed	Developed	Developed				
<b>Tinian</b>	Agriculture	Developed	Developed	Developed	Developed				
<b>Agrihan</b>	Leucaena Thicket	NonNative Dominated	Forest	Leucaena Forest	Leucaena Forest				
<b>Aguiguan</b>	Leucaena Thicket	NonNative Dominated	Forest	Leucaena Forest	Leucaena Forest				
<b>Guam</b>	Leucaena Thicket	NonNative Dominated	Forest	Leucaena Forest	Leucaena Forest				
<b>Pagan</b>	Leucaena Thicket	NonNative Dominated	Forest	Leucaena Forest	Leucaena Forest				
<b>Rota</b>	Leucaena Thicket	NonNative Dominated	Forest	Leucaena Forest	Leucaena Forest				
<b>Saipan</b>	Leucaena Thicket	NonNative Dominated	Forest	Leucaena Forest	Leucaena Forest				
<b>Sarigan</b>	Leucaena Thicket	NonNative Dominated	Forest	Leucaena Forest	Leucaena Forest				
<b>Tinian</b>	Leucaena Thicket	NonNative Dominated	Forest	Leucaena Forest	Leucaena Forest				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				
<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine				

<b>Marine</b>	Open Water - Marine	Marine	Marine	Marine	Marine			
<b>Aguiguan</b>	Mixed Grass/Herbaceous	NonNative Dominated	Forest	Mixed Grass/Herbaceous	Mixed Grass/Herbaceous	Just checking if consistent. They don't seem consistent?	good	
<b>Farallon de Medinilla</b>	Mixed Grass/Herbaceous	NonNative Dominated	Savanna/ Grassland	Mixed Grass/Herbaceous	Mixed Grass/Herbaceous	Just checking if consistent. They don't seem consistent?	good	
<b>Guam</b>	Mixed Grass/Herbaceous	NonNative Dominated	Forest	Mixed Grass/Herbaceous	Mixed Grass/Herbaceous	Just checking if consistent. They don't seem consistent?	good	
<b>Maug</b>	Mixed Grass/Herbaceous	Native Dominated	Savanna/ Grassland	Mixed Grass/Herbaceous	Mixed Grass/Herbaceous	Just checking if consistent. They don't seem consistent?	good	
<b>Rota</b>	Mixed Grass/Herbaceous	NonNative Dominated	Forest	Mixed Grass/Herbaceous	Mixed Grass/Herbaceous	Just checking if consistent. They don't seem consistent?	good	
<b>Saipan</b>	Mixed Grass/Herbaceous	NonNative Dominated	Forest	Mixed Grass/Herbaceous	Mixed Grass/Herbaceous	Just checking if consistent. They don't seem consistent?	good	
<b>Tinian</b>	Mixed Grass/Herbaceous	NonNative Dominated	Forest	Mixed Grass/Herbaceous	Mixed Grass/Herbaceous	Just checking if consistent. They don't seem consistent?	good	
<b>Agrihan</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Agrihan</b>	Casuarina Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Aguiguan</b>	Casuarina Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Alamagan</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Anatahan</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Asuncion</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Guam</b>	Acacia Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Guam</b>	Bamboo Thicket	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Guam</b>	Casuarina Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			

<b>Guam</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Guam</b>	Vitex Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Maug</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Pagan</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Pagan</b>	Casuarina Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Rota</b>	Bamboo Thicket	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Rota</b>	Casuarina Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Rota</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Saipan</b>	Bamboo Thicket	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Saipan</b>	Casuarina Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Saipan</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Sarigan</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Tinian</b>	Coconut Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Tinian</b>	Bamboo Thicket	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Tinian</b>	Casuarina Forest	NonNative Dominated	Forest	Monoculture Forest	Monoculture Forest			
<b>Agrihan</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Agrihan</b>	Native Volcanic Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Aguiguan</b>	Native Limestone Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Alamagan</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Anatahan</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Asuncion</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Asuncion</b>	Native Volcanic Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Guam</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Guam</b>	Native Limestone Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Guam</b>	Native Volcanic Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Guguan</b>	Native Volcanic Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Maug</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Maug</b>	Native Volcanic Forest	Native Dominated	Forest	Native Forest	Native Forest			

<b>Pagan</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Rota</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Rota</b>	Native Limestone Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Saipan</b>	Native Limestone Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Saipan</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Sarigan</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Sarigan</b>	Native Volcanic Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Tinian</b>	Hibiscus Thicket	Native Dominated	Forest	Native Forest	Native Forest			
<b>Tinian</b>	Native Limestone Forest	Native Dominated	Forest	Native Forest	Native Forest			
<b>Guam</b>	Grassland	NonNative Dominated	Savanna/Grassland	Savanna/Swordgrass	Savanna/Swordgrass			
<b>Rota</b>	Grassland	NonNative Dominated	Savanna/Grassland	Savanna/Swordgrass	Savanna/Swordgrass			
<b>Saipan</b>	Grassland	Native Dominated	Savanna/Grassland	Savanna/Swordgrass	Savanna/Swordgrass	Is this native on Saipan, but not on Guam or Rota?	All should non-native - some on northern islands native	
<b>Agrihan</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Aguiguan</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Alamagan</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Anatahan</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Asuncion</b>	Scrub/Shrub	Native Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent -	It's island specific.	

						Is this because it's polygon specific?		
<b>Farallon de Medinilla</b>	Scrub/Shrub	Native Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Guam</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Maug</b>	Scrub/Shrub	Native Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Pagan</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Rota</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Saipan</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Sarigan</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Tinian</b>	Scrub/Shrub	NonNative Dominated	Scrub/Shrub	Scrub/Shrub	Scrub/Shrub	These are not consistent - Is this because it's polygon specific?	It's island specific.	
<b>Aguiguan</b>	Mixed Introduced Forest	NonNative Dominated	Forest	Secondary/Mixed Forest	Secondary/Mixed Forest			

<b>Alamagan</b>	Mixed Introduced Forest	NonNative Dominated	Forest	Secondary/Mixed Forest	Secondary/Mixed Forest			
<b>Anatahan</b>	Mixed Introduced Forest	NonNative Dominated	Forest	Secondary/Mixed Forest	Secondary/Mixed Forest			
<b>Guam</b>	Mixed Introduced Forest	NonNative Dominated	Forest	Secondary/Mixed Forest	Secondary/Mixed Forest			
<b>Pagan</b>	Mixed Introduced Forest	NonNative Dominated	Forest	Secondary/Mixed Forest	Secondary/Mixed Forest			
<b>Rota</b>	Mixed Introduced Forest	NonNative Dominated	Forest	Secondary/Mixed Forest	Secondary/Mixed Forest			
<b>Saipan</b>	Mixed Introduced Forest	NonNative Dominated	Forest	Secondary/Mixed Forest	Secondary/Mixed Forest			
<b>Sarigan</b>	Mixed Introduced Forest	NonNative Dominated	Forest	Secondary/Mixed Forest	Secondary/Mixed Forest			
<b>Tinian</b>	Mixed Introduced Forest	NonNative Dominated	Forest	Secondary/Mixed Forest	Secondary/Mixed Forest			
<b>Agrihan</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Agrihan</b>	Cloud	Unknown	Unknown	Unknown	Unknown	Document in Data Gap		
<b>Alamagan</b>	Cloud	Unknown	Unknown	Unknown	Unknown	Document in Data Gap		
<b>Alamagan</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Anatahan</b>	Cloud	Unknown	Unknown	Unknown	Unknown	Document in Data Gap		
<b>Anatahan</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Asuncion</b>	Cloud	Unknown	Unknown	Unknown	Unknown	Document in Data Gap		
<b>Asuncion</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Farallon de Medinilla</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Maug</b>	Cloud	Unknown	Unknown	Unknown	Unknown	Document in Data Gap		
<b>Maug</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Pagan</b>	Cloud	Unknown	Unknown	Unknown	Unknown	Document in Data Gap		
<b>Pagan</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Rota</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Saipan</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Sarigan</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Tinian</b>	Shadow	Unknown	Unknown	Unknown	Unknown			
<b>Anatahan</b>	Open Water	Open Water	Wetland	Wetland	Wetland	Why would open water be classified as Non-native dominated?	Decided to leave as open water and figure out how to do habitat quality after	

<b>Guam</b>	Emergent Wetland	NonNative Dominated	Wetland	Wetland	Wetland	Are all emergent wetlands non-native dominated?	Yes.	
<b>Guam</b>	Mangrove Wetland	Native Dominated	Wetland	Wetland	Wetland	Are mangroves native in Marianas	Yes, native	
<b>Guam</b>	Open Water	Open Water	Wetland	Wetland	Wetland	Why would open water be classified as Non-native dominated?	Decided to leave as open water and figure out how to do habitat quality after	
<b>Pagan</b>	Open Water	Open Water	Wetland	Wetland	Wetland	Why would open water be classified as Non-native dominated?	Decided to leave as open water and figure out how to do habitat quality after	
<b>Rota</b>	Emergent Wetland	NonNative Dominated	Wetland	Wetland	Wetland	Are all emergent wetlands non-native dominated?	Yes.	
<b>Rota</b>	Open Water	Open Water	Wetland	Wetland	Wetland	Why would open water be classified as Non-native dominated?	Decided to leave as open water and figure out how to do habitat quality after	
<b>Saipan</b>	Open Water	Open Water	Wetland	Wetland	Wetland	Why would open water be classified as Non-native dominated?	Decided to leave as open water and figure out how to do habitat quality after	
<b>Saipan</b>	Mangrove Wetland	Native Dominated	Wetland	Wetland	Wetland	Are mangroves native in Marianas	Yes, native	
<b>Saipan</b>	Emergent Wetland	NonNative Dominated	Wetland	Wetland	Wetland	Are all emergent wetlands	Yes.	

						non-native dominated?		
Tinian	Emergent Wetland	NonNative Dominated	Wetland	Wetland	Wetland	Are all emergent wetlands non-native dominated?	Yes.	
Tinian	Open Water	Open Water	Wetland	Wetland	Wetland	Why would open water be classified as Non-native dominated?	Decided to leave as open water and figure out how to do habitat quality after	

R code to reclassify the 2017 Land Cover layers into these Habitat Types and Qualities are included as Appendices C and D.

### Land Ownership

The land ownership layers were limited for the Mariana Islands. The only islands with complete land ownership data were Rota (MPLA 2014) and Saipan (CRM 2008, BECQ 2015), CNMI. An incomplete parcel dataset was also available for Guam (Bureau of Statistics and Plans 2013a) which included public and private lands for most of the island. In addition, a boundary data set was available for Federal lands on Guam (Bureau of Statistics 2013b, National Park Service 2013, USFWS 2012). Unfortunately, no parcel data were available for Tinian, Aguijan, or the northern islands of the CNMI. The only exception was approximate boundaries of Department of Defense leased lands on Tinian (Unknown 2012a).

We summarized land ownership into the categories below:

- Private
- Public
- Public Homestead (Public lands proposed for either village or agricultural homesteads. These will be private once they are re-leased)
- Public Leased (lands in the CNMI leased to developers)
- Federal DoD
- Federal DoD Leased (lands leased by DoD)
- Federal DoD Leaseback (these are lands DoD leased and leased back to farmers)
- Federal NPS
- Federal NPS Leased (lands leased by the National Park Service on Saipan)
- Federal USFWS
- Unknown (These are lands for which we have no data on ownership)

### Reserve Status

The conservation and reserve areas were in numerous geospatial files (see list below for references), which we merged with the habitat data by doing repeated spatial intersections in ArcGIS. We

enumerated areas of each habitat type that had conservation protections by being inside of a reserve or conservation area. In some cases more than one conservation or reserve areas overlap, and in this case, we enumerated a single area to both reserve types in the tables. We describe the different conservation and reserve areas are below.

- CNMI (these are CNMI legislated conservation lands; Unknown 2016)
- Rota (these are Rota legislated conservation lands; Unknown 2012b)
- Tinian (these are Tinian legislated conservation lands; Unknown 2012c)
- Guam (these are Guam legislated conservation lands; Kottermair 2013a)
- Territorial Seashore (this is land legislated as a seashore by Guam; Kottermair 2013b)
- CNMI Mitigation Area (these are lands that were set aside as mitigation; Unknown 2012c, 2016)
- Eco Res Area (these are DoD Ecological Reserve Areas; Bureau of Statistics and Plans 2013c)
- NPS (this is a National Park; National Park Service 2013)
- USFWS NWR (this is a fee simple refuge; USFWS 2012)
- USFWS NWR Overlay (this is an overlay refuge on DoD lands; USFWS 2012)

#### Critical Habitat

Finally, the Critical Habitat (CH) categories are listed below and are based on final designation boundaries reported in USFWS (2004, 2006). The Aga and Nosa Luta overlap so they are both listed if they overlap in an area, e.g., we identified the habitat area as “Aga and Nosa Luta” in the tables. The Aga, Sihek, and Fanihi also overlap so all three are listed where they overlap.

- Aga (This is Mariana crow critical habitat - occurs on Guam and Rota)
- Fanihi (This is Mariana fruit bat critical habitat - Guam only)
- Nosa Luta (This is Rota White-eye critical habitat - Rota only)
- Sihek (This is Guam Kingfisher critical habitat - Guam only)

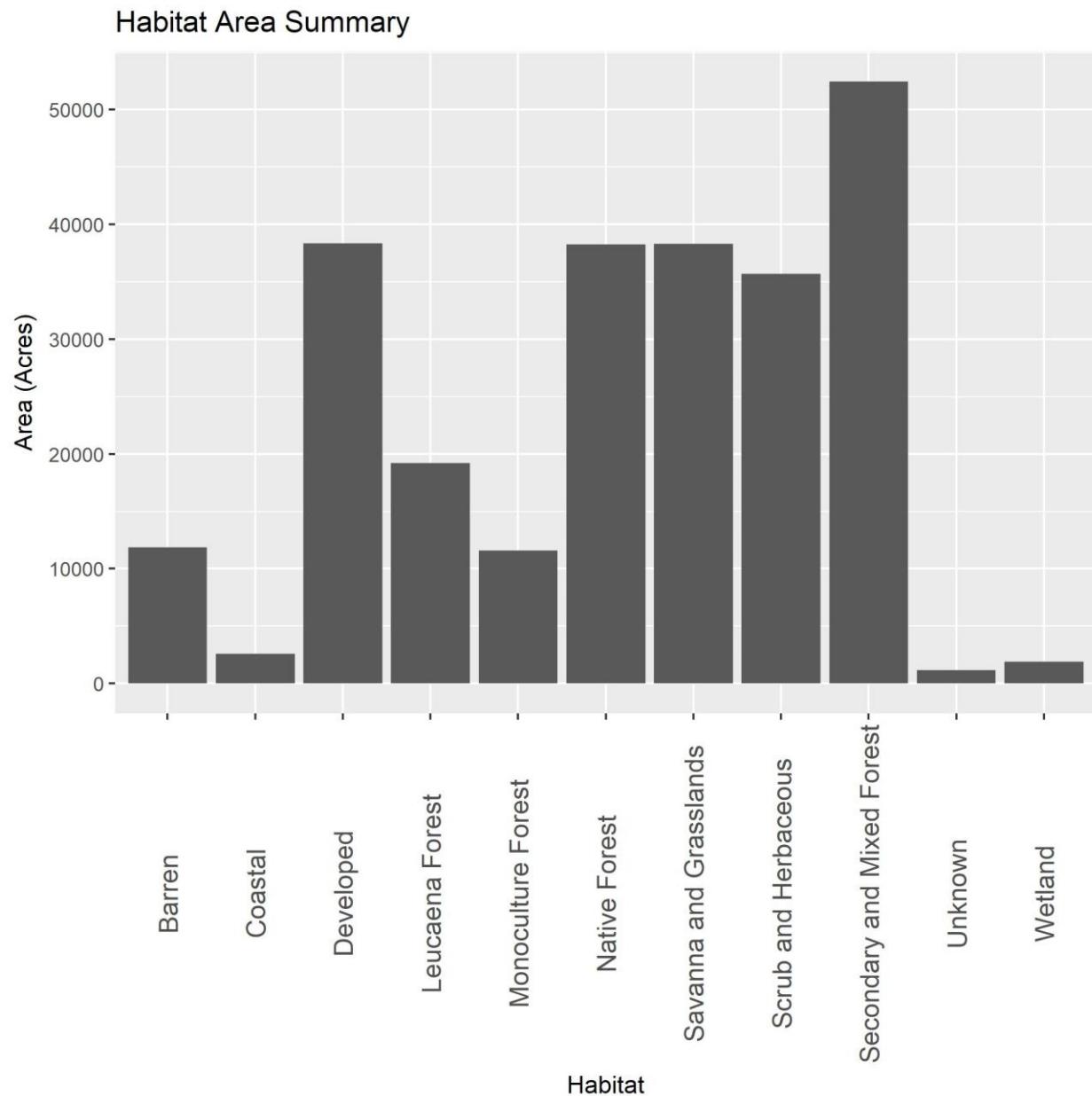
#### Other layers not used

Although several other data layers exist to inform this analysis, but the Strategic Habitat Conservation branch did not summarize these layers. The rivers layer (Kottermair 2006) represents the Streams Habitat on Guam. A similar data layer was not available for the remaining Mariana Islands with streams (i.e., Rota and Saipan). Therefore, streams on those islands were digitized from the 1999 USGS 7.5' Quadrangle Maps for these islands (USGS 1999a, b). The Caves (Selected) layer from Taboroi (2002) to represent this Habitat on Guam. Similar data was not available for the remaining Mariana Islands.

## Summary Information Provided

The final versions of the figures for the HSA reports follow. The maps are included as Appendix A and tables as Appendix B. The code used to generate these is included as Appendices C and D.

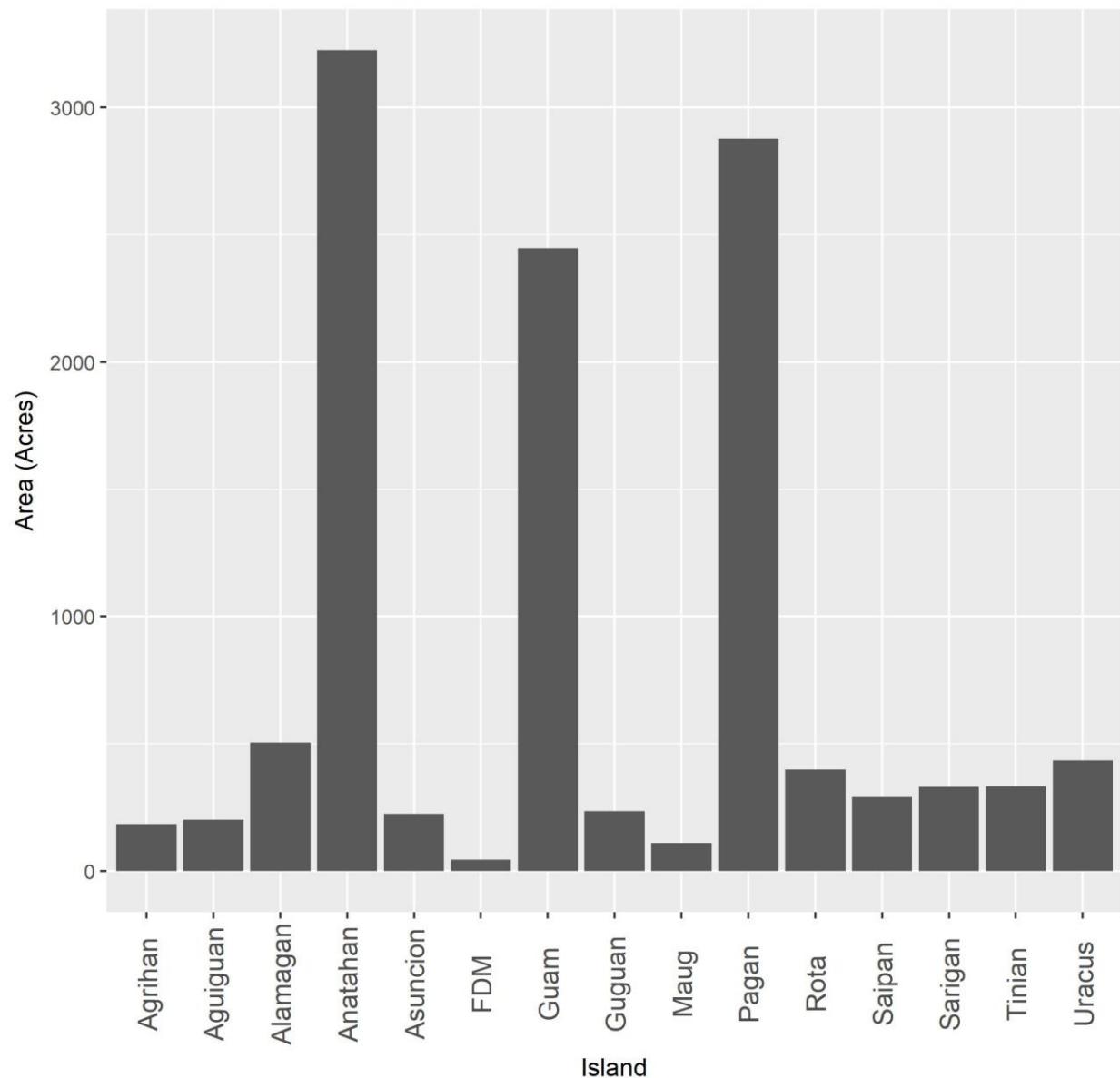
## Simple Archipelago Summary



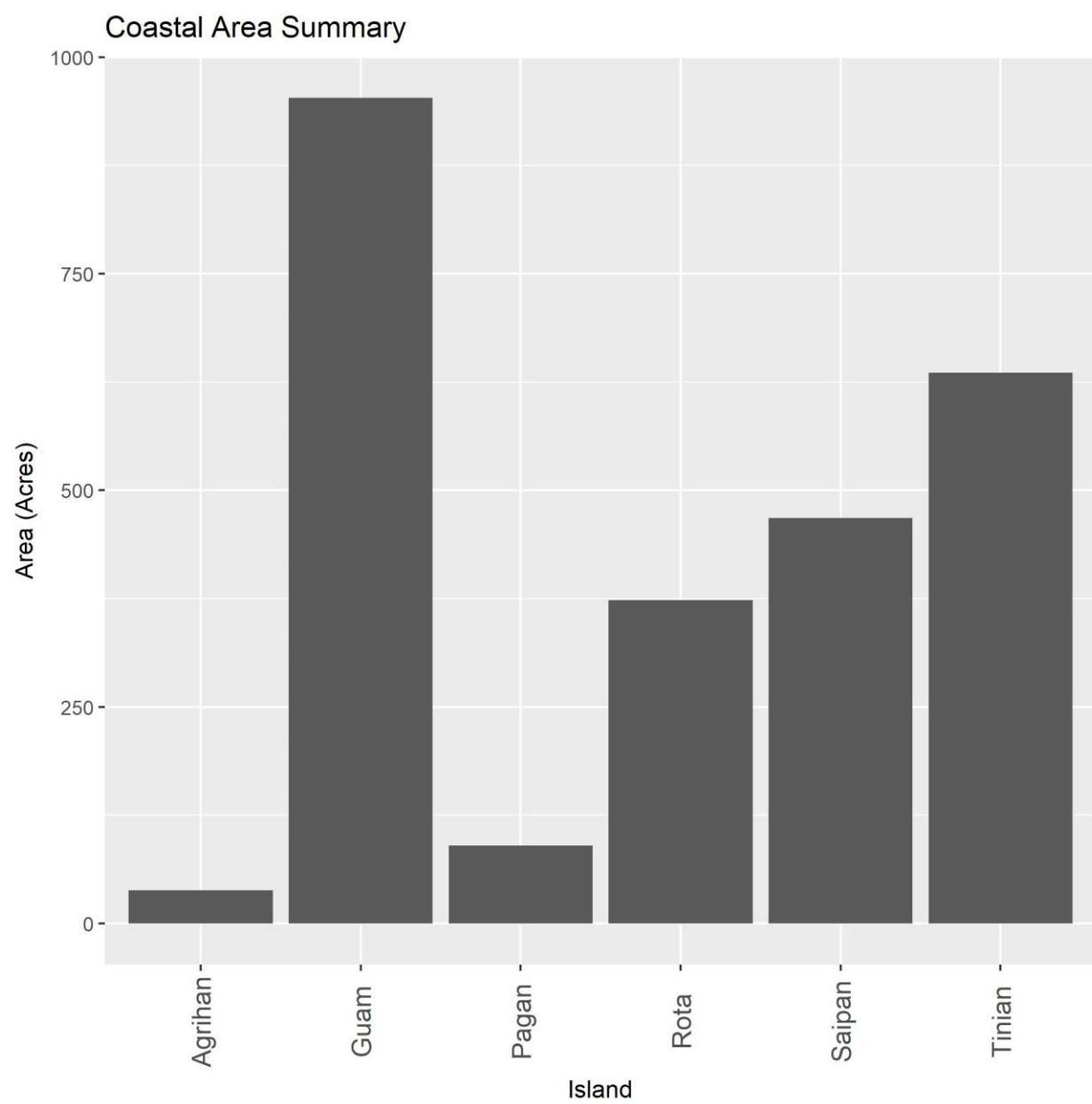
## Simple Island Summaries

Barren

Barren Area Summary

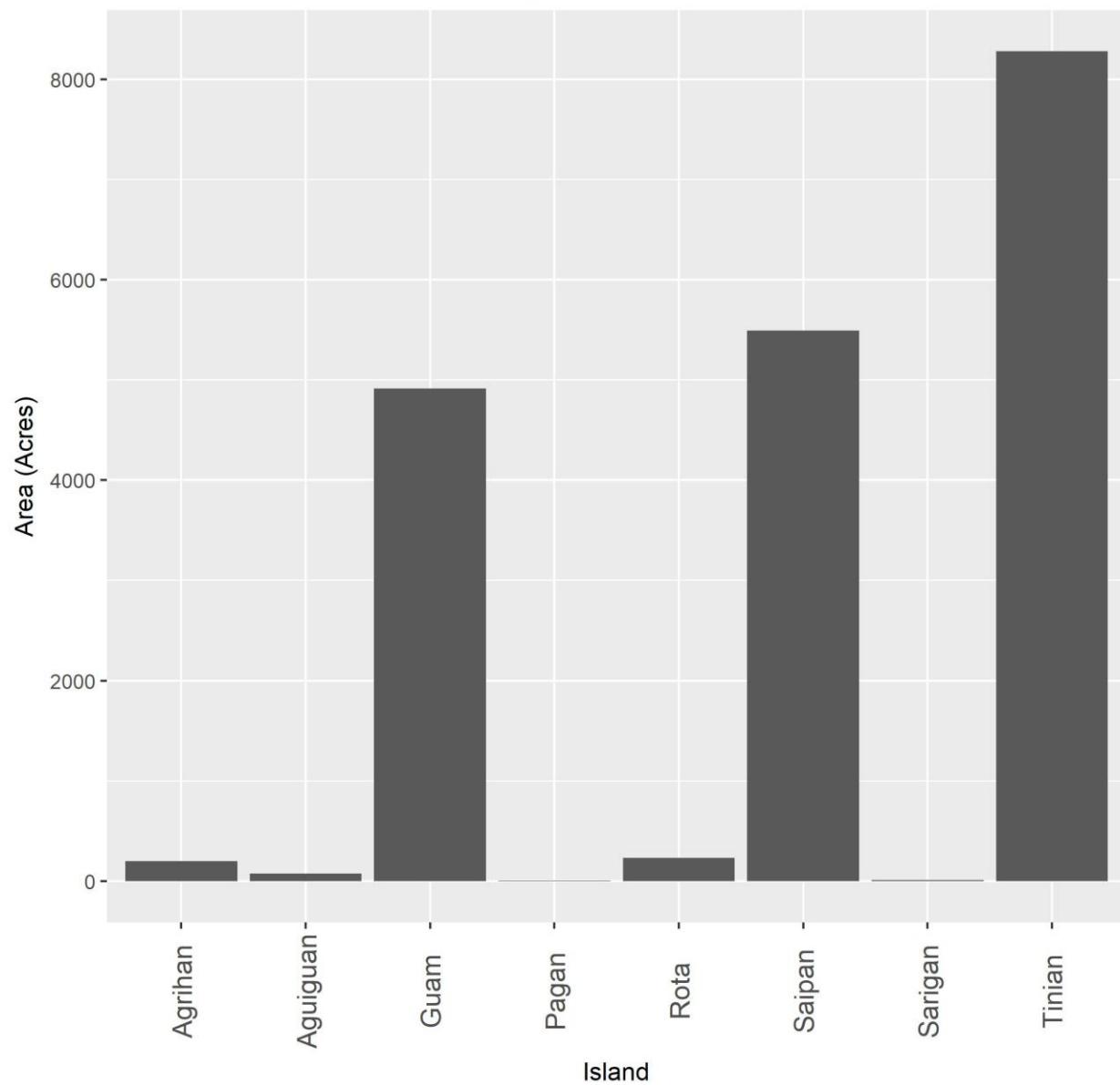


Coastal

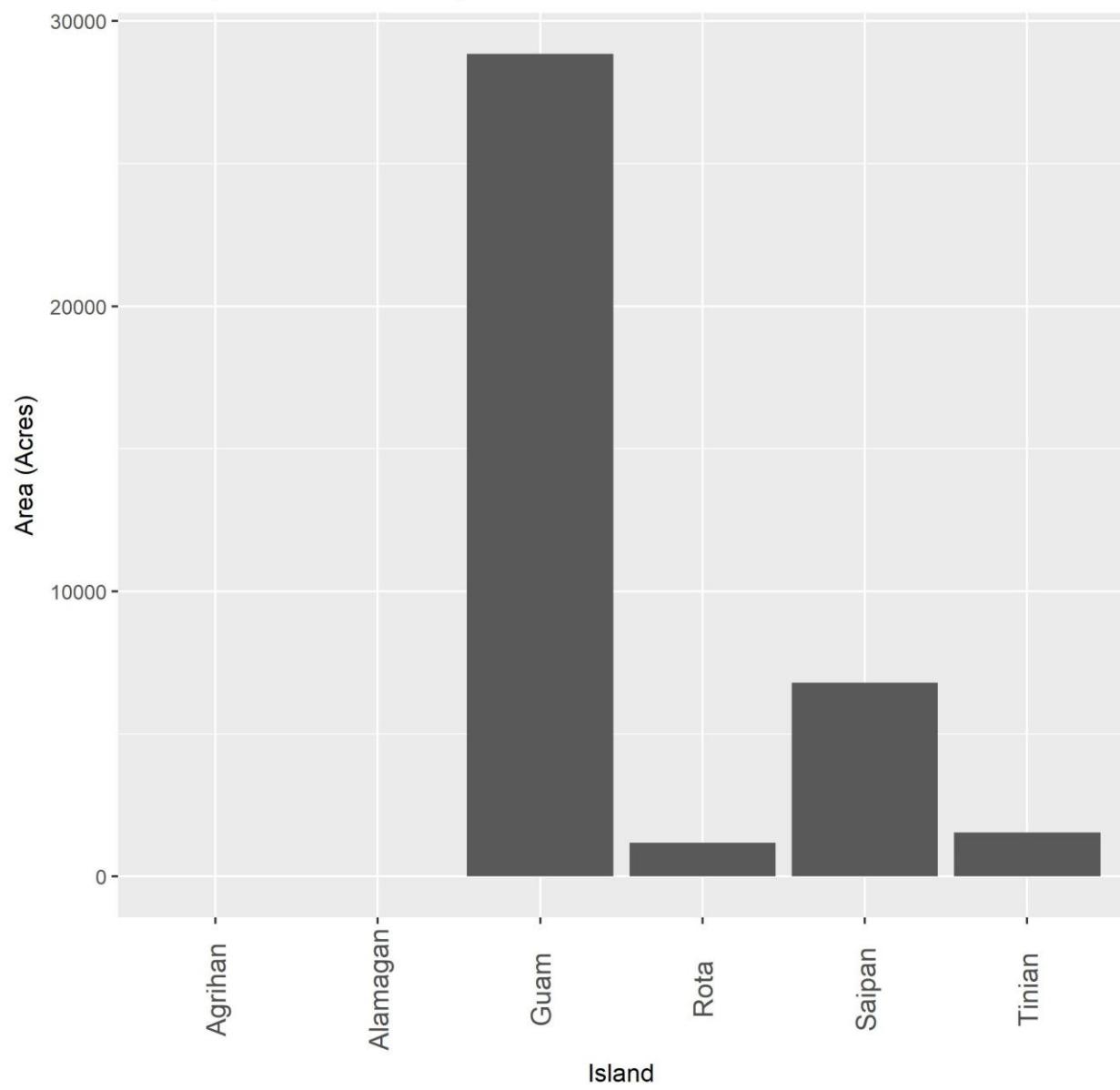


Developed

### Leucaena Forest Area Summary

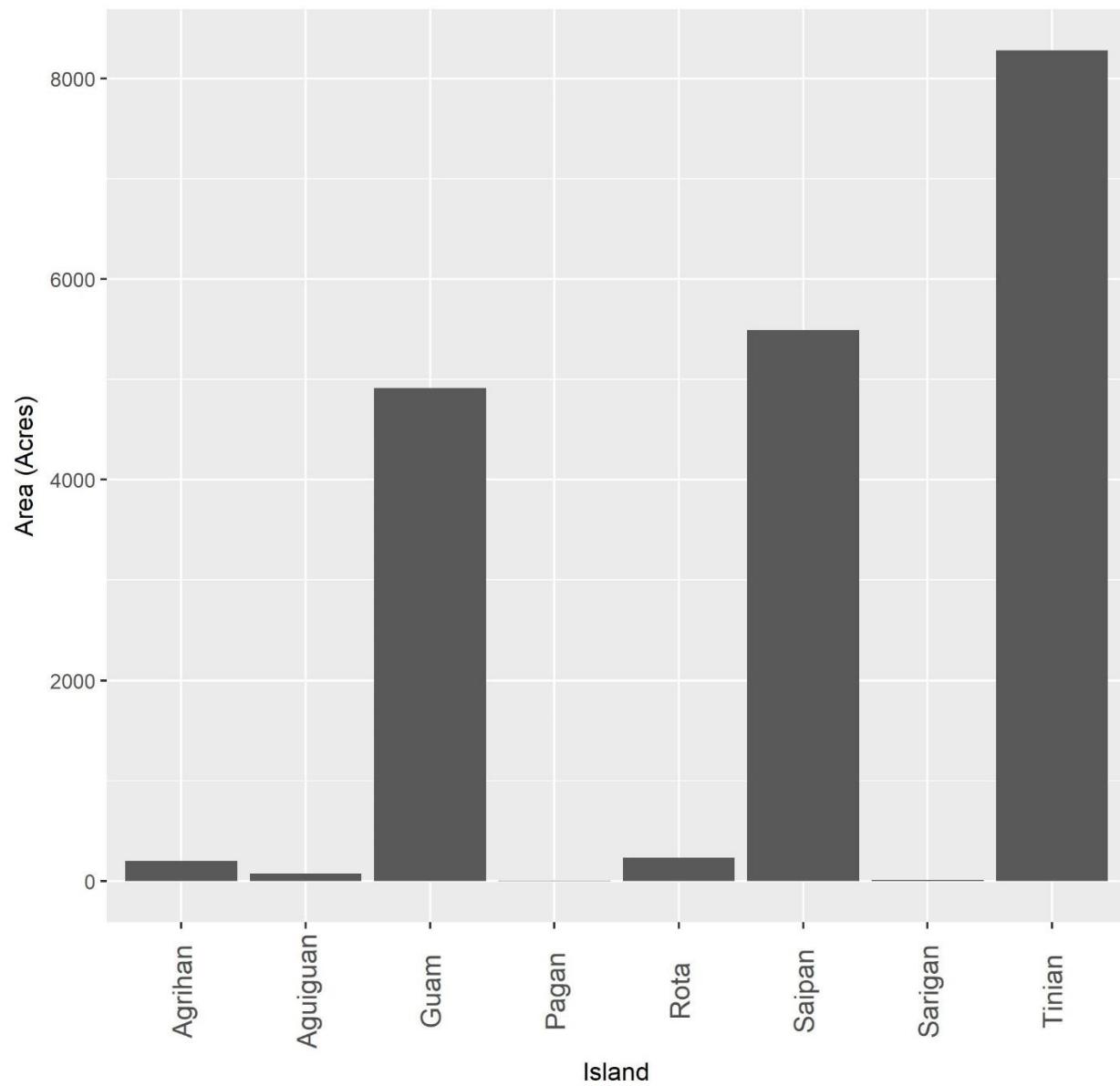


### Developed Area Summary



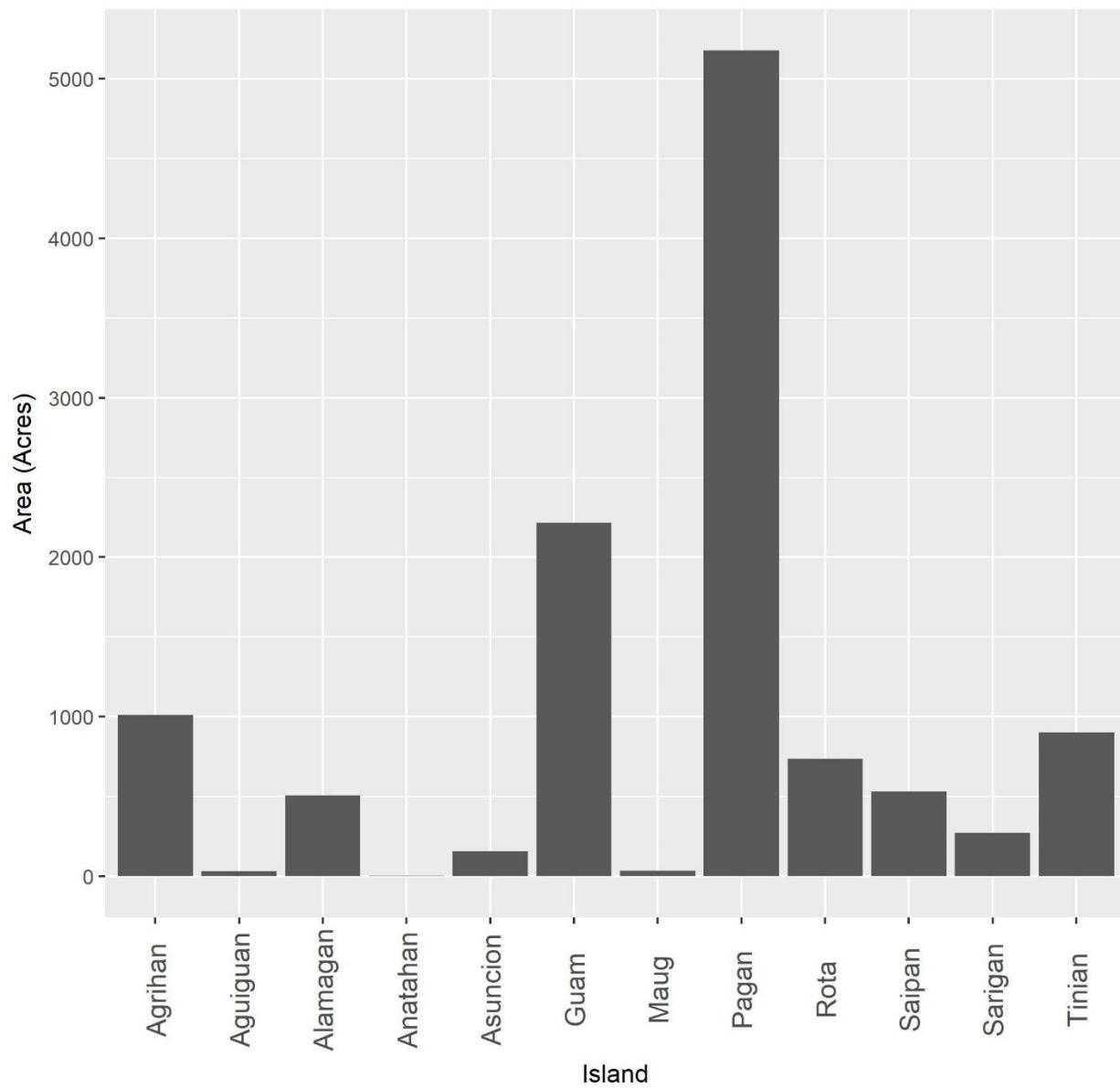
Leucaena Forest

Leucaena Forest Area Summary



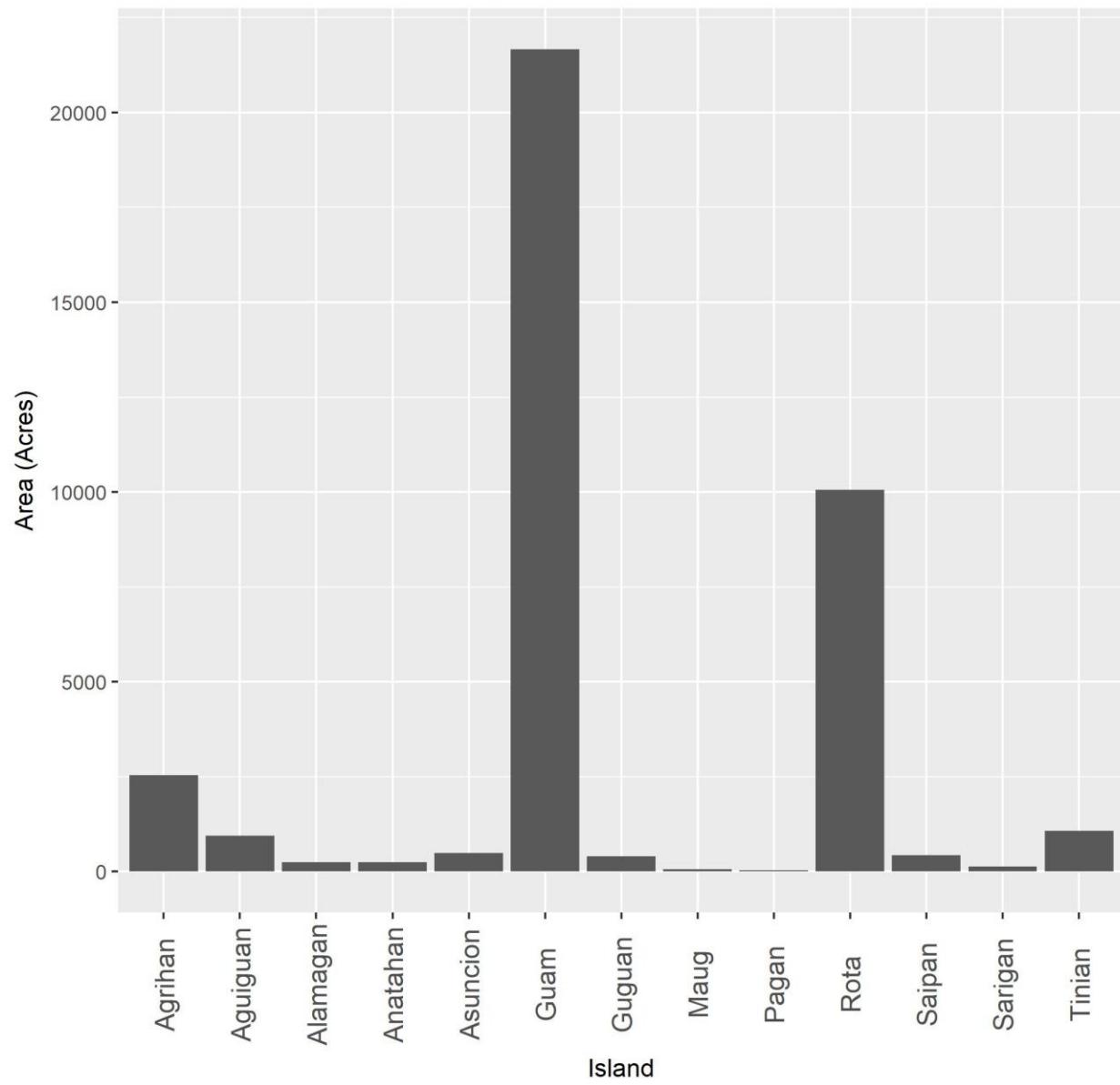
## Monoculture Forest

### Monoculture Forest Area Summary



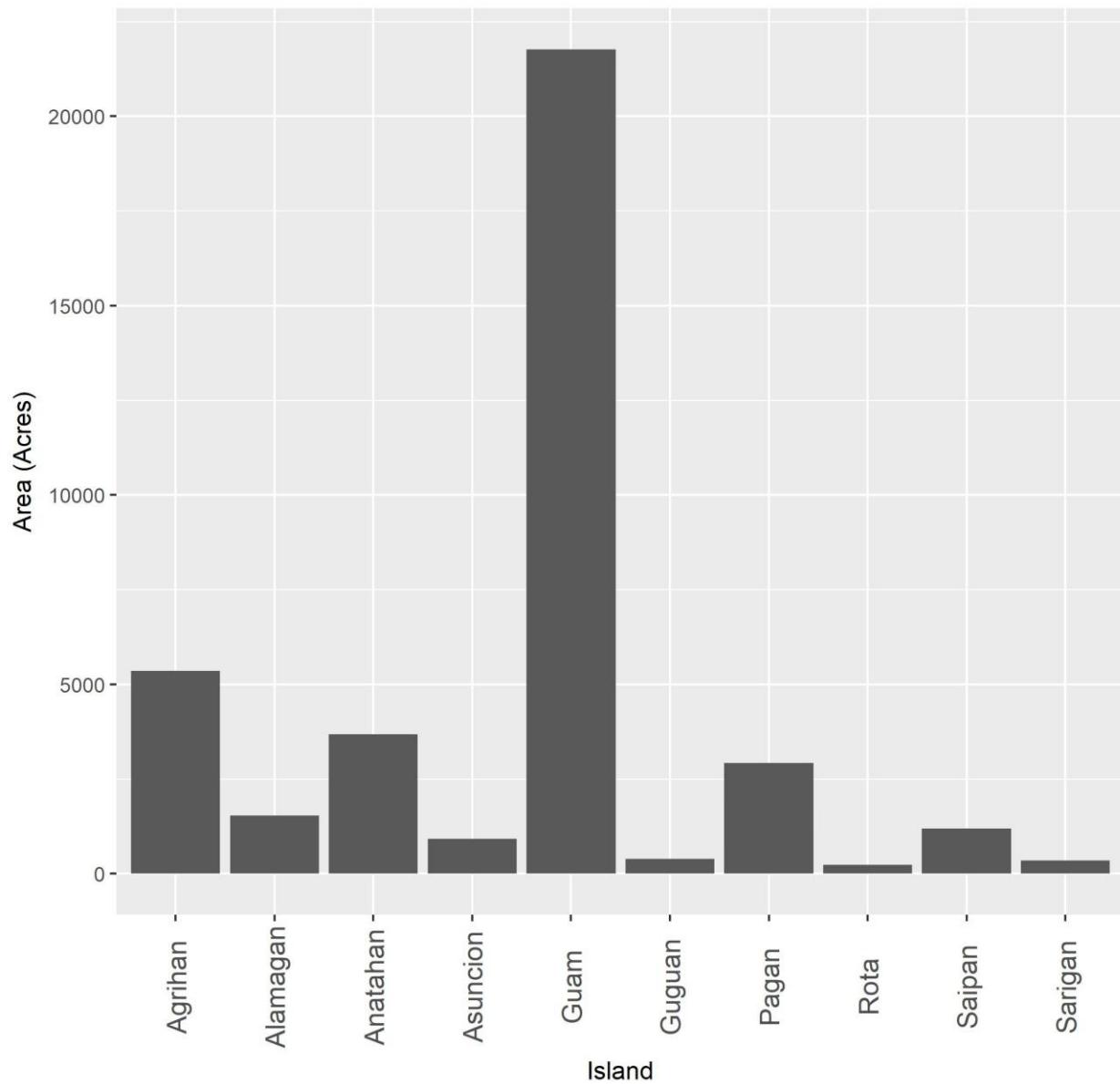
Native Forest

Native Forest Area Summary



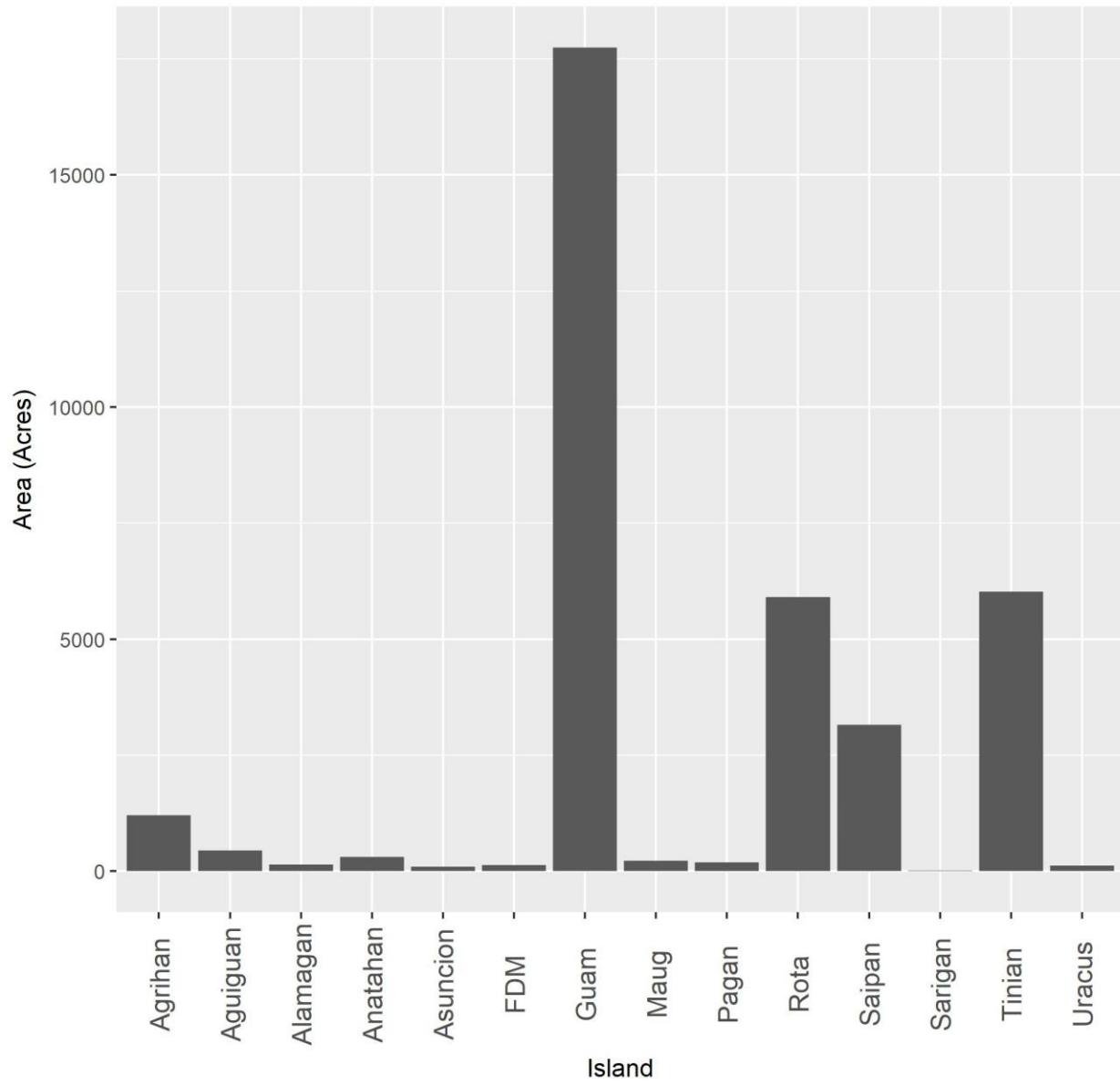
Savanna and Grasslands

Savanna and Grasslands Area Summary



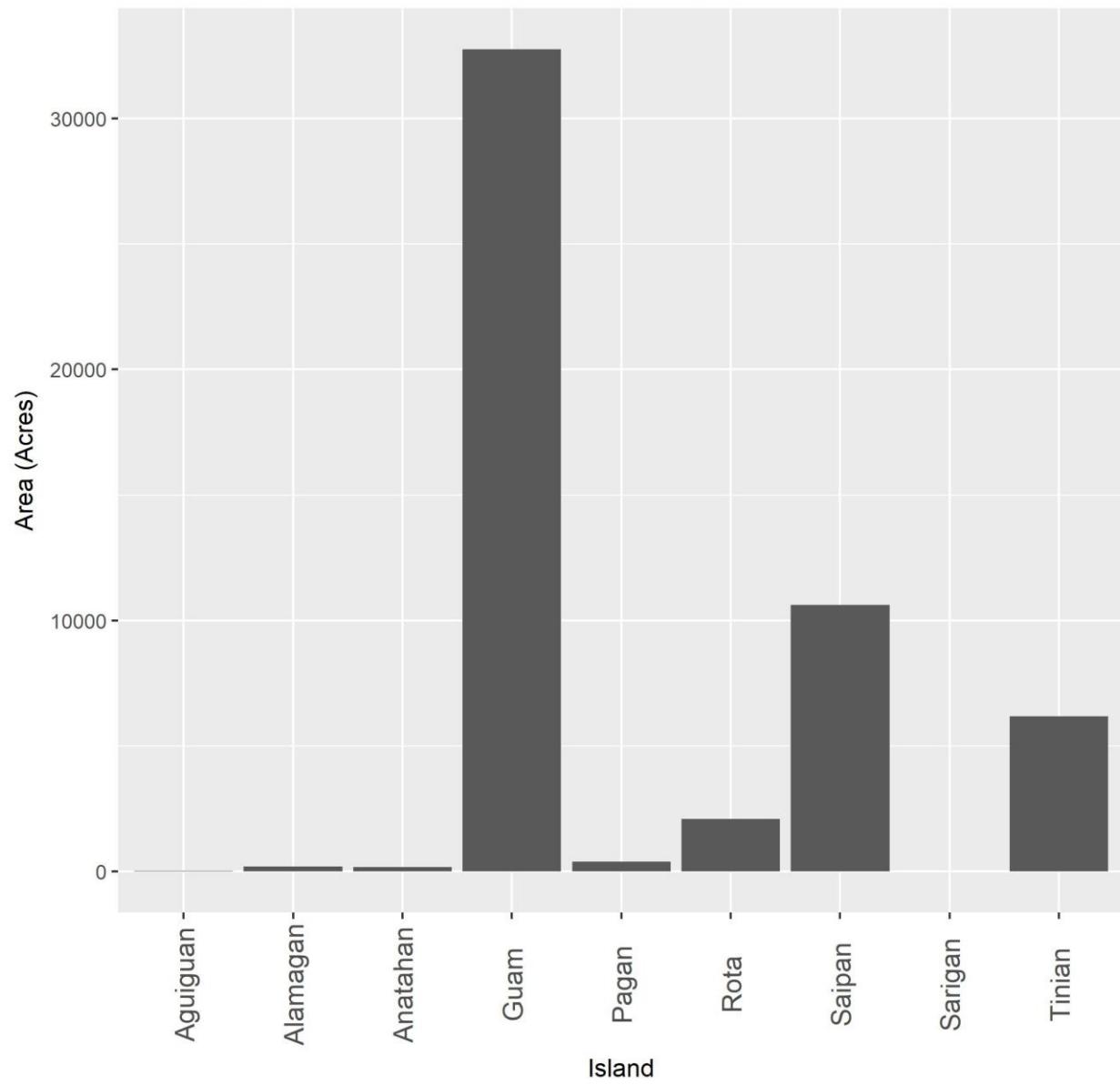
Scrub and Herbaceous

**Scrub and Herbaceous Area Summary**



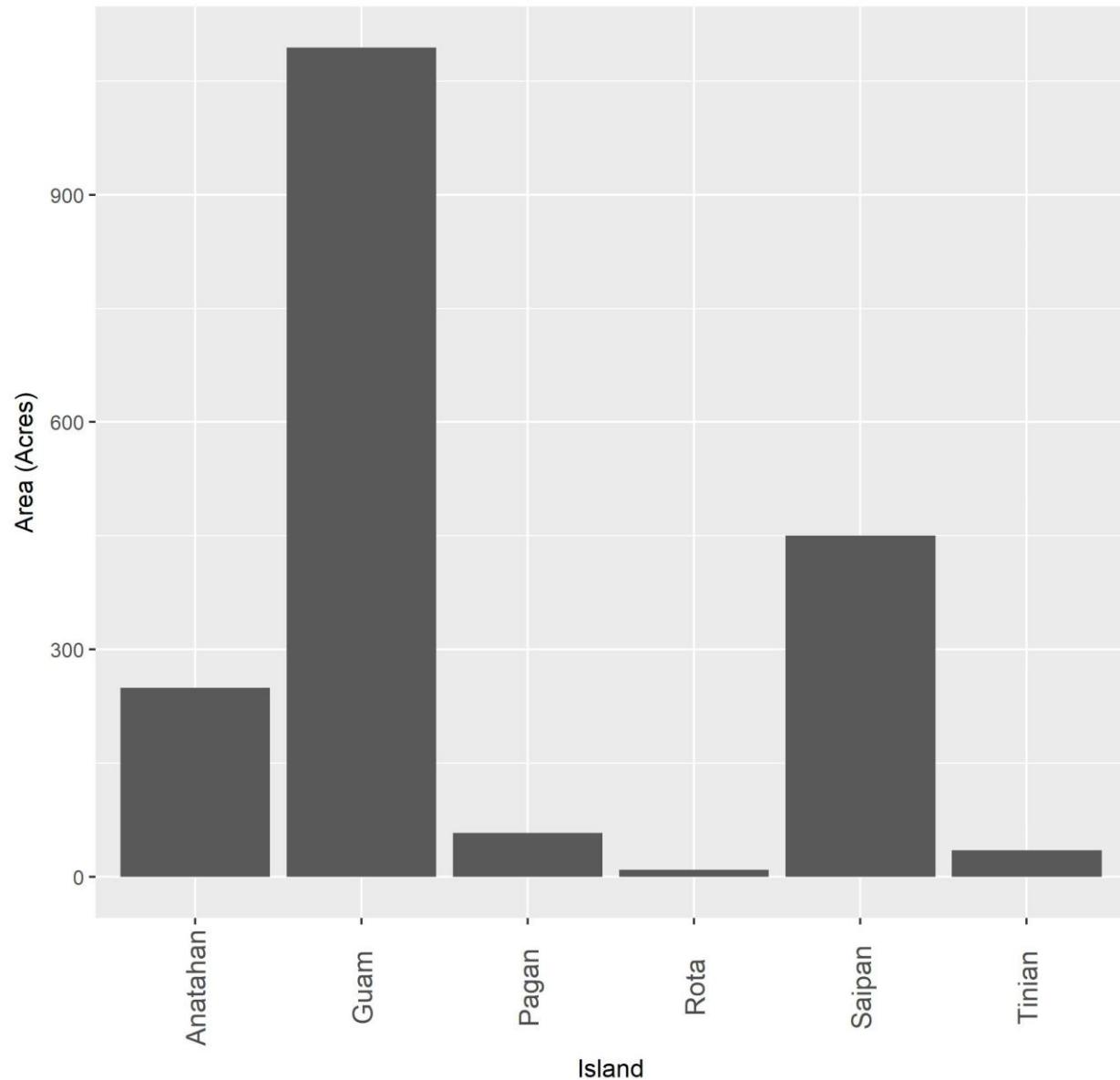
Secondary and Mixed Forest

**Secondary and Mixed Forest Area Summary**



Wetlands

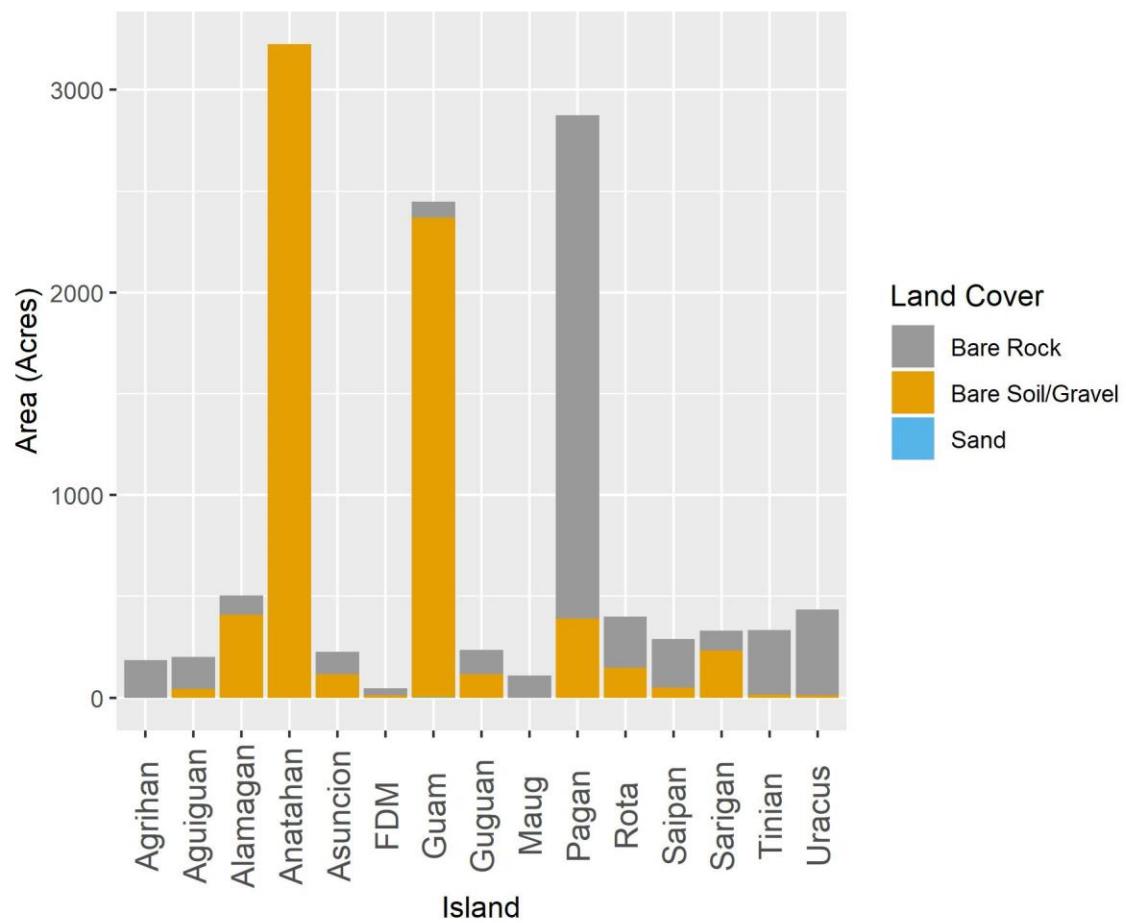
Wetland Area Summary



## Vegetation and Land Cover

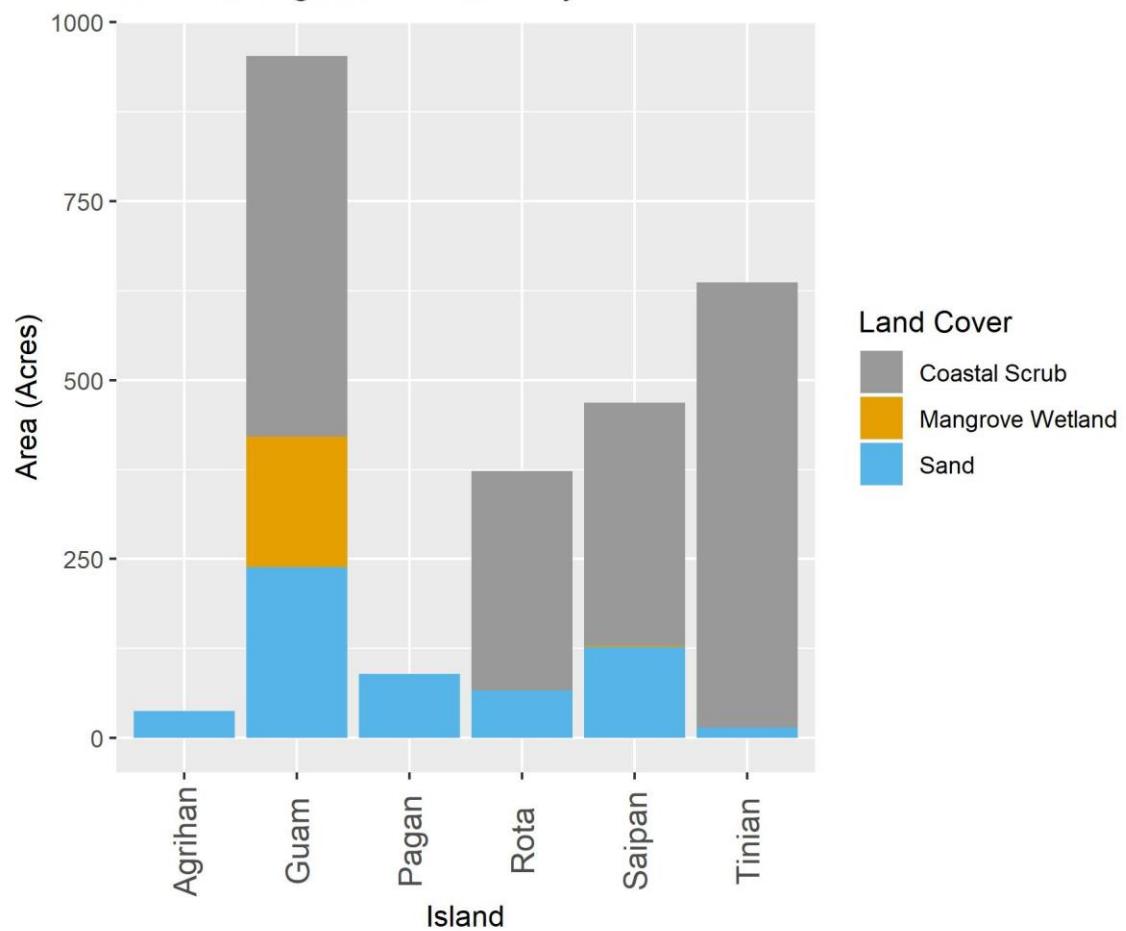
Barren

### Barren Vegetation Summary

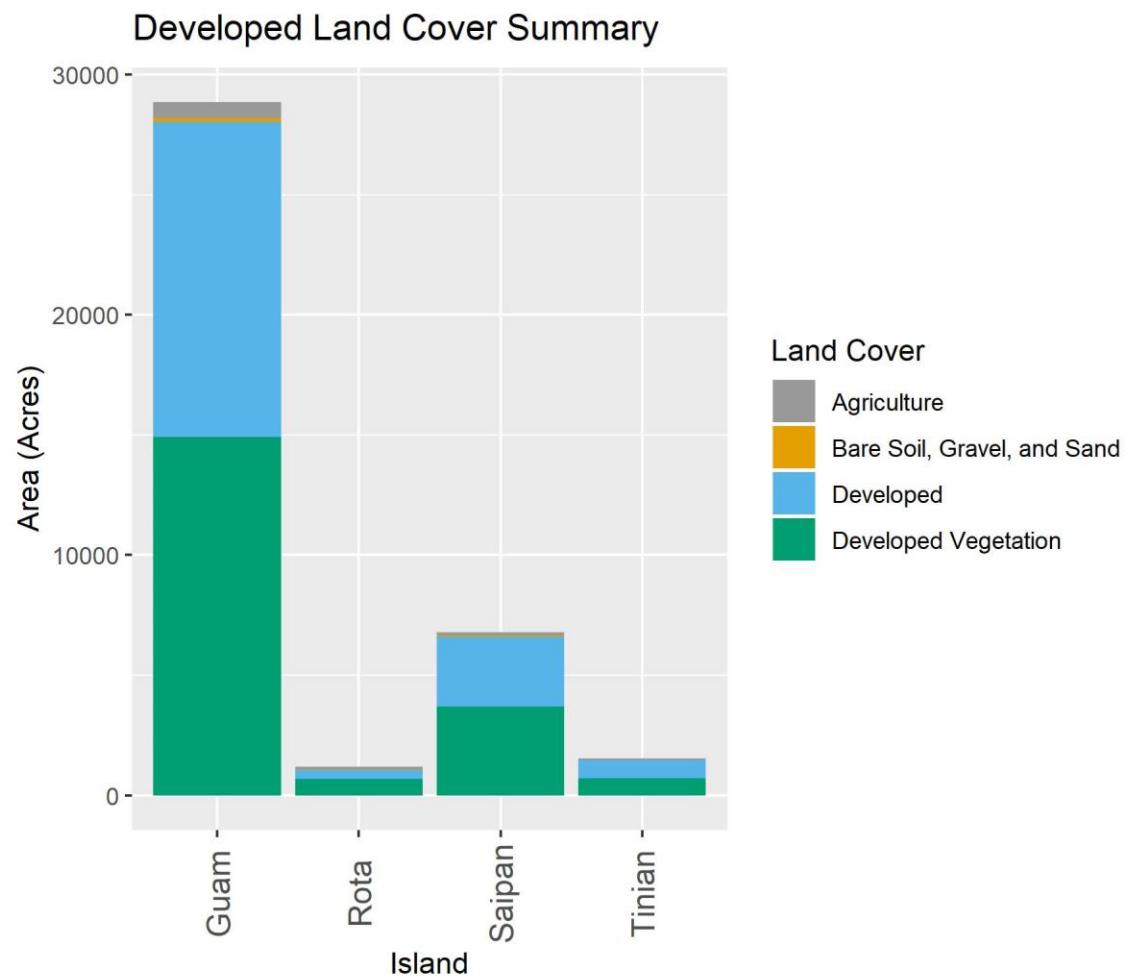


Coastal

### Coastal Vegetation Summary

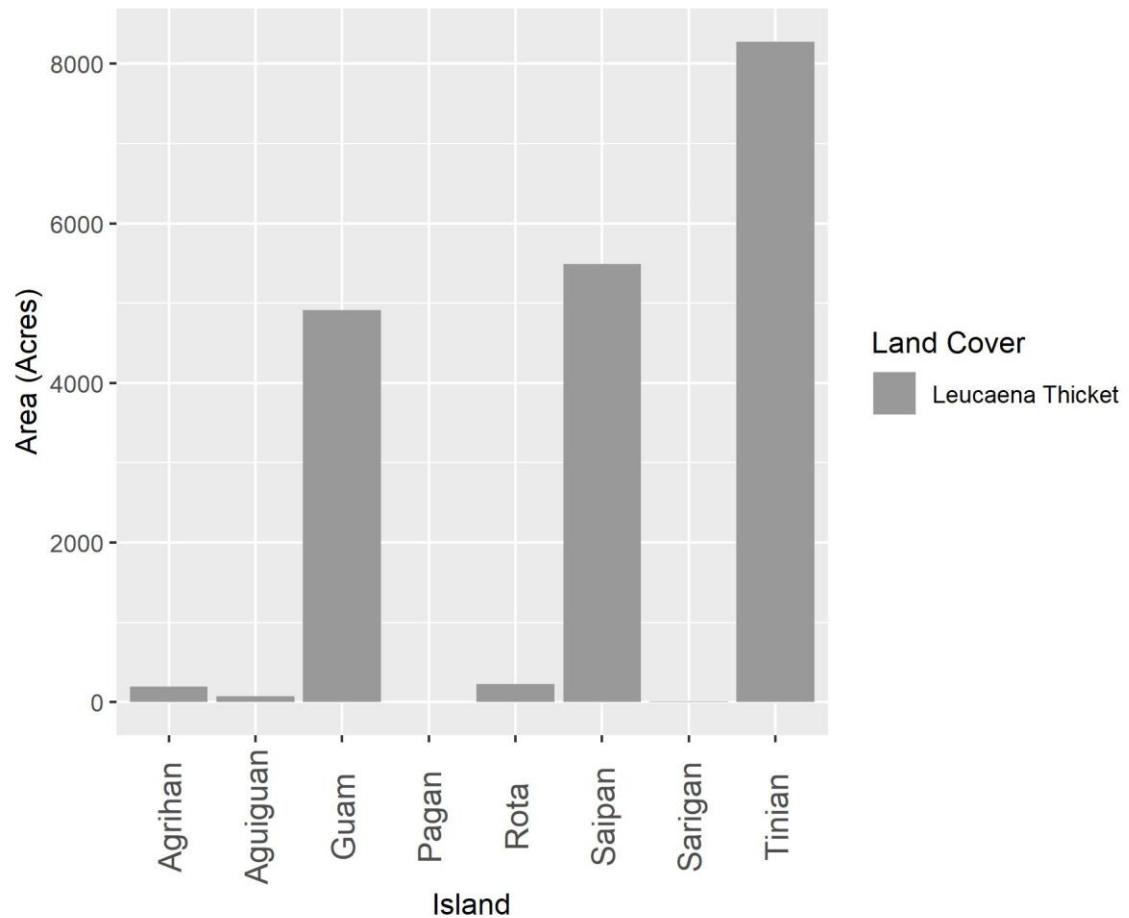


Developed



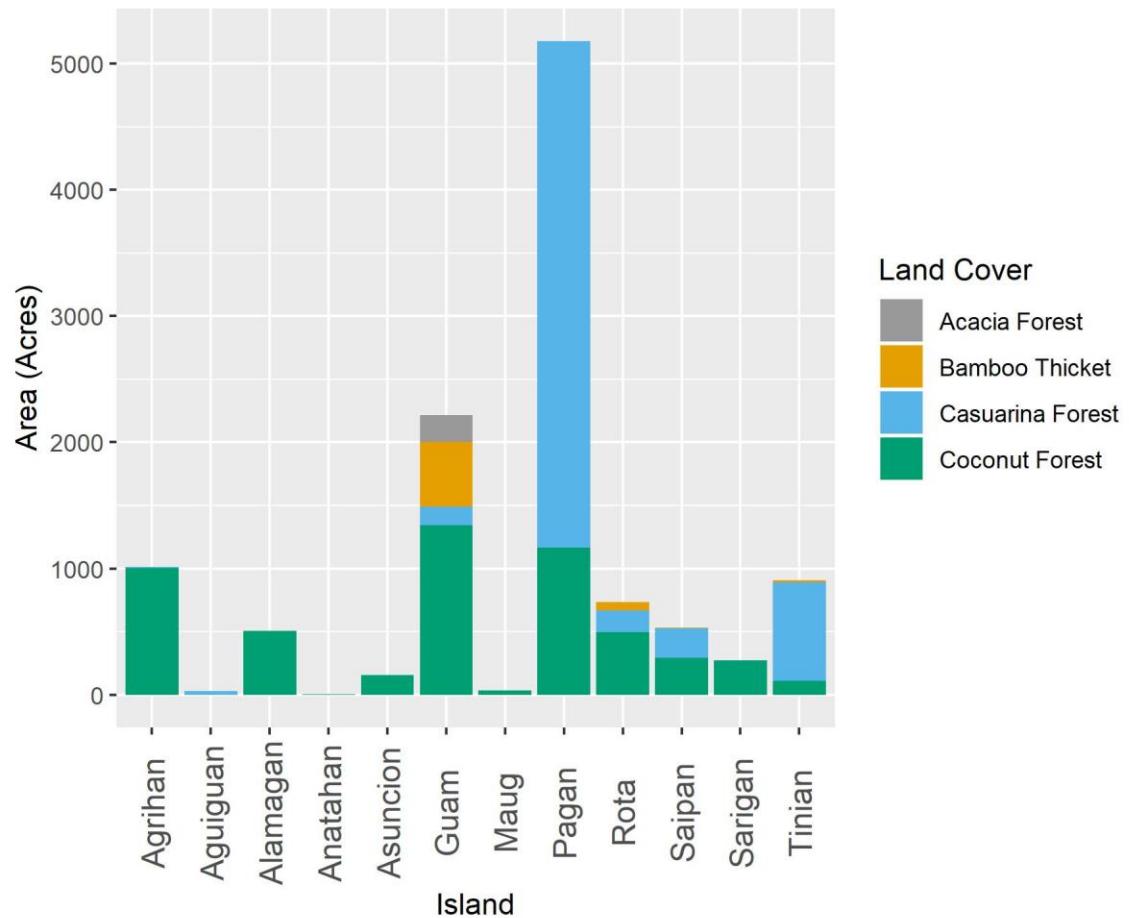
Leucaena Forest

Leucaena Forest Vegetation Summary



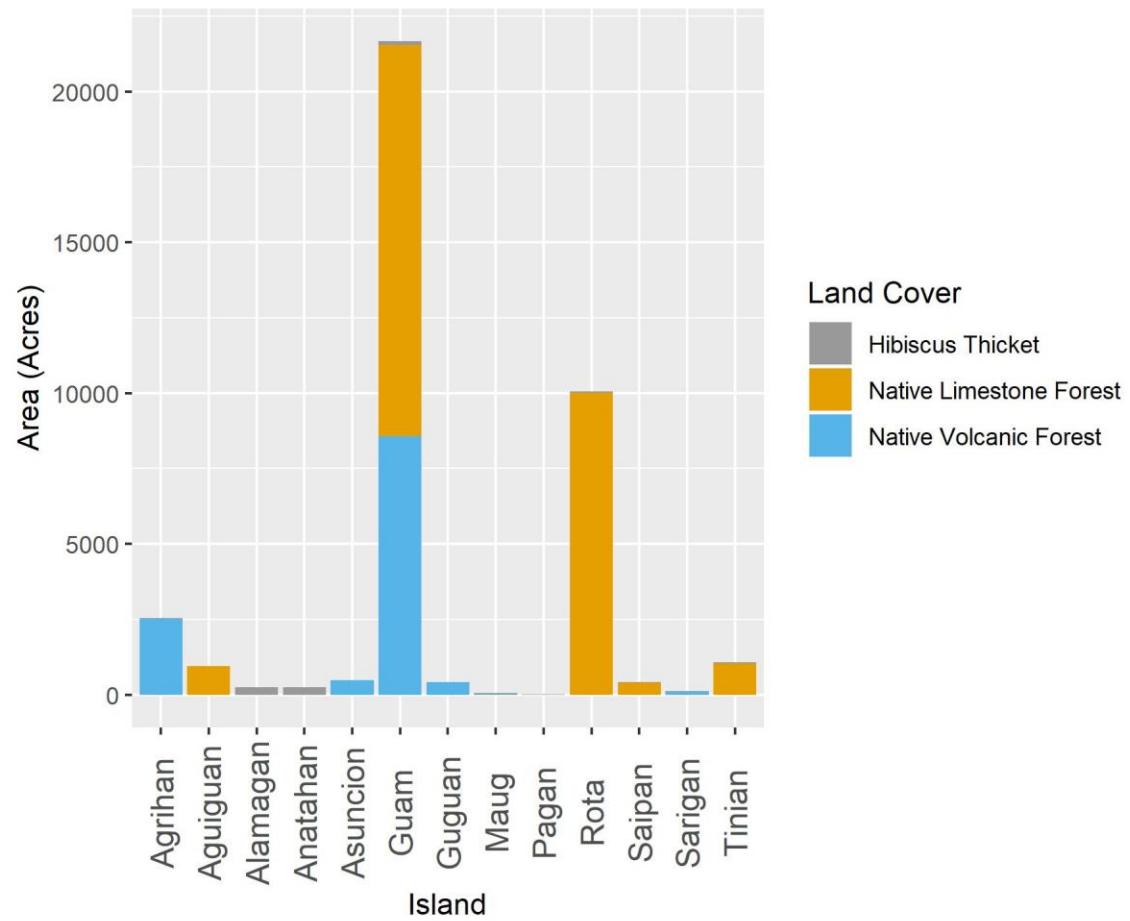
## Monoculture Forest

### Monoculture Forest Vegetation Summary



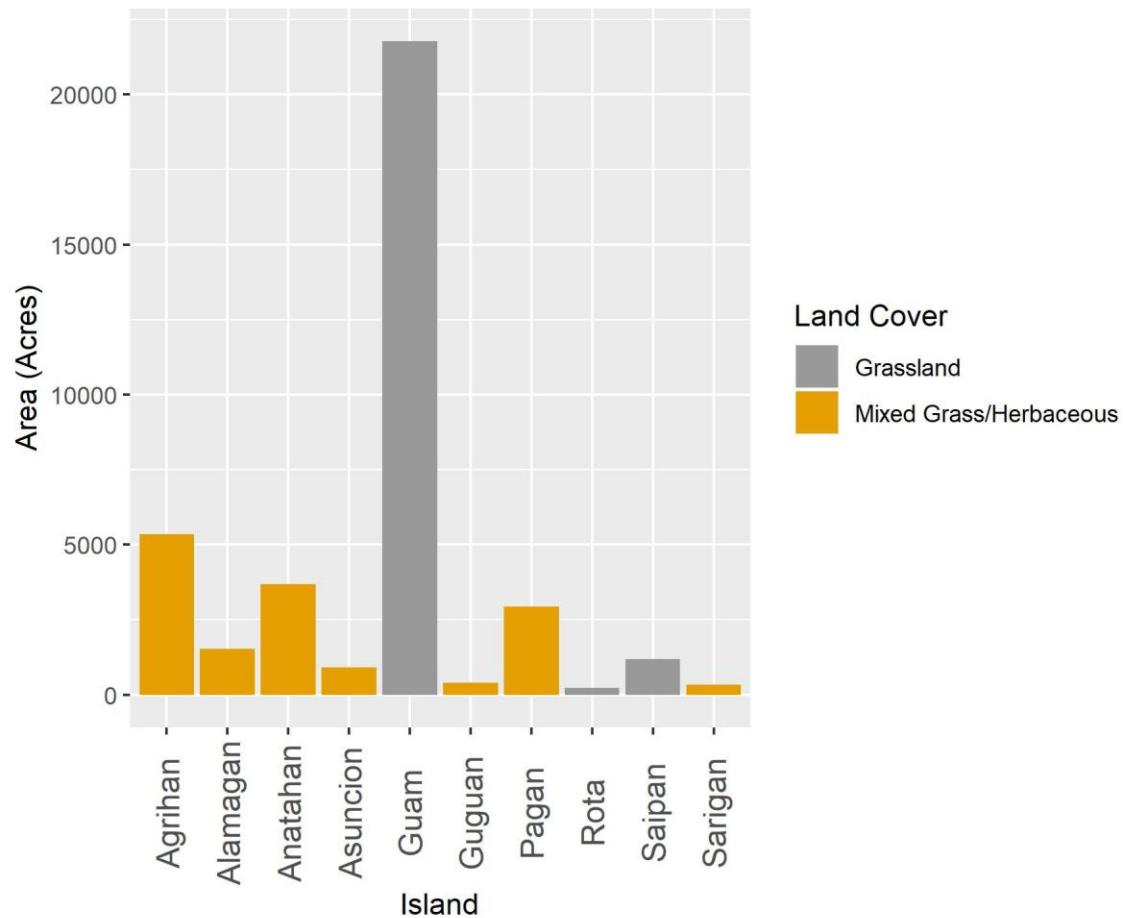
Native Forest

Native Forest Vegetation Summary



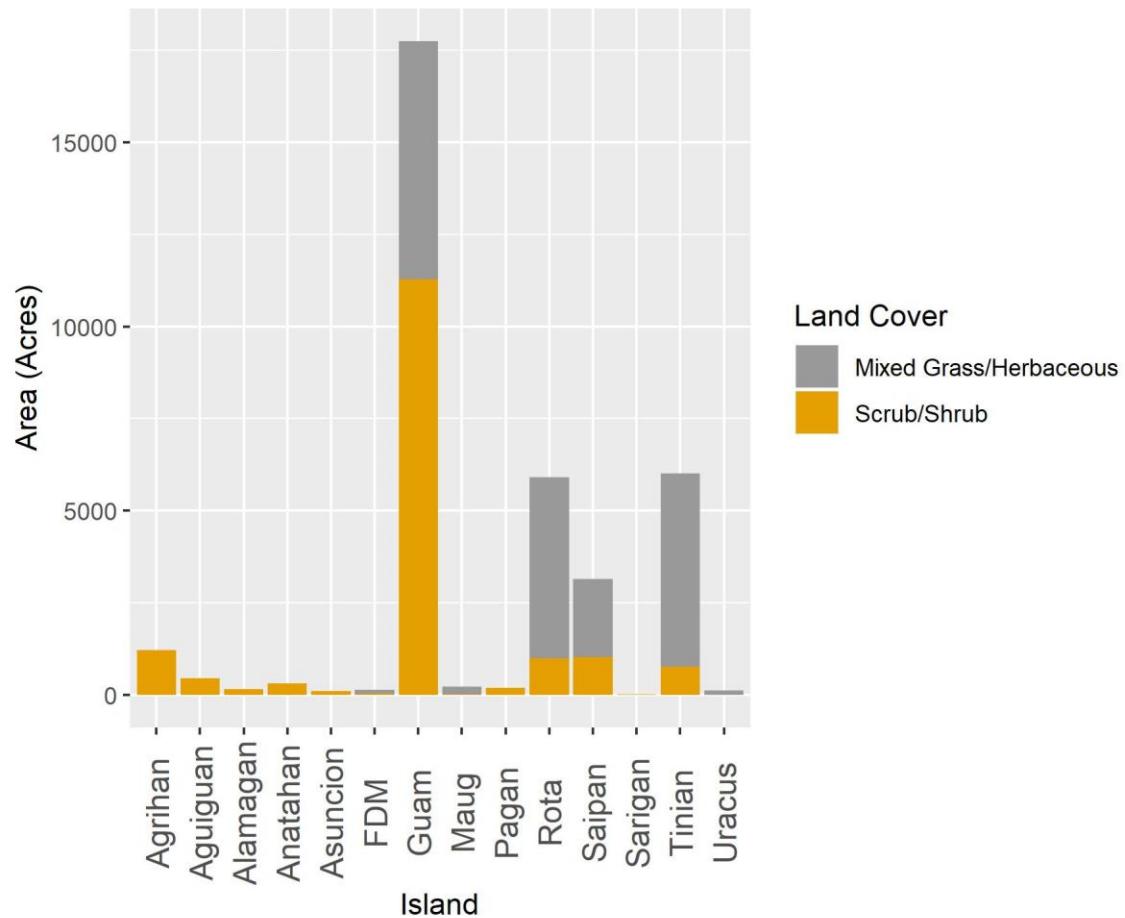
## Savanna and Grasslands

### Savanna and Grasslands Vegetation Summary



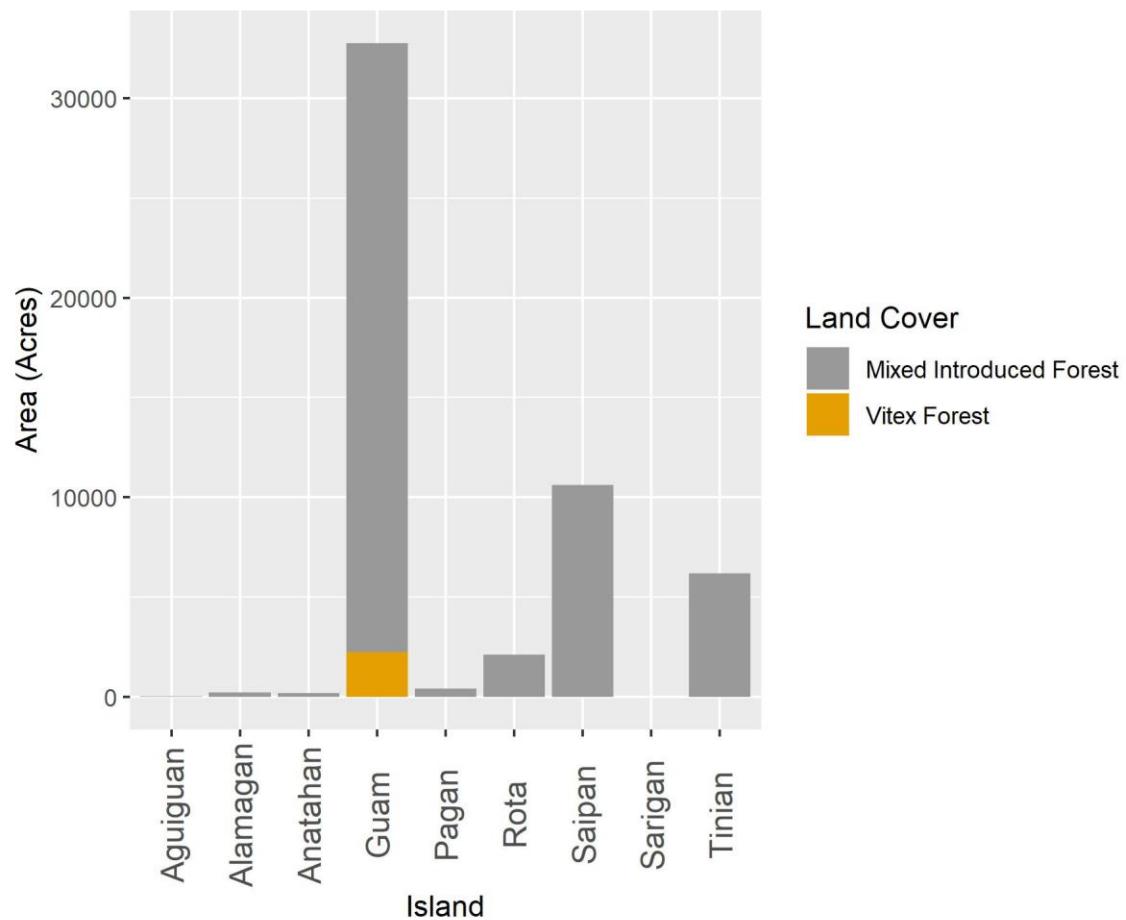
## Scrub and Herbaceous

### Scrub and Herbaceous Vegetation Summary



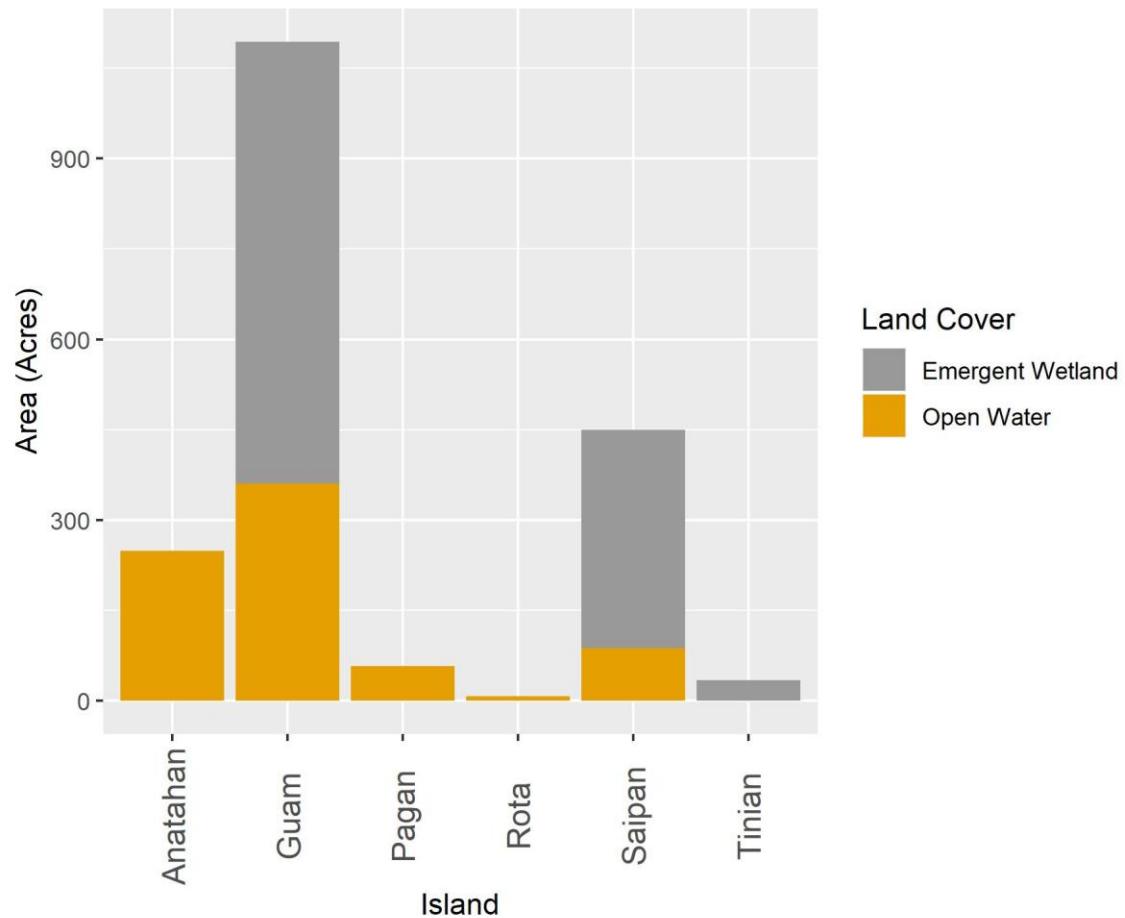
Secondary and Mixed Forest

**Secondary and Mixed Forest Vegetation Summary**



## Wetlands

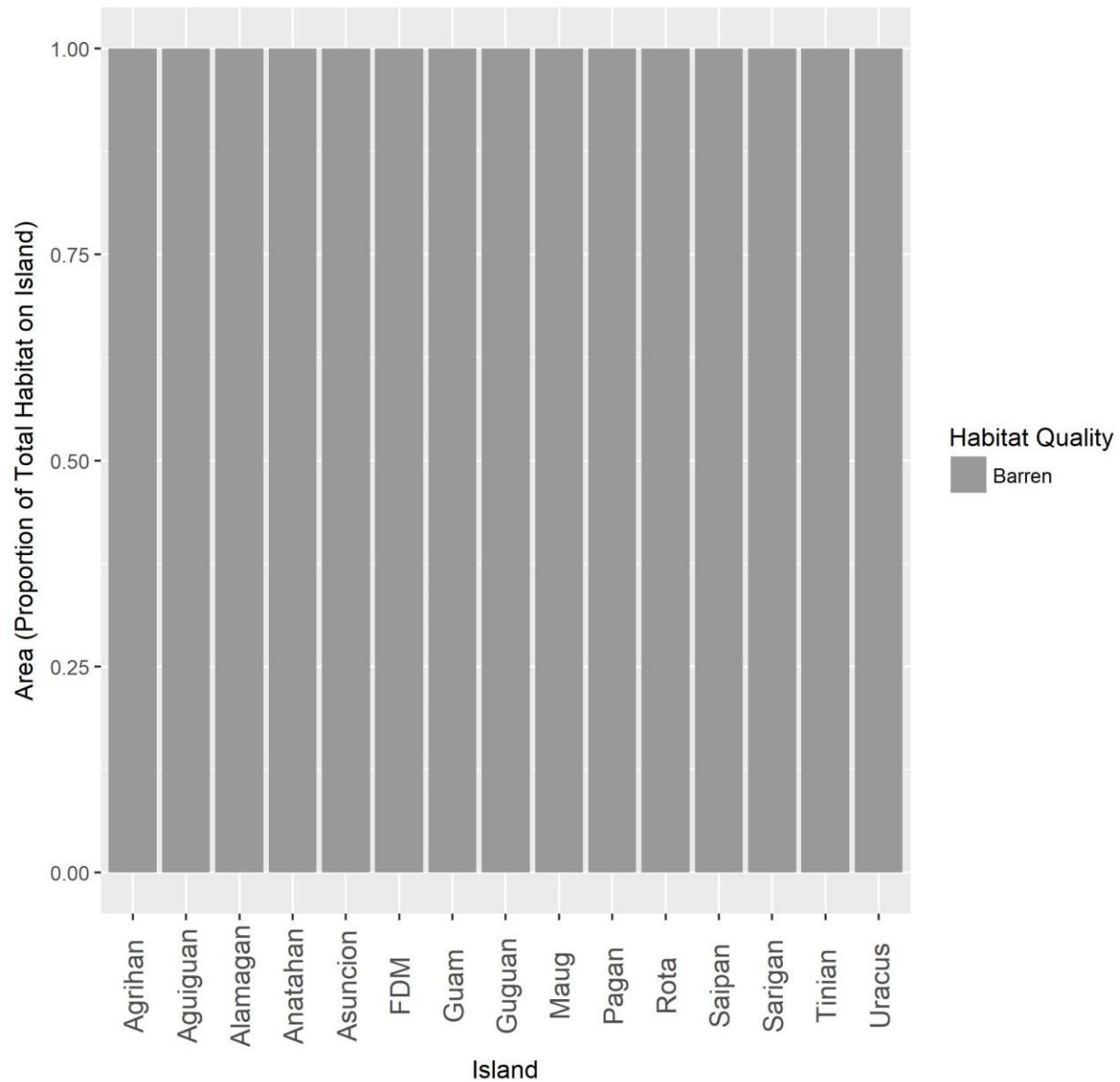
### Wetland Vegetation Summary



## Habitat Quality

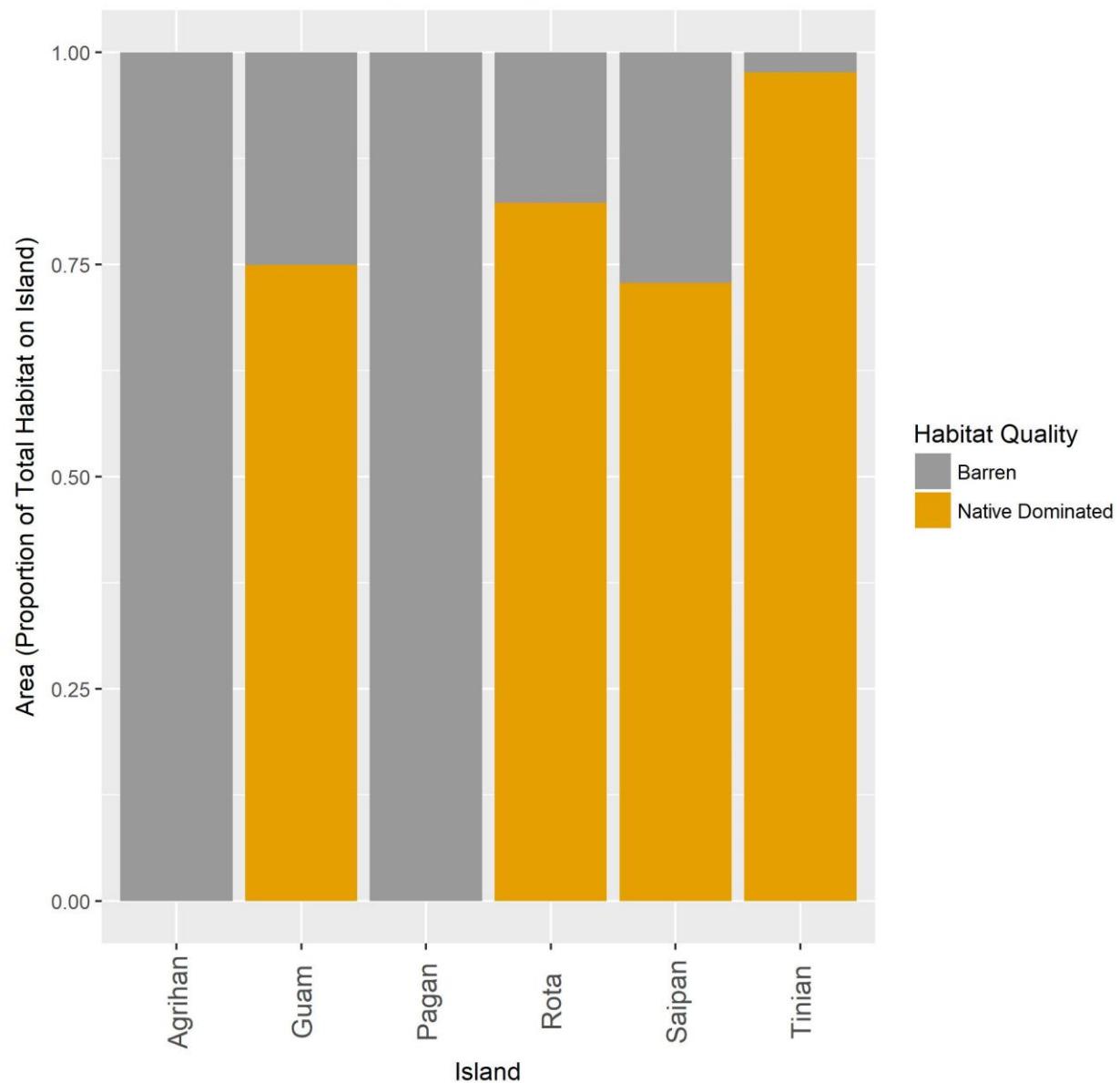
Barren

### Barren Habitat Quality Summary



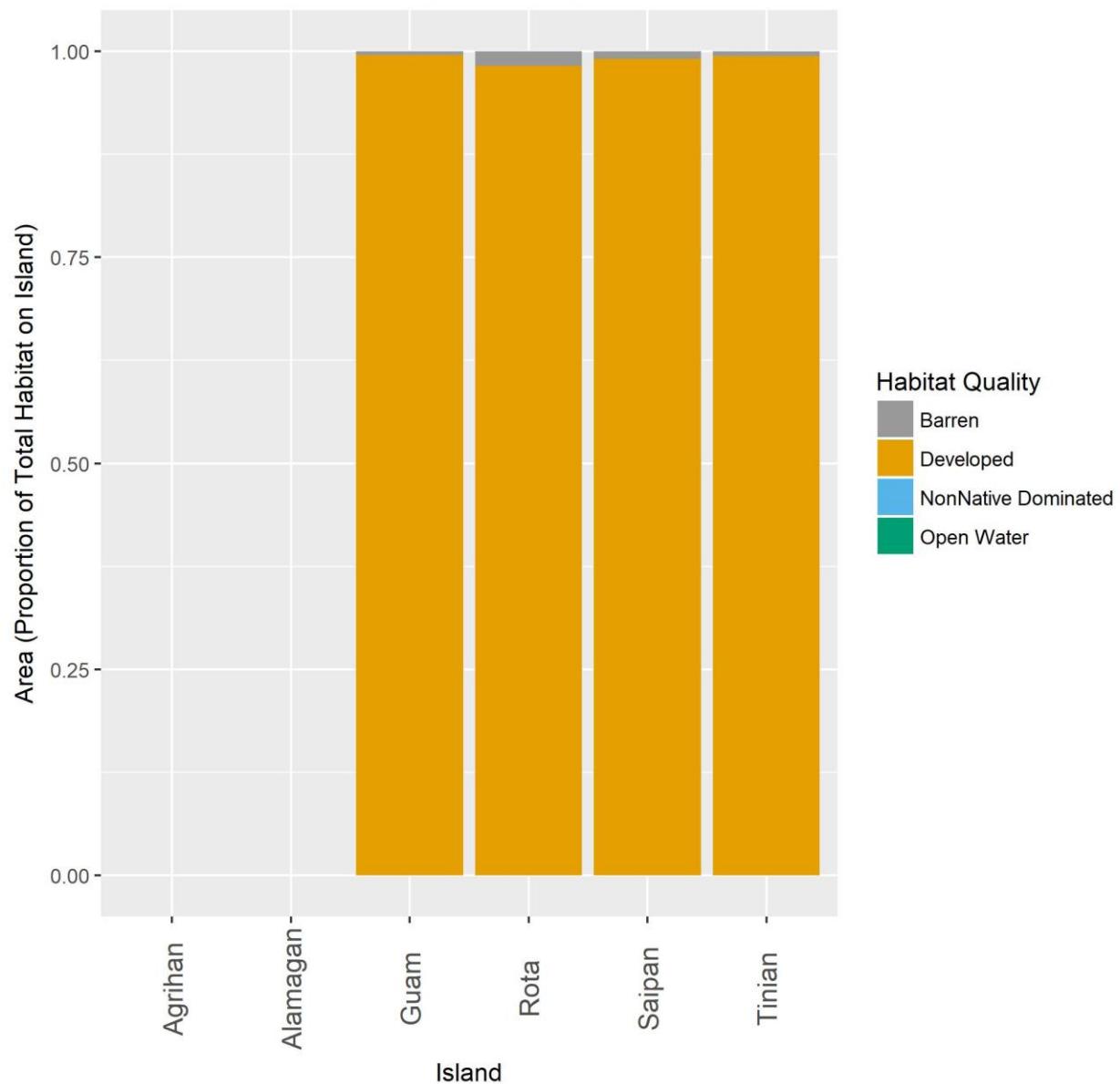
Coastal

### Coastal Habitat Quality Summary



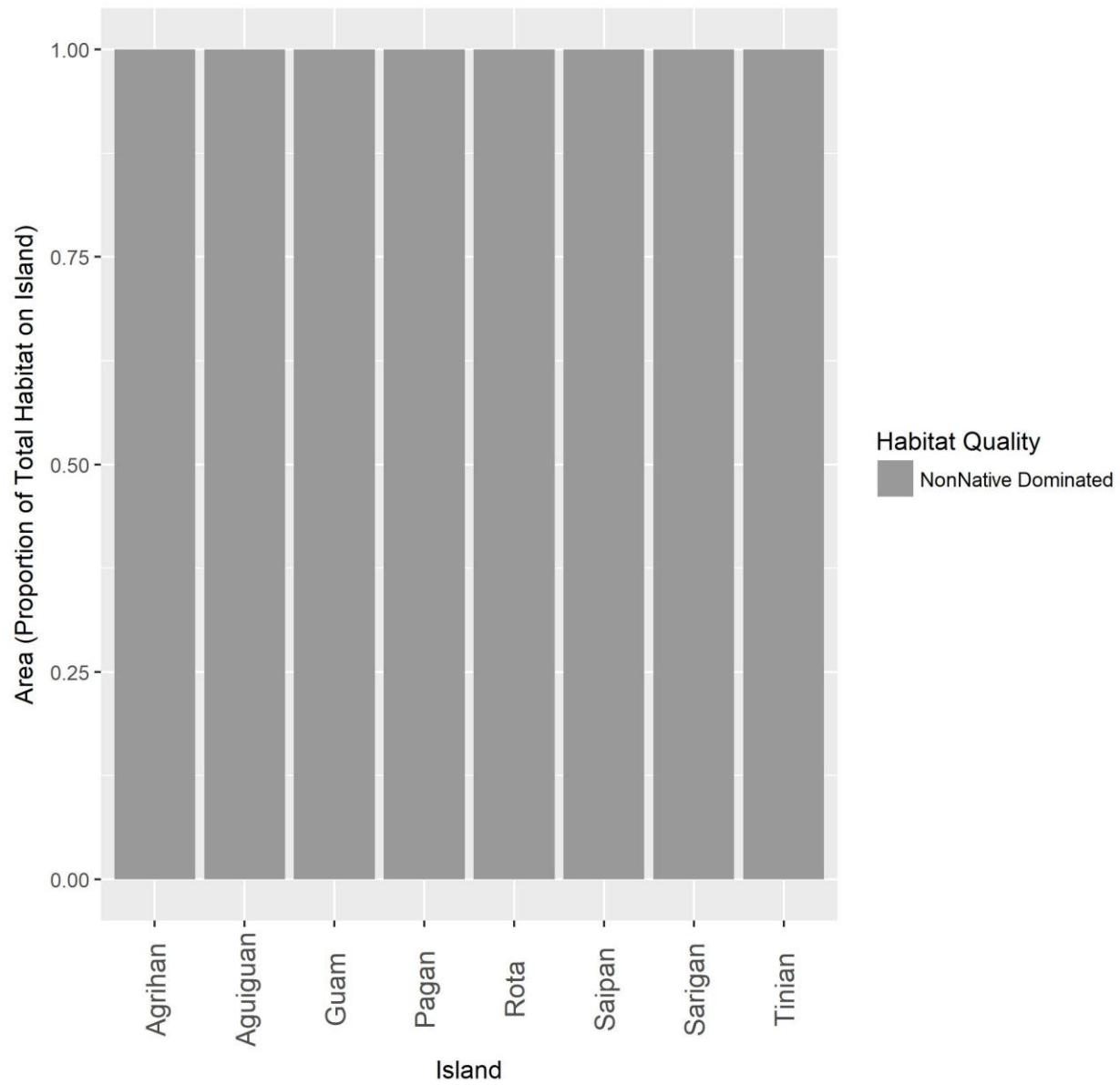
Developed

### Developed Habitat Quality Summary



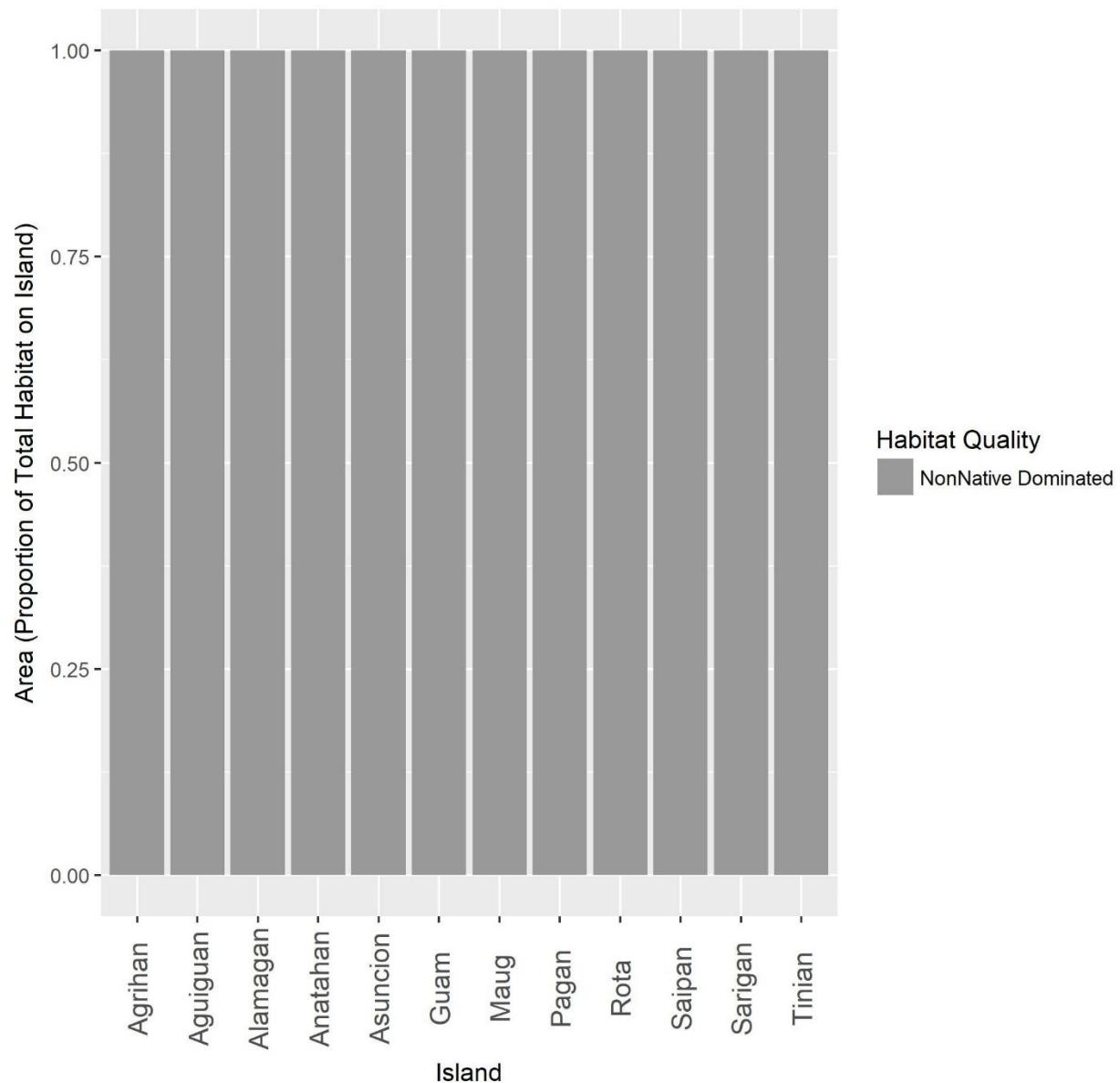
Leucaena Forest

Leucaena Forest Habitat Quality Summary



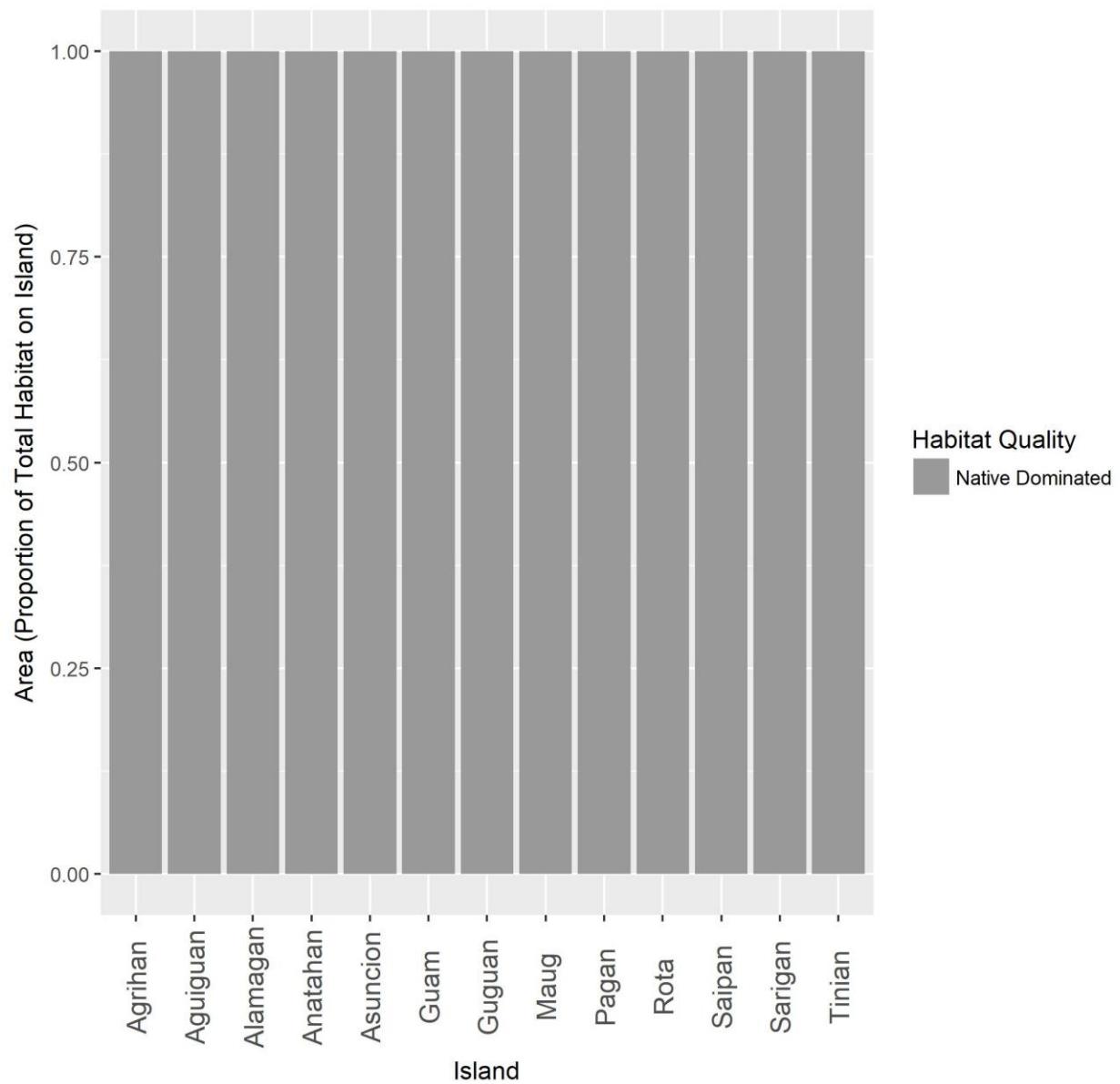
## Monoculture Forest

### Monoculture Forest Habitat Quality Summary



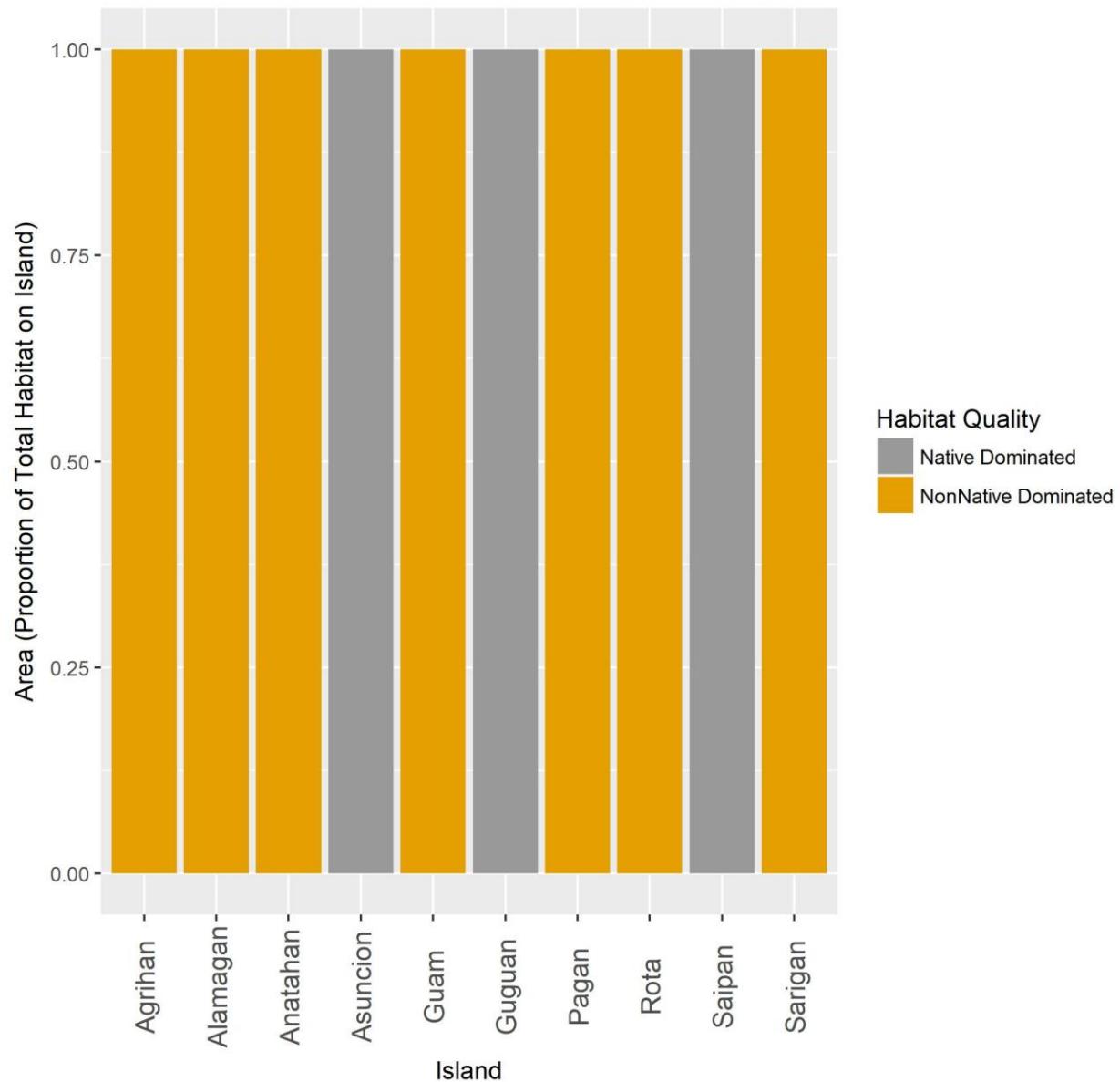
Native Forest

Native Forest Habitat Quality Summary



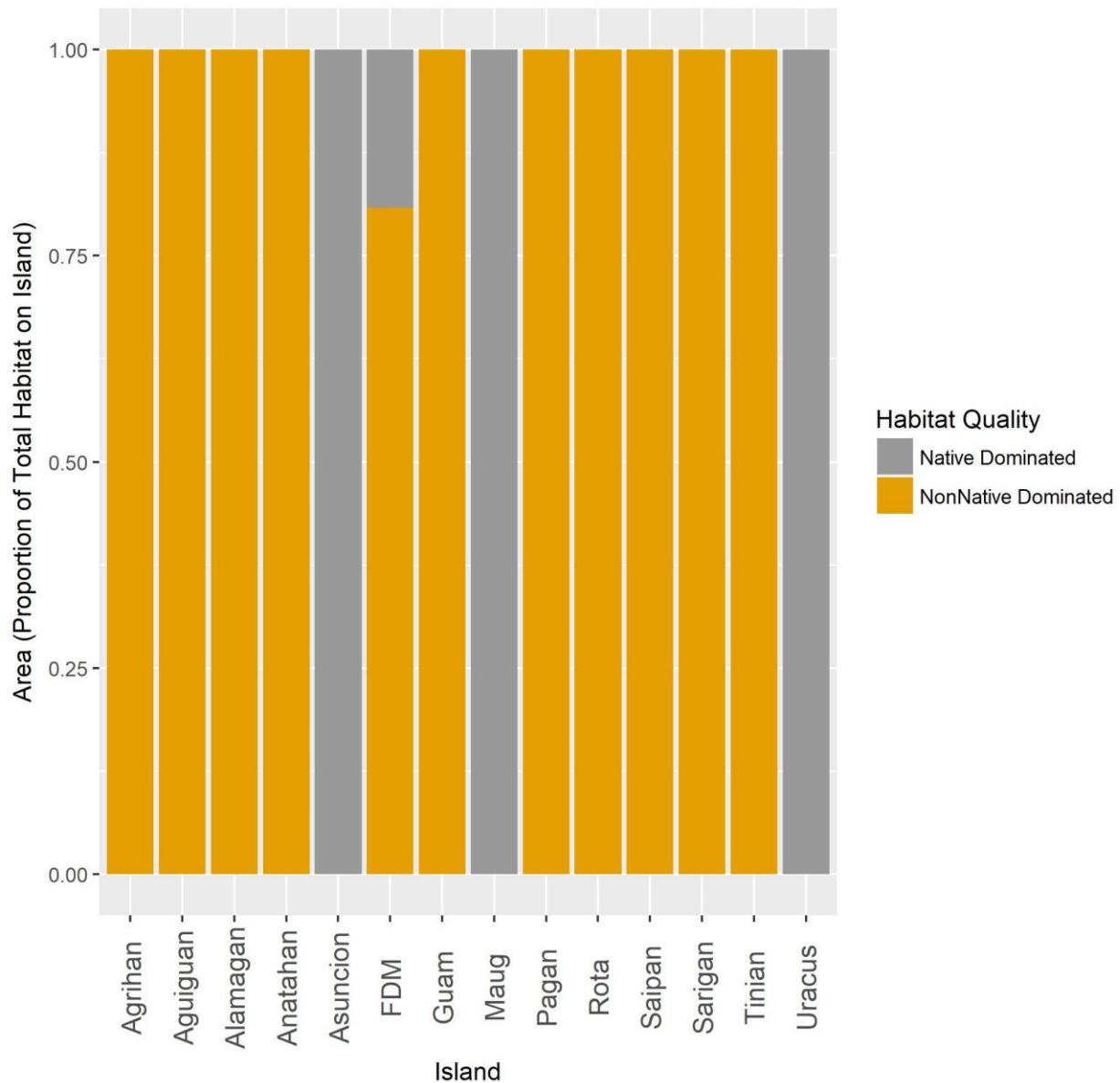
Savanna and Grasslands

Savanna and Grasslands Habitat Quality Summary



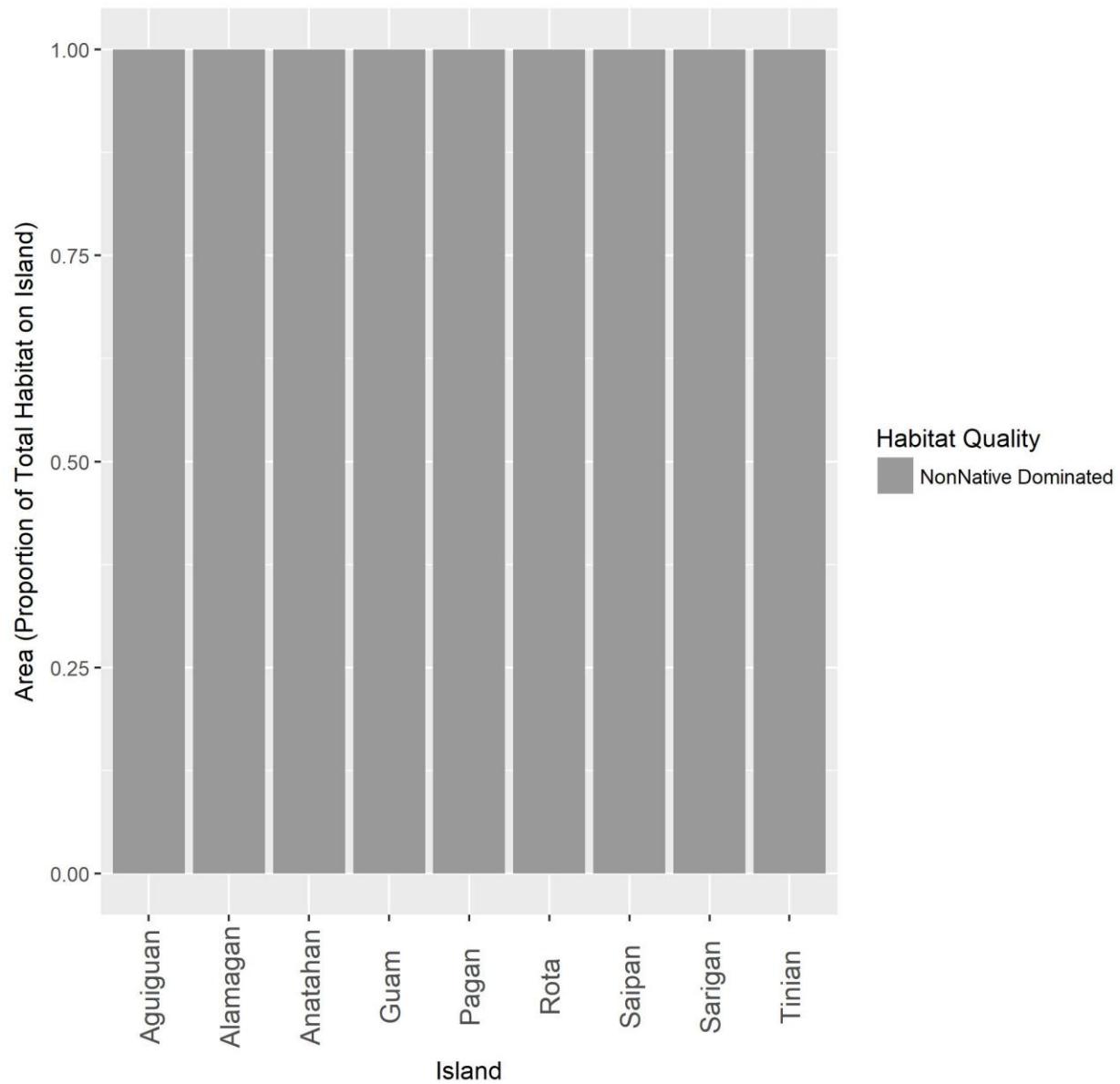
Scrub and Herbaceous

Scrub and Herbaceous Habitat Quality Summary



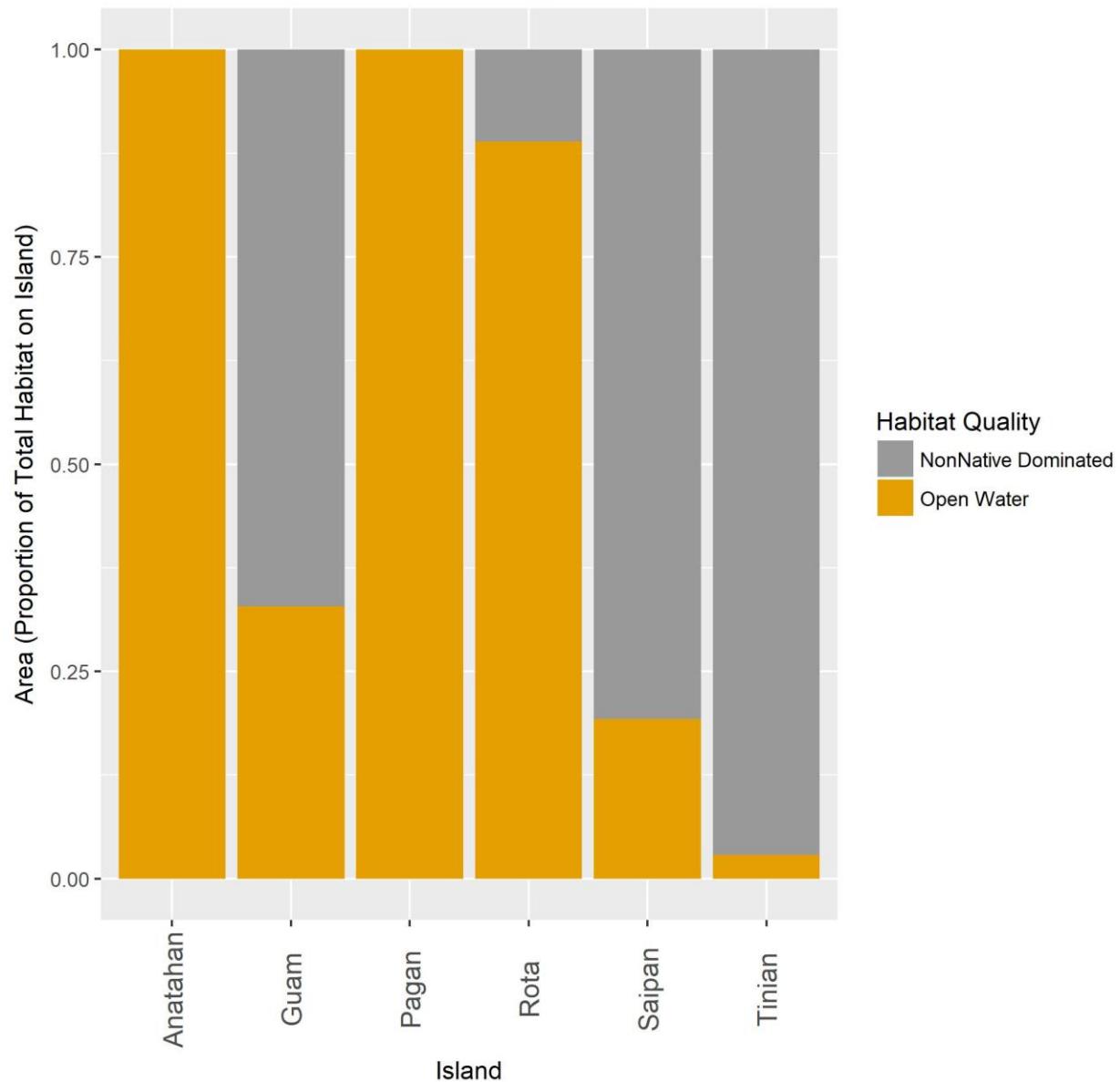
## Secondary and Mixed Forest

### Secondary and Mixed Forest Habitat Quality Summary



Wetlands

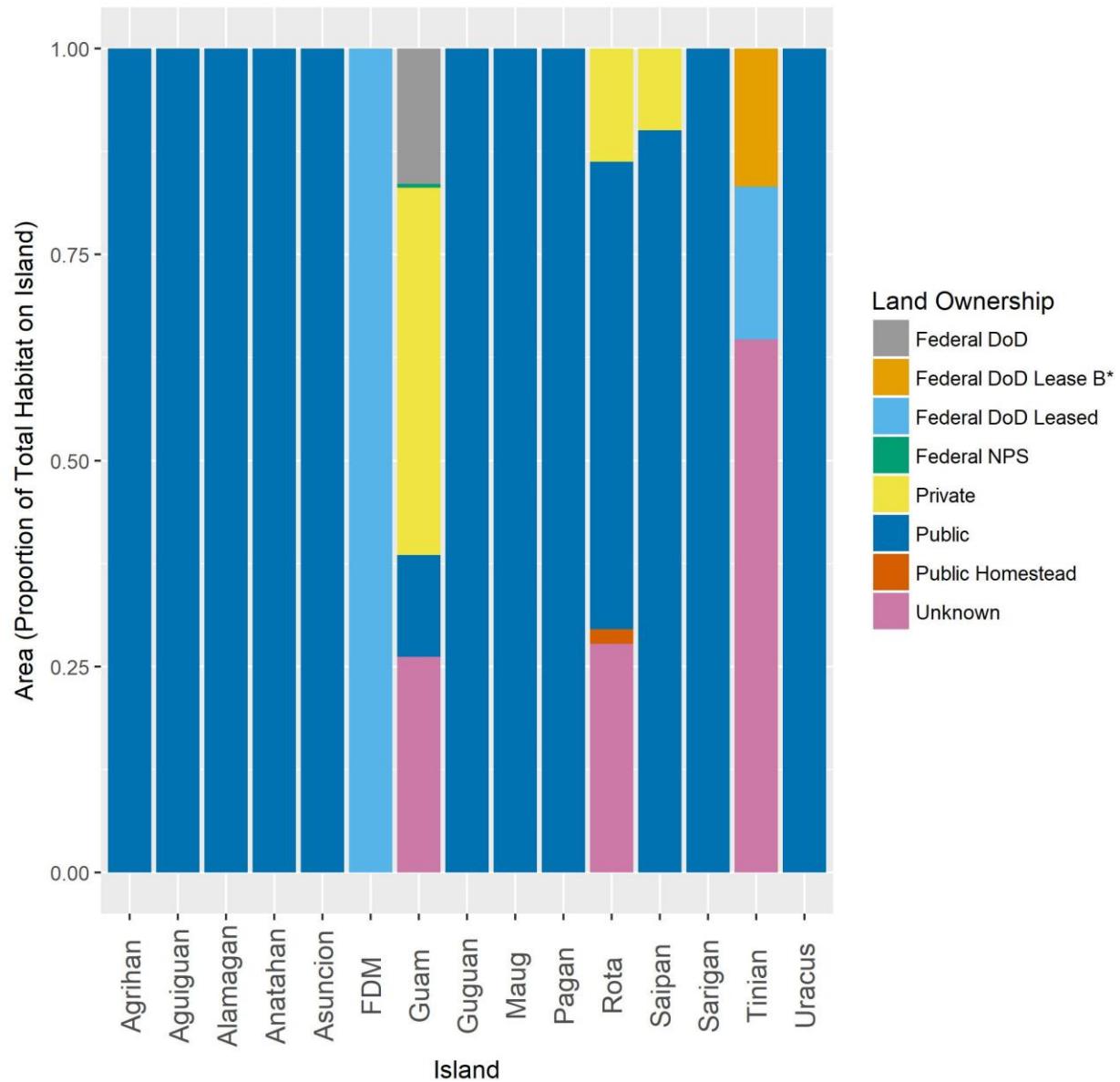
Wetland Habitat Quality Summary



## Land Ownership

### Barren

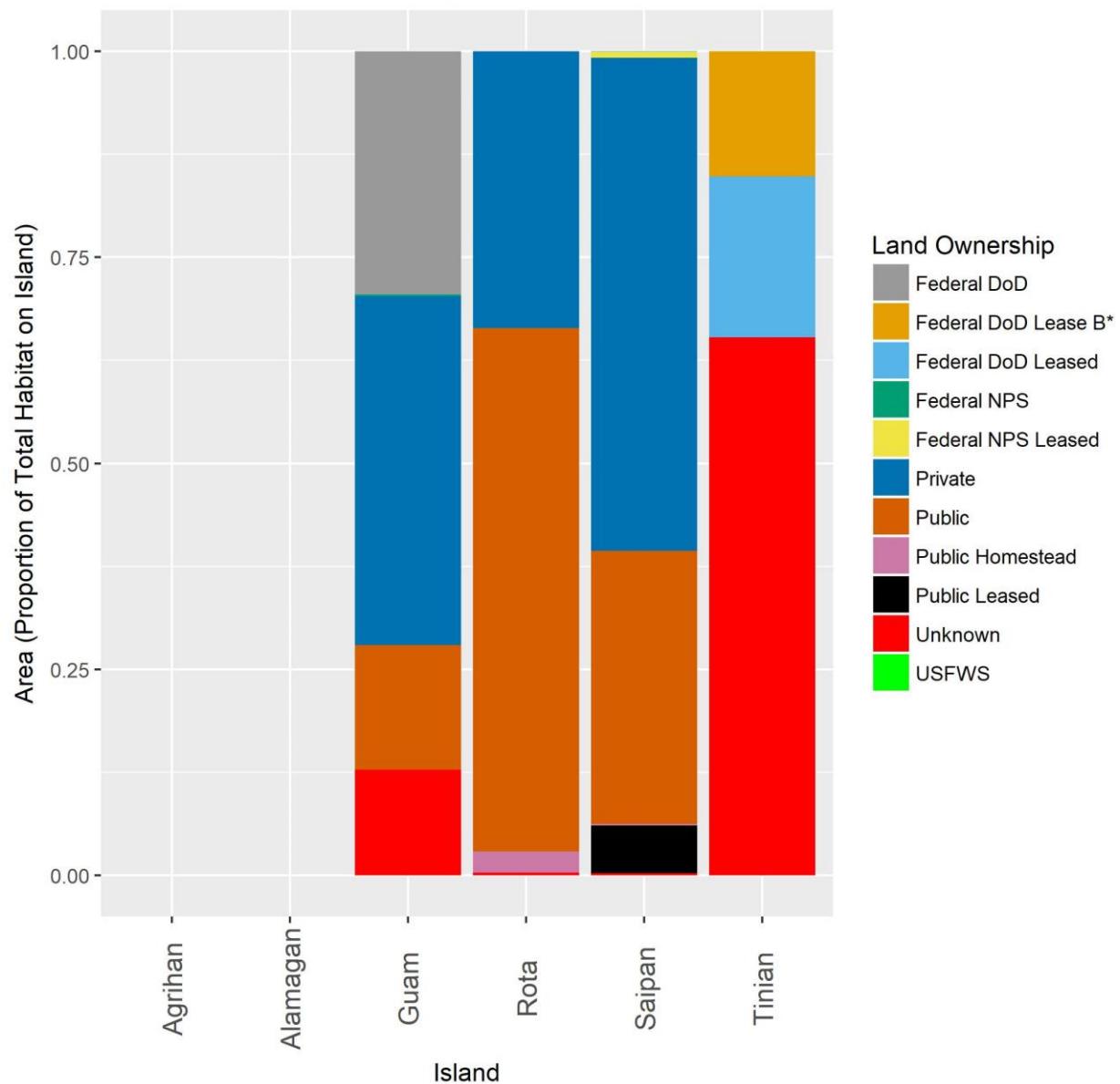
#### Barren Land Ownership Summary



### Coastal

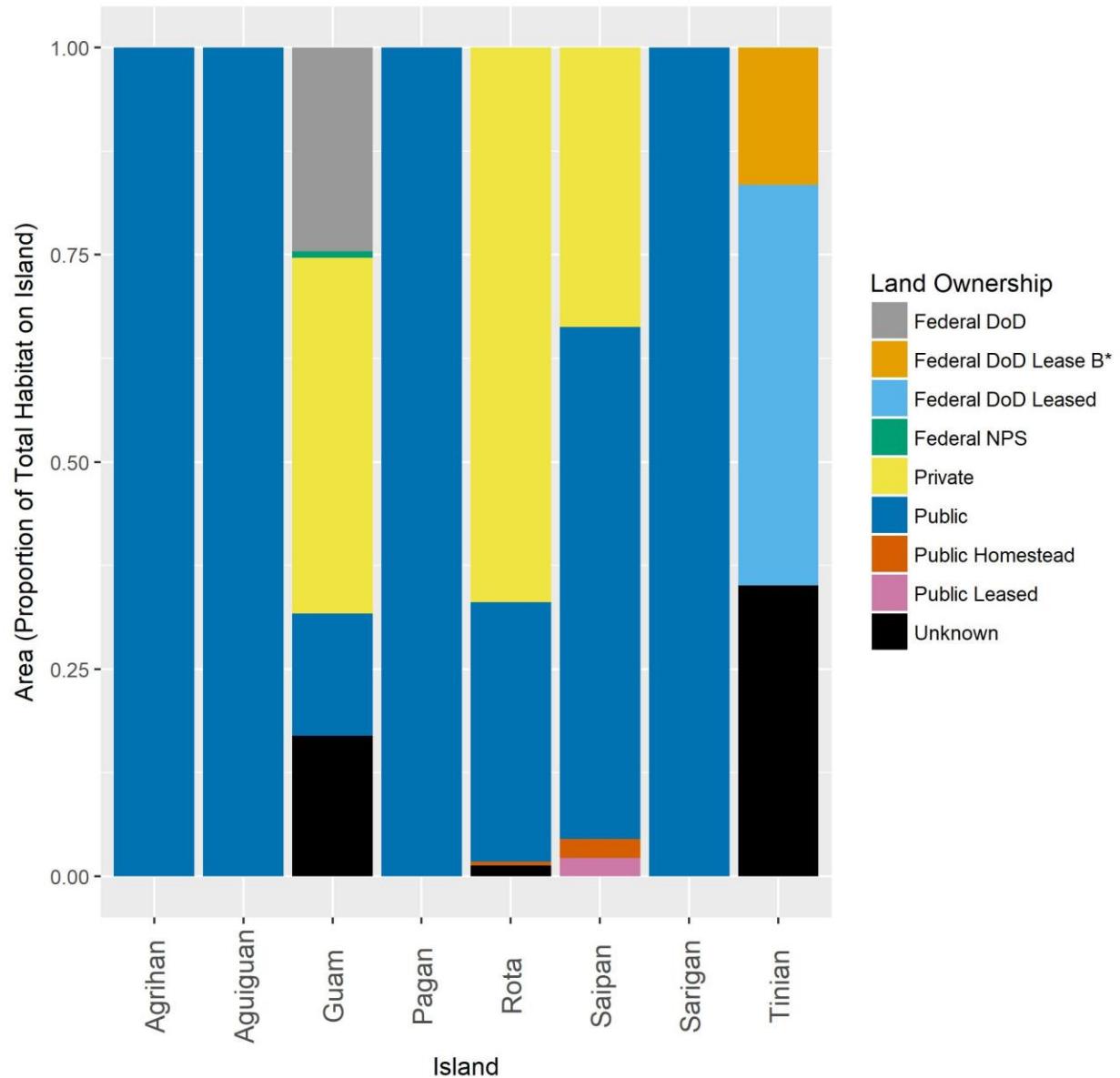
Developed

### Developed Land Ownership Summary



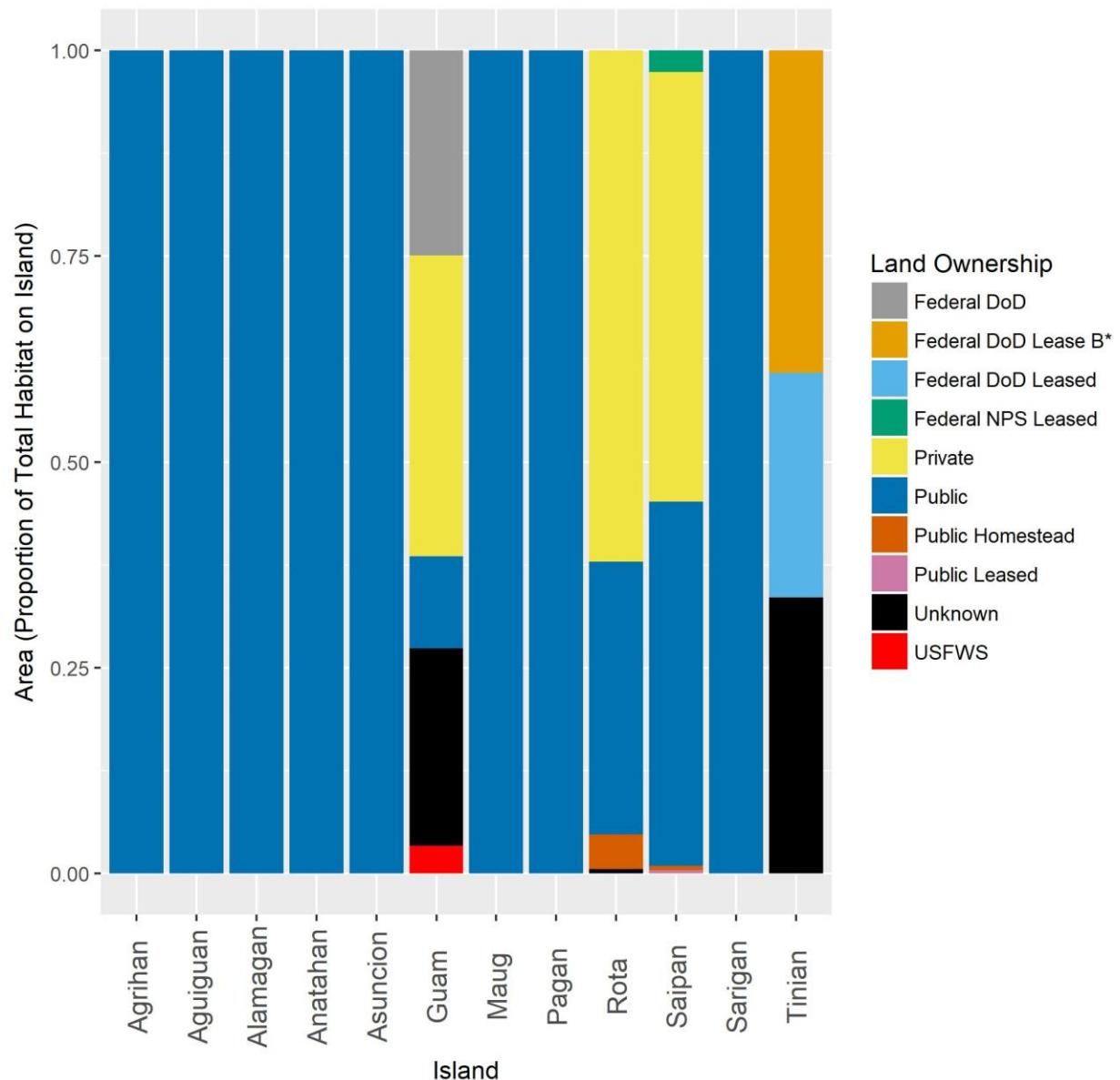
Leucaena Forest

Leucaena Forest Land Ownership Summary



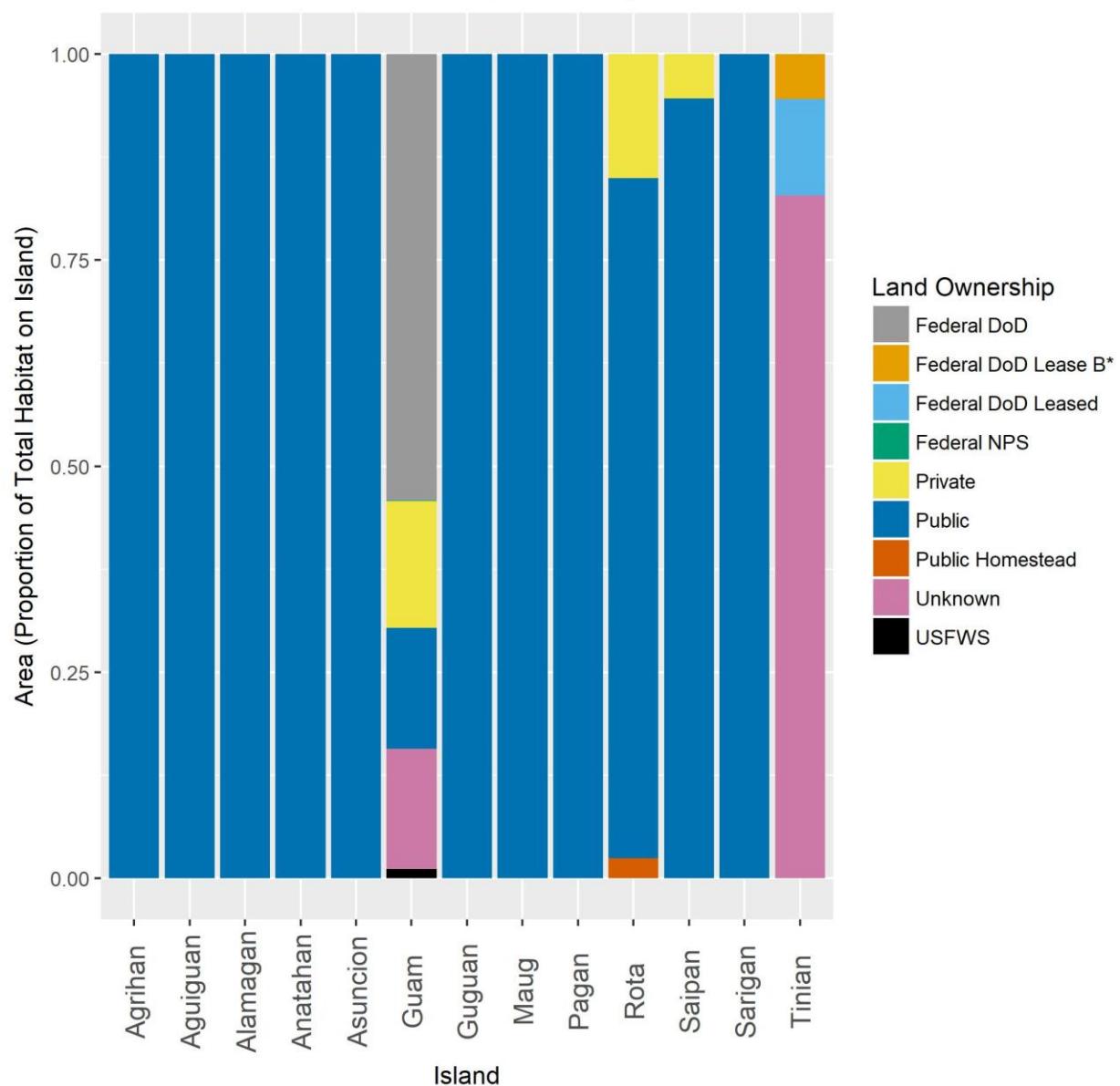
## Monoculture Forest

### Monoculture Forest Land Ownership Summary



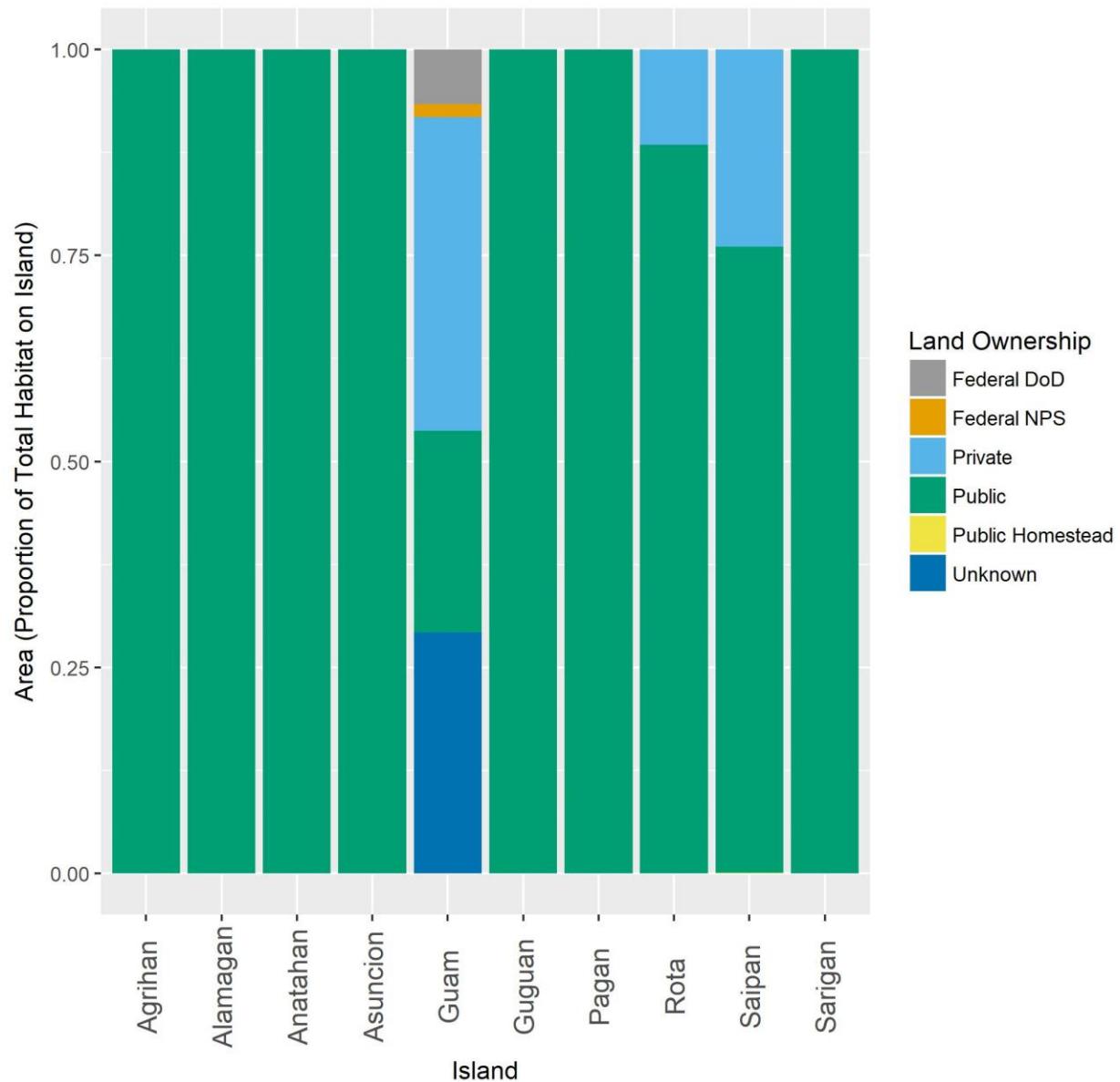
## Native Forest

### Native Forest Land Ownership Summary



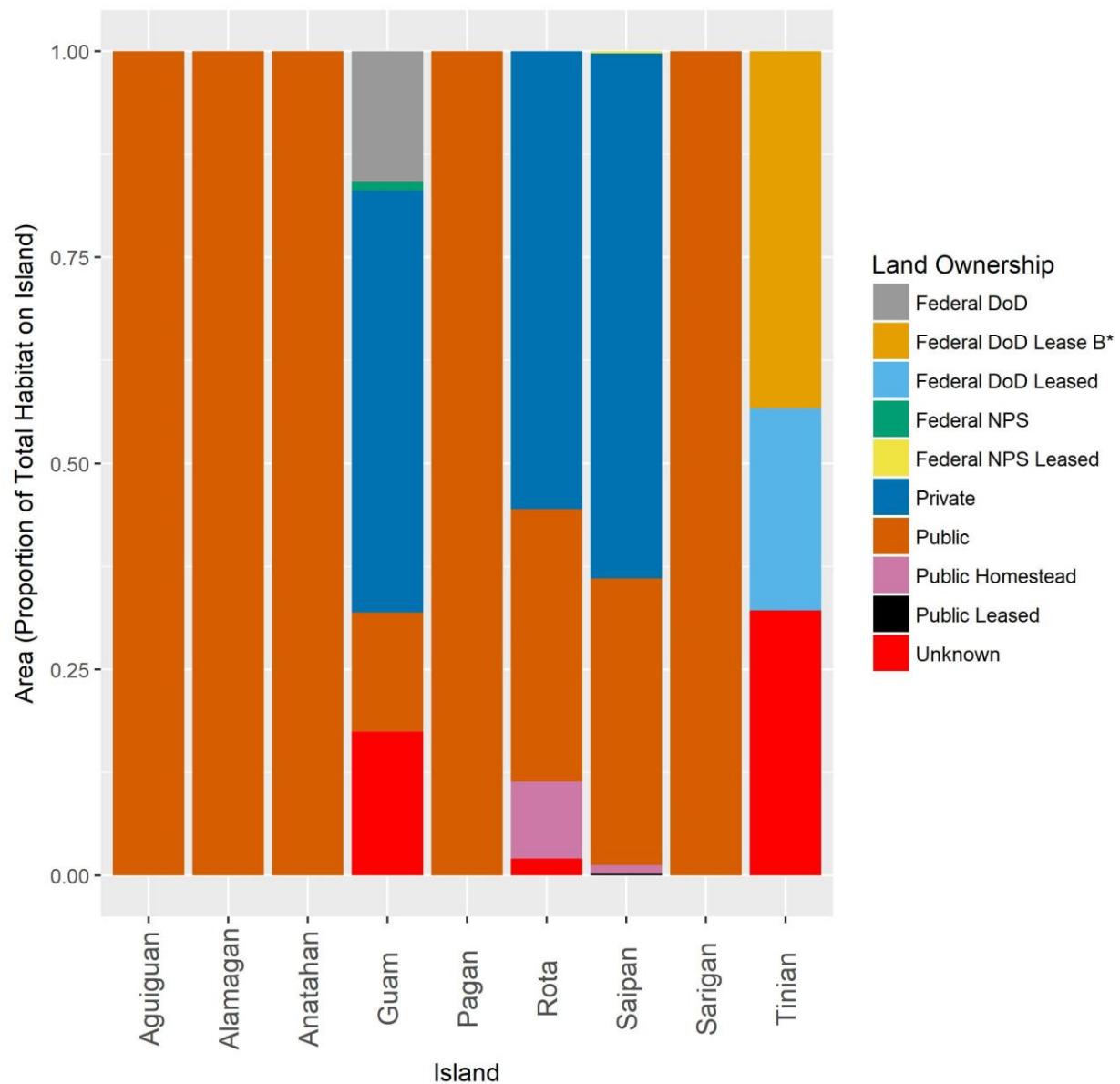
Savanna and Grasslands

Savanna and Grasslands Land Ownership Summary



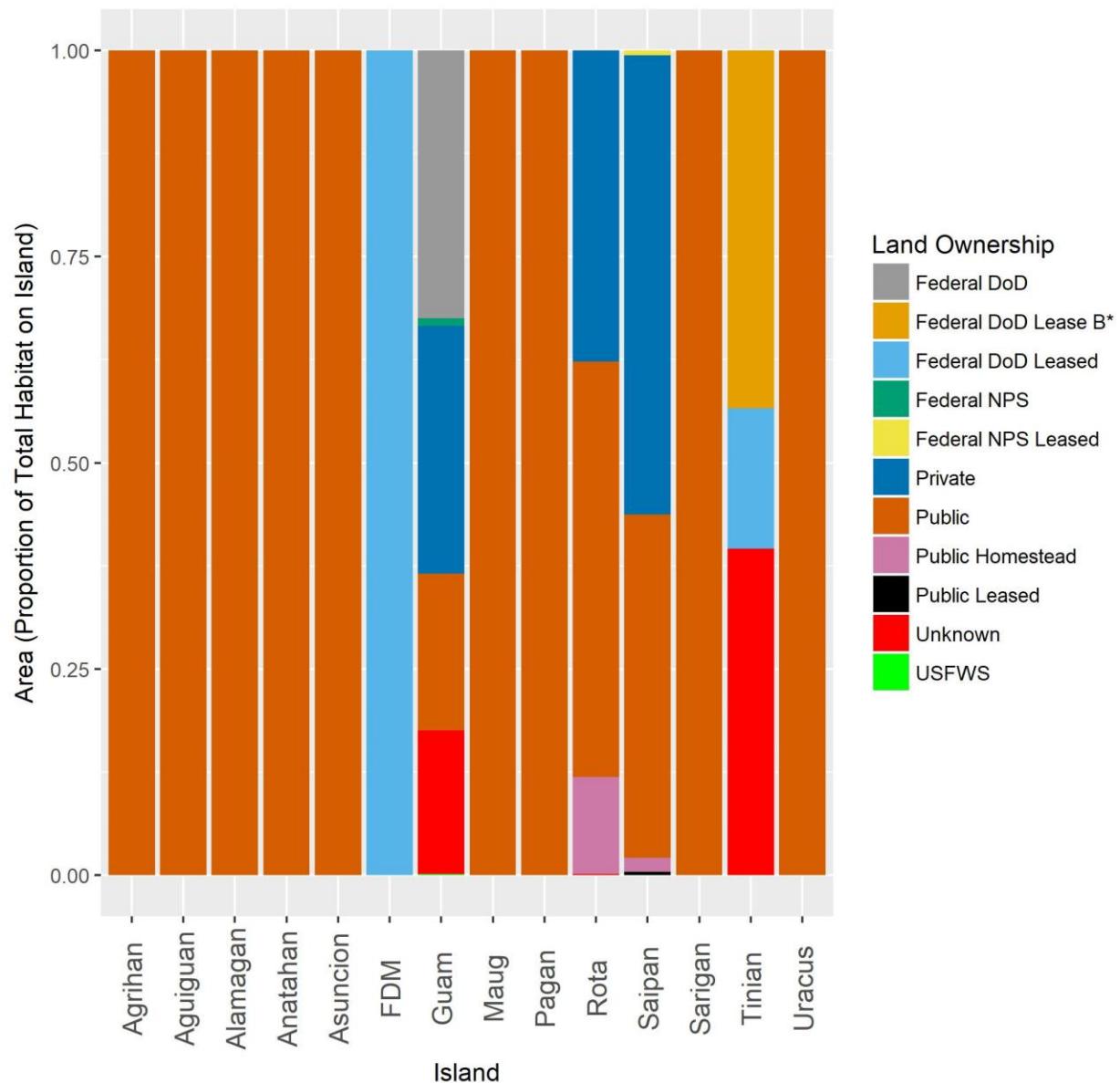
Scrub and Herbaceous

Secondary and Mixed Forest Land Ownership Summary



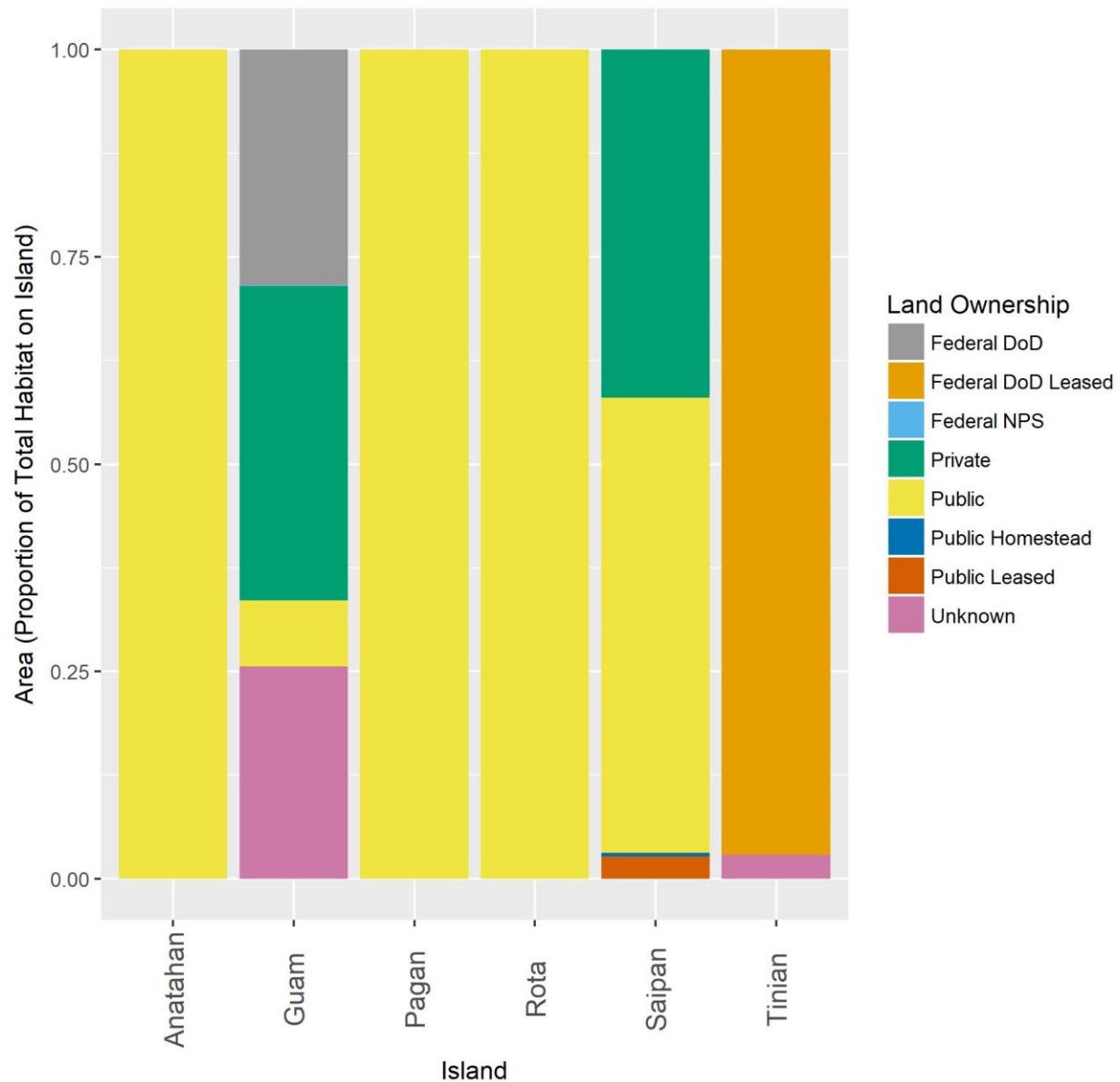
## Secondary and Mixed Forest

### Scrub and Herbaceous Land Ownership Summary



## Wetlands

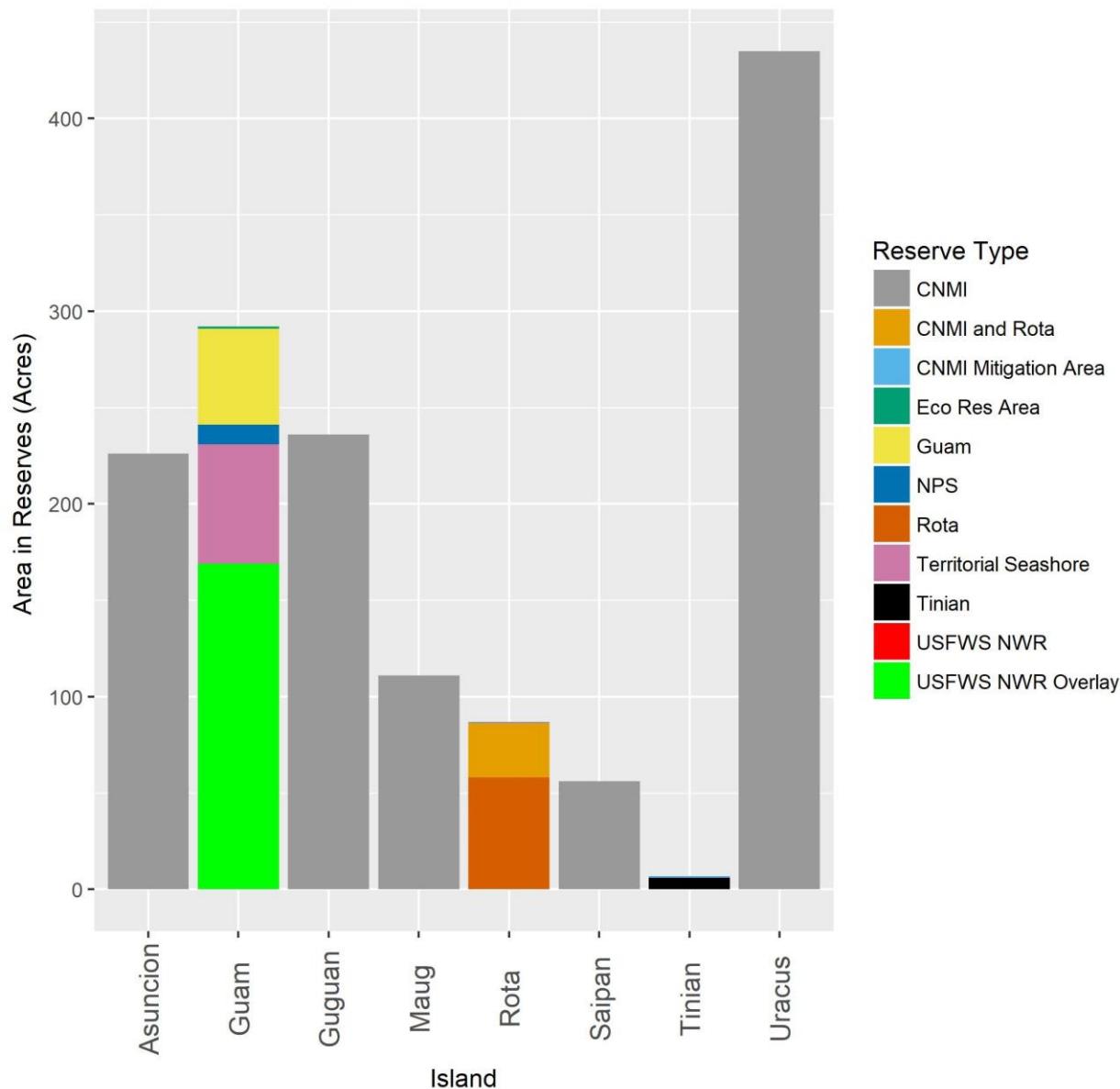
### Wetland Land Ownership Summary



Reserve Status

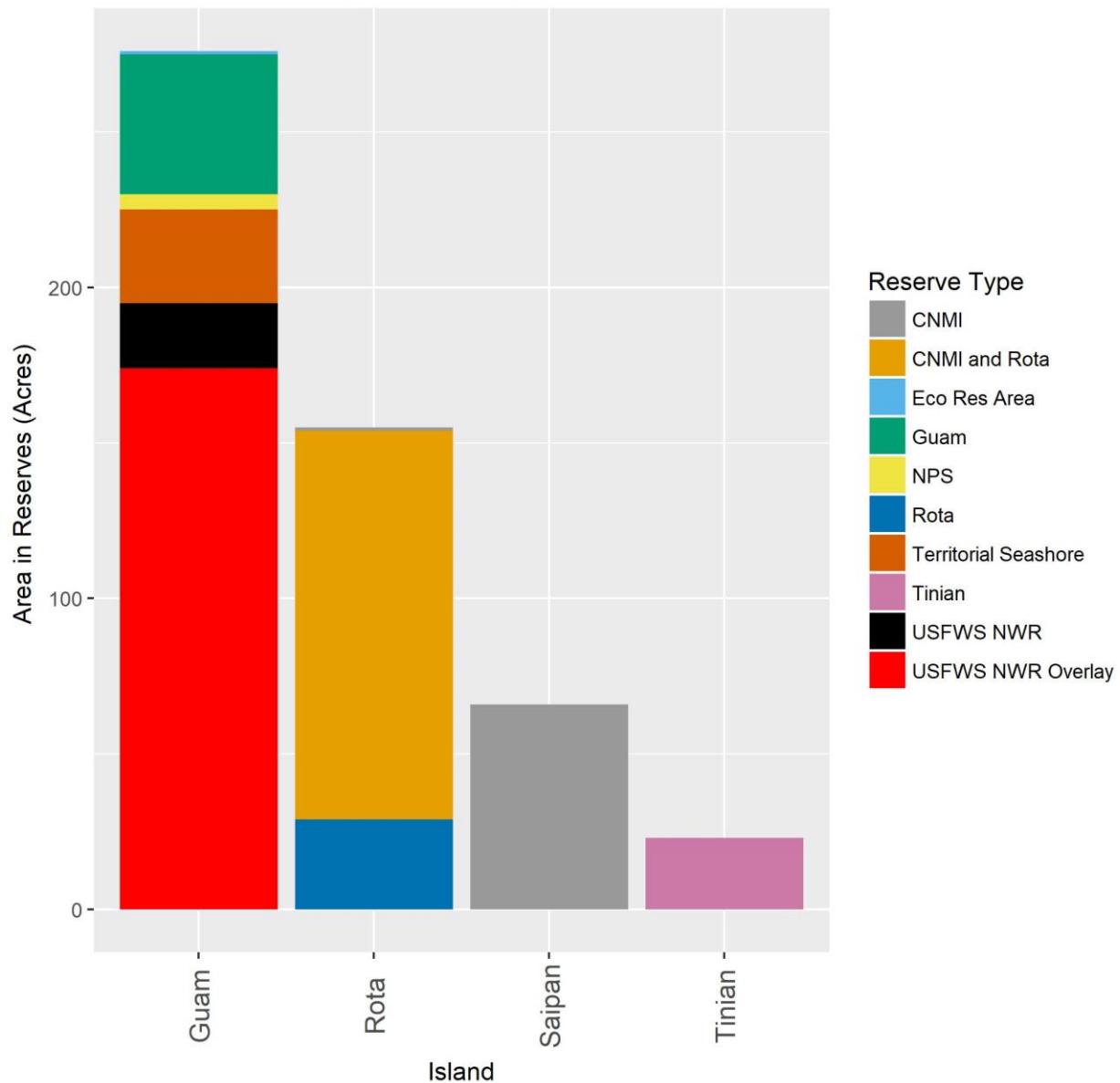
Barren

Barren Reserve Type Summary



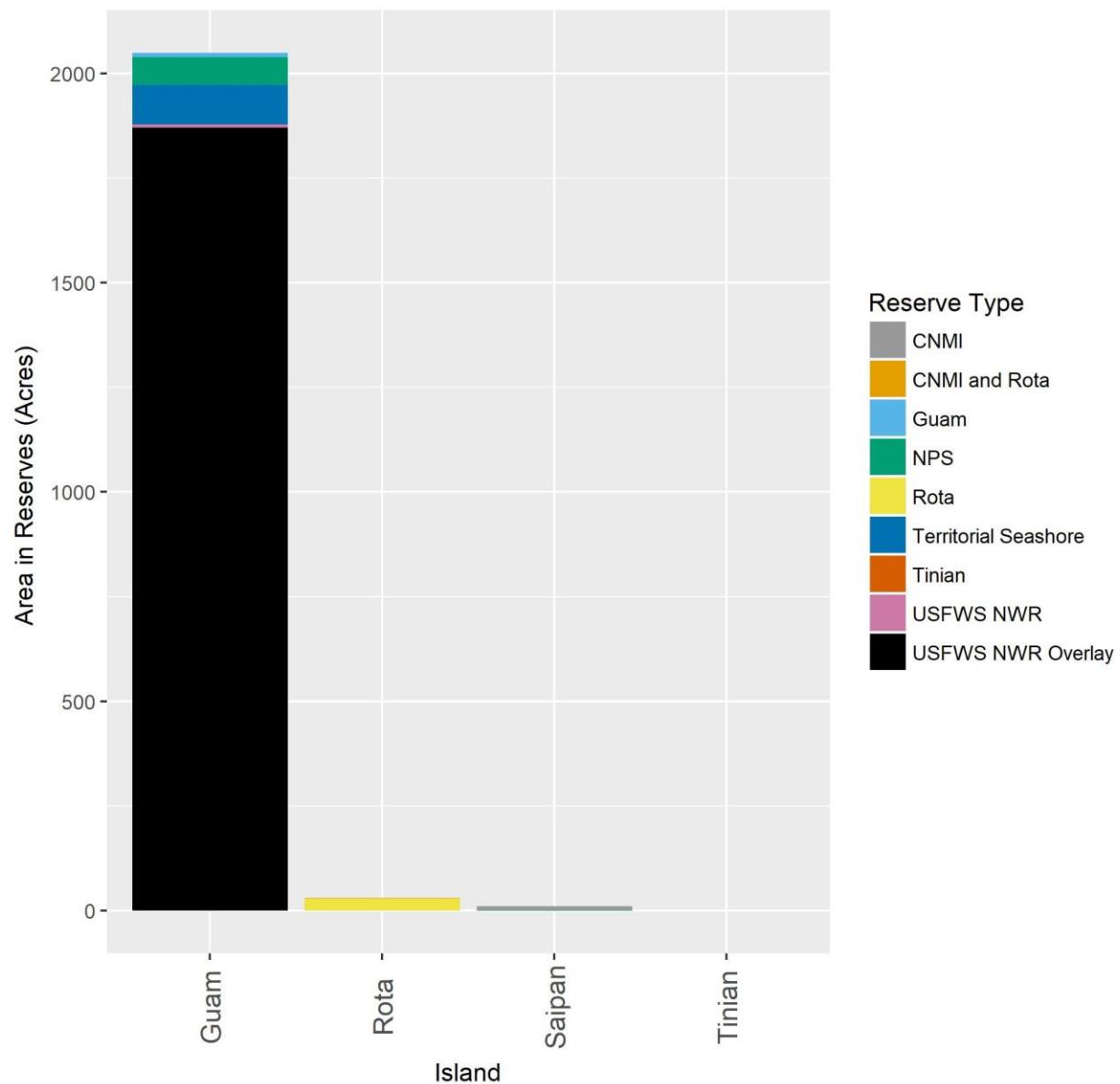
Coastal

### Coastal Reserve Type Summary



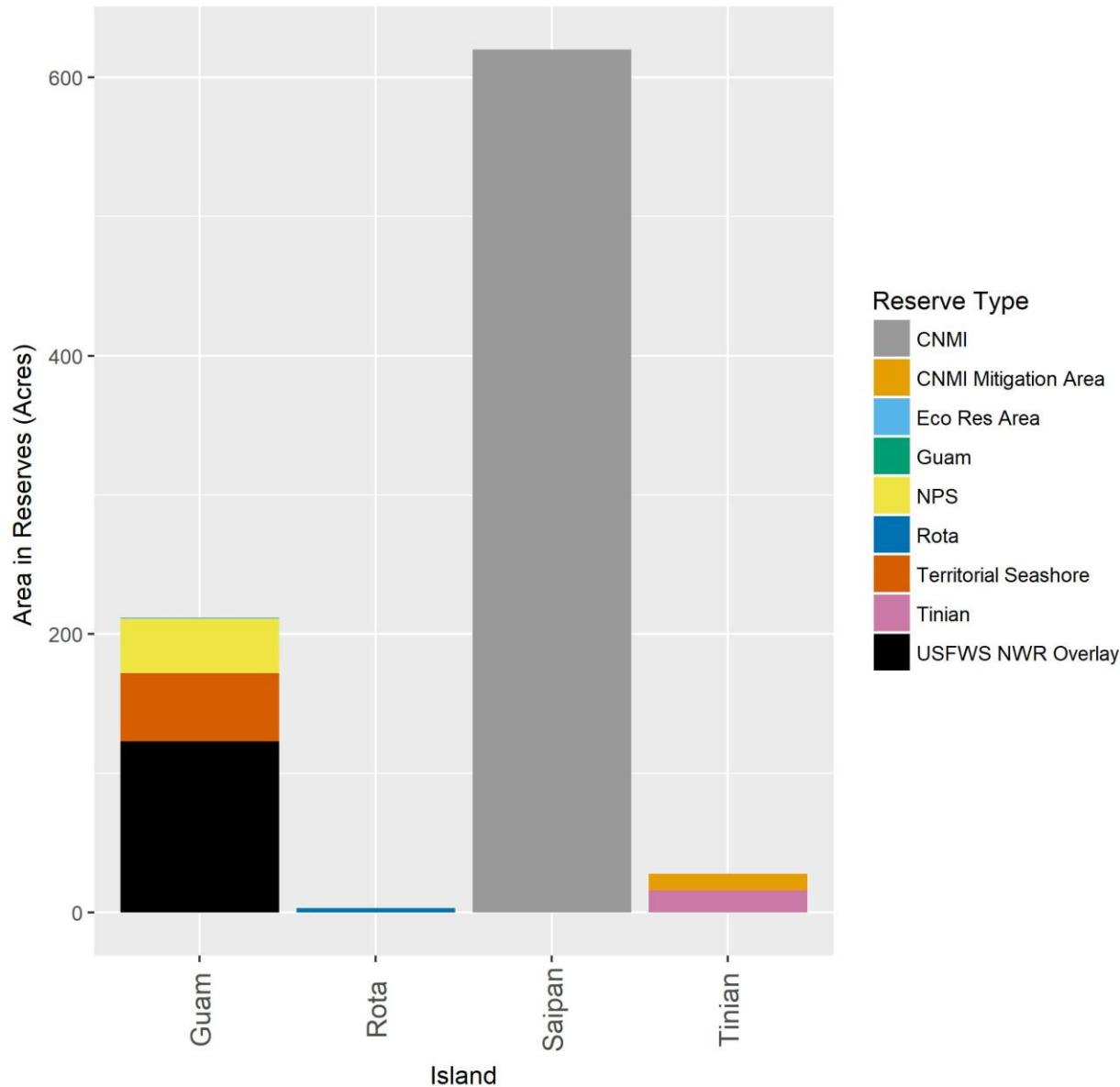
Developed

### Developed Reserve Type Summary



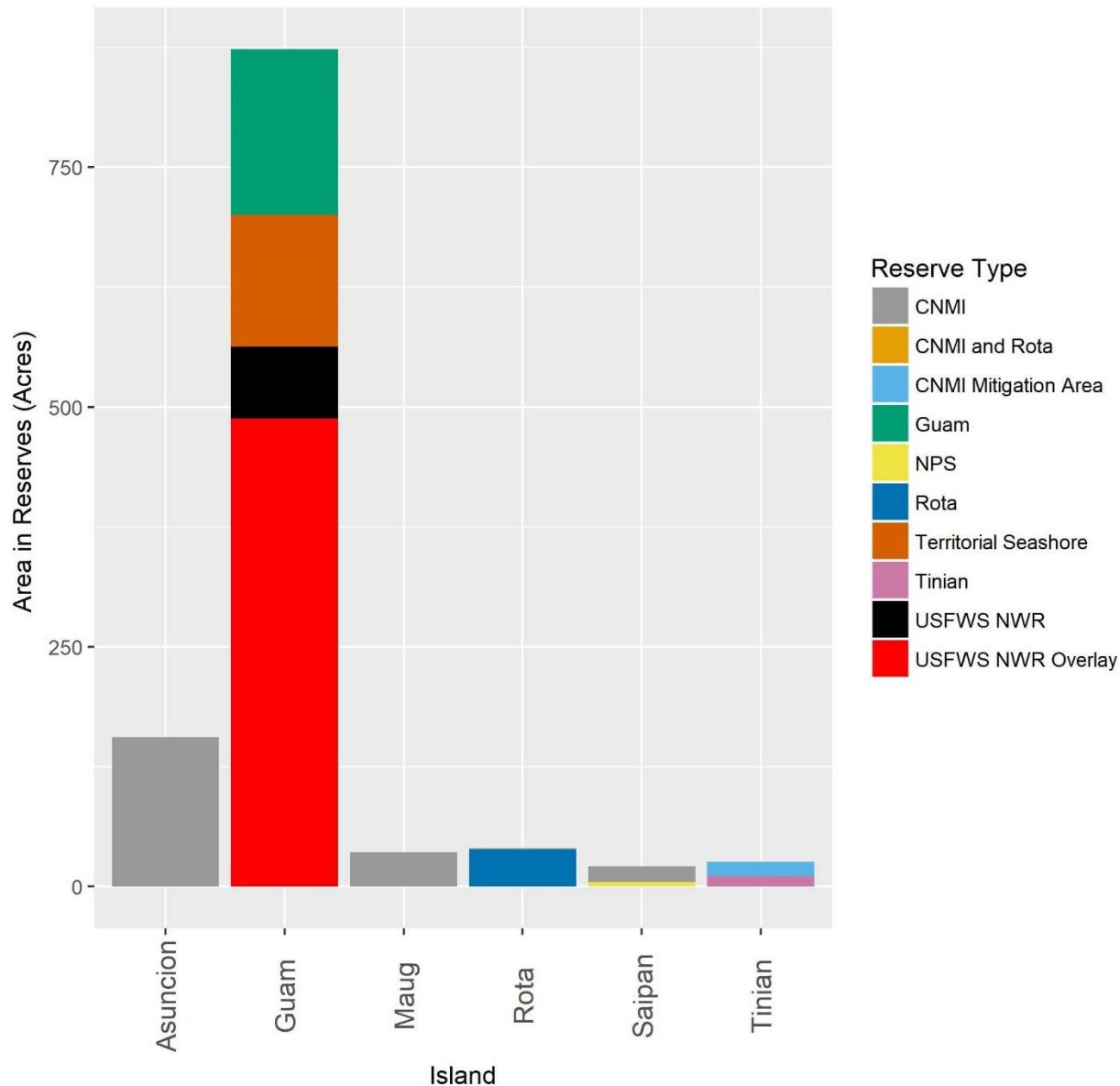
Leucaena Forest

Leucaena Forest Reserve Type Summary



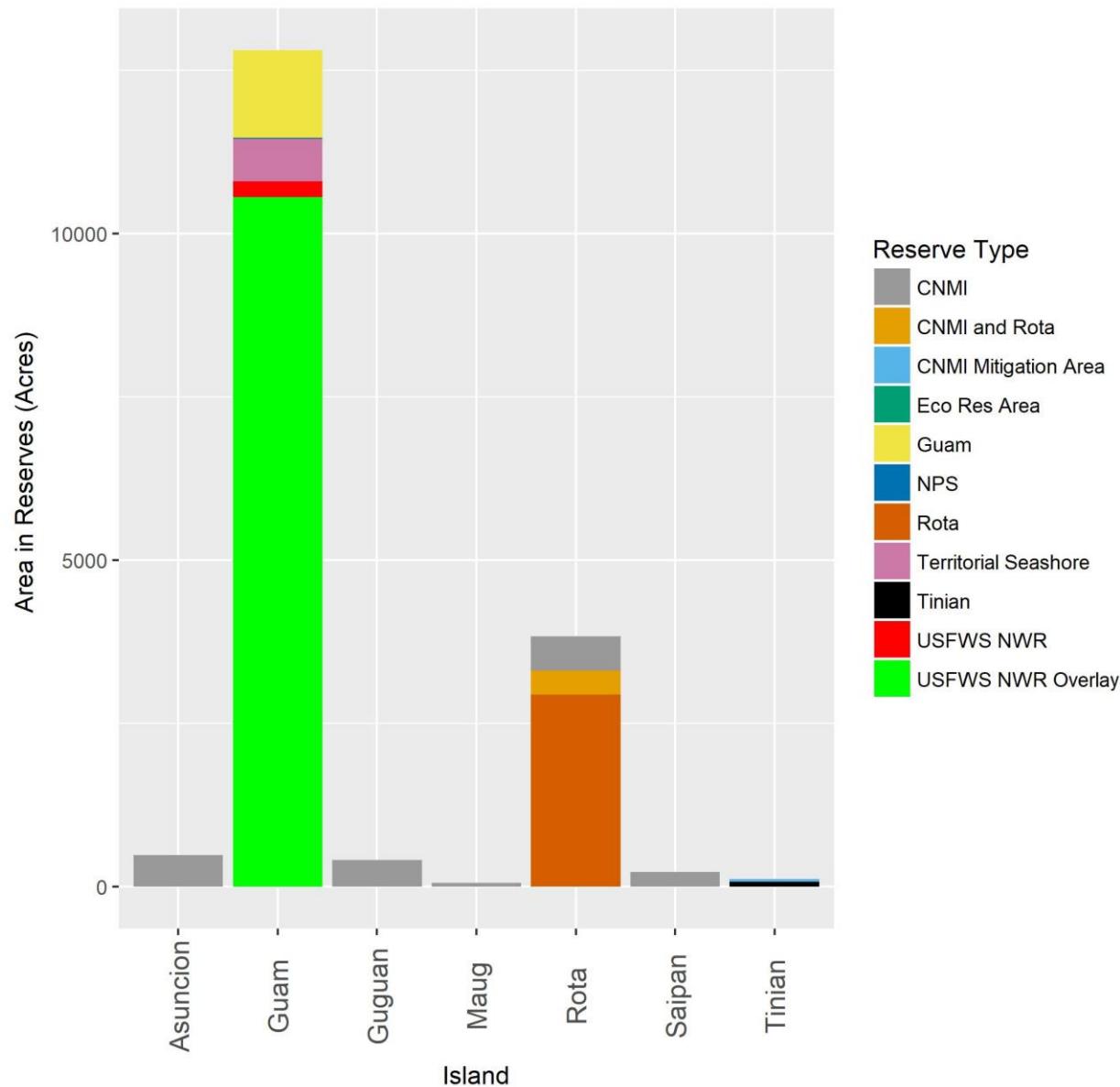
## Monoculture Forest

### Monoculture Forest Reserve Type Summary



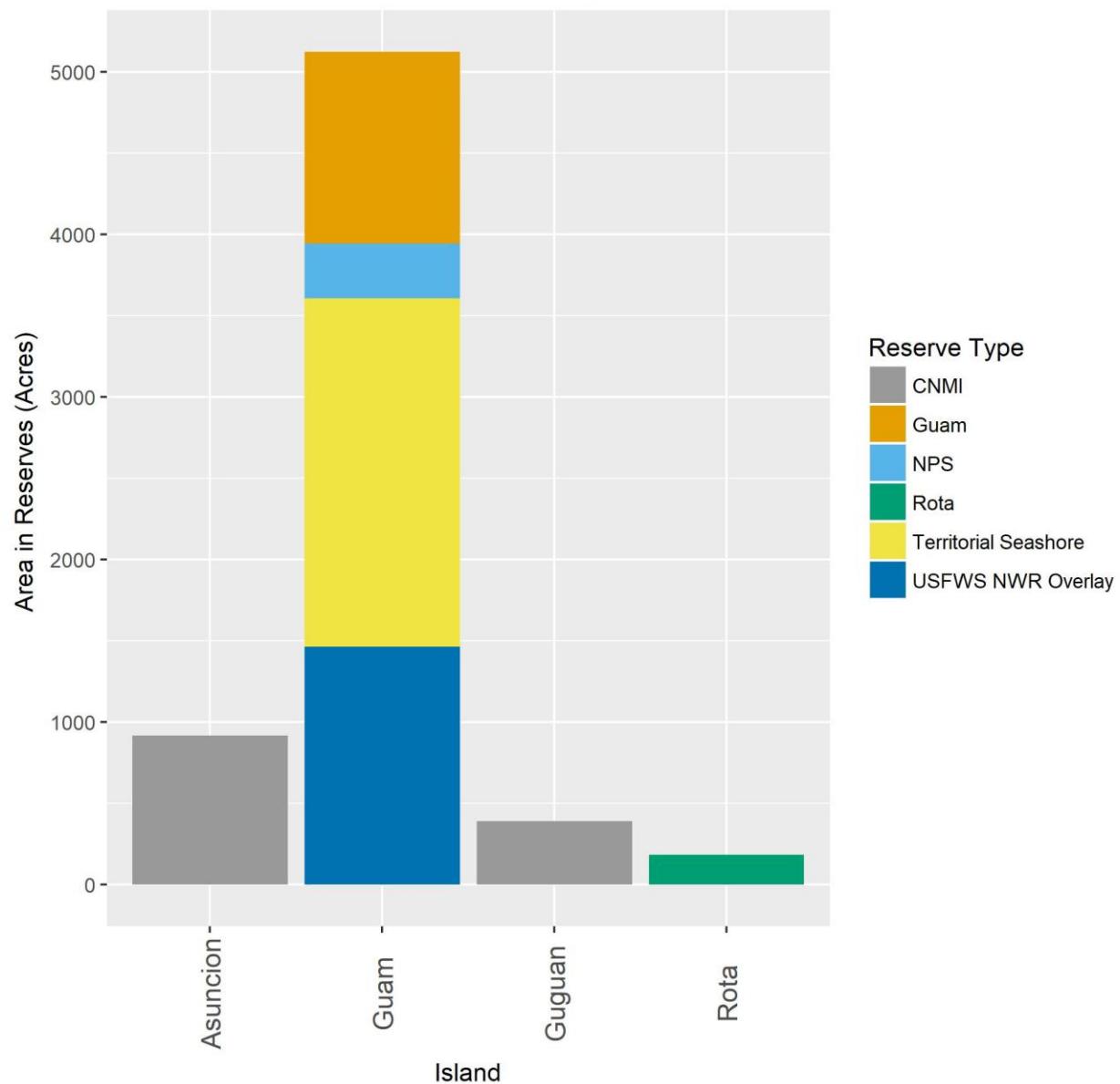
## Native Forest

### Native Forest Reserve Type Summary



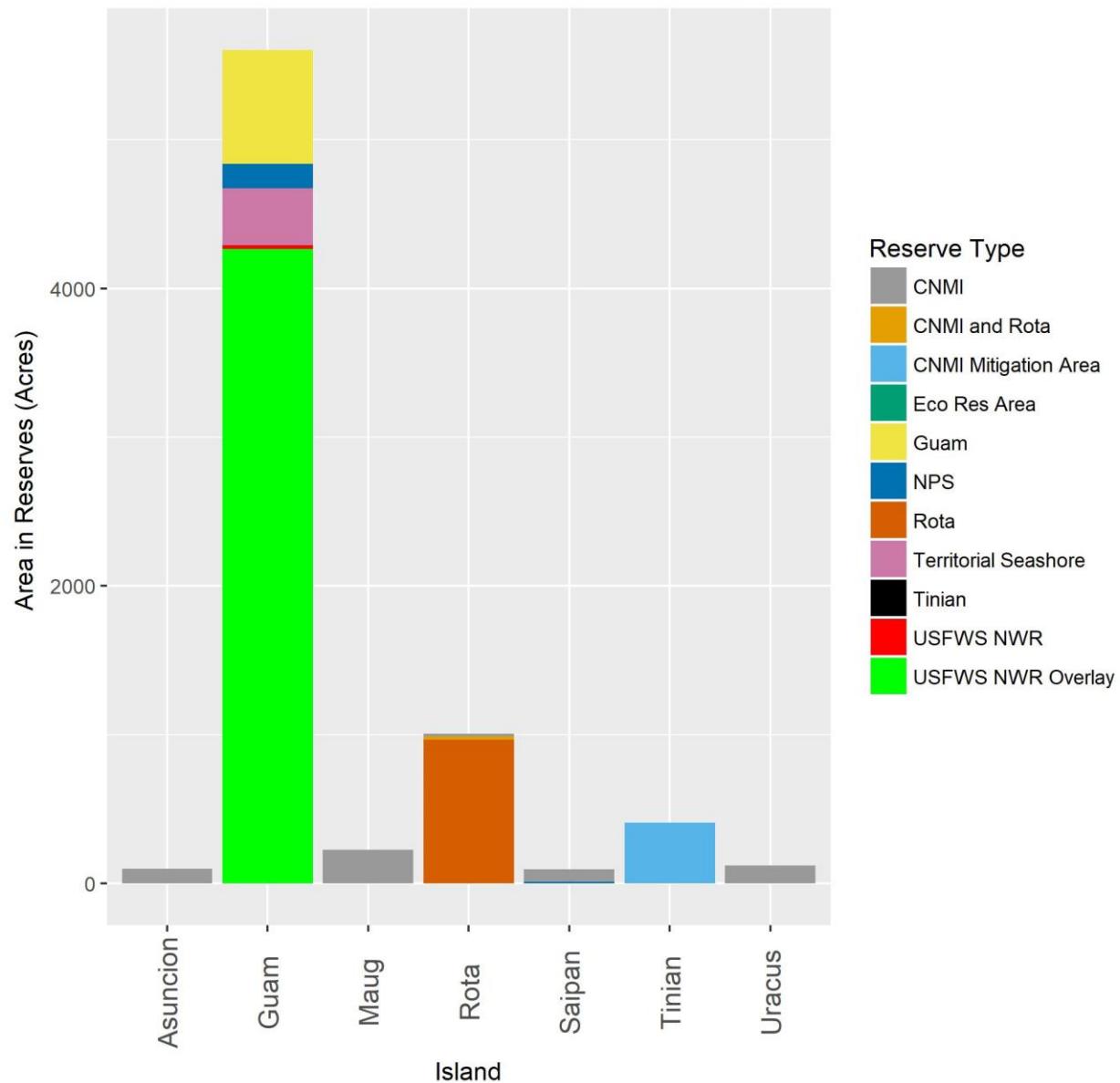
## Savanna and Grasslands

### Savanna and Grasslands Reserve Type Summary



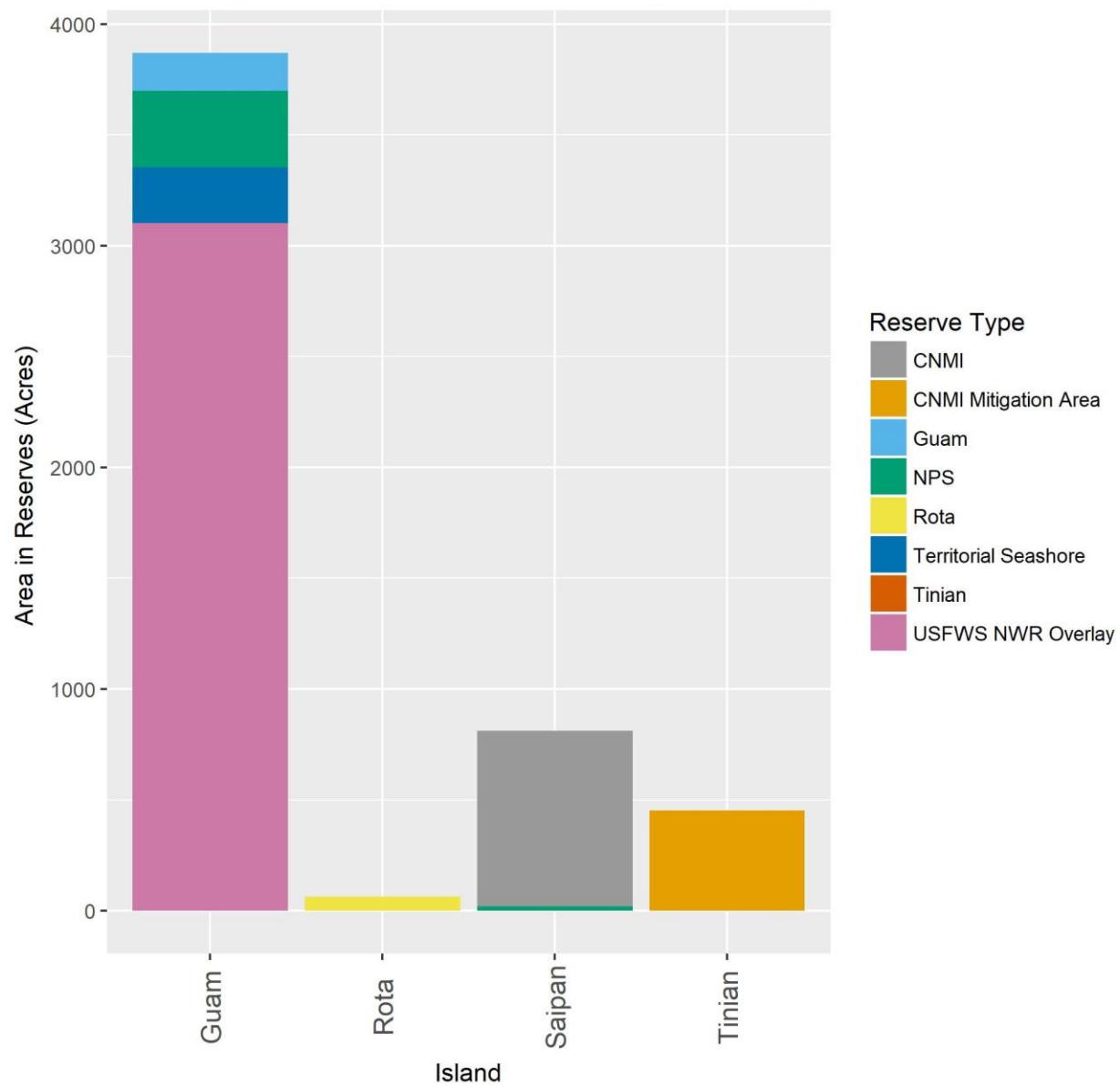
## Scrub and Herbaceous

### Scrub and Herbaceous Reserve Type Summary



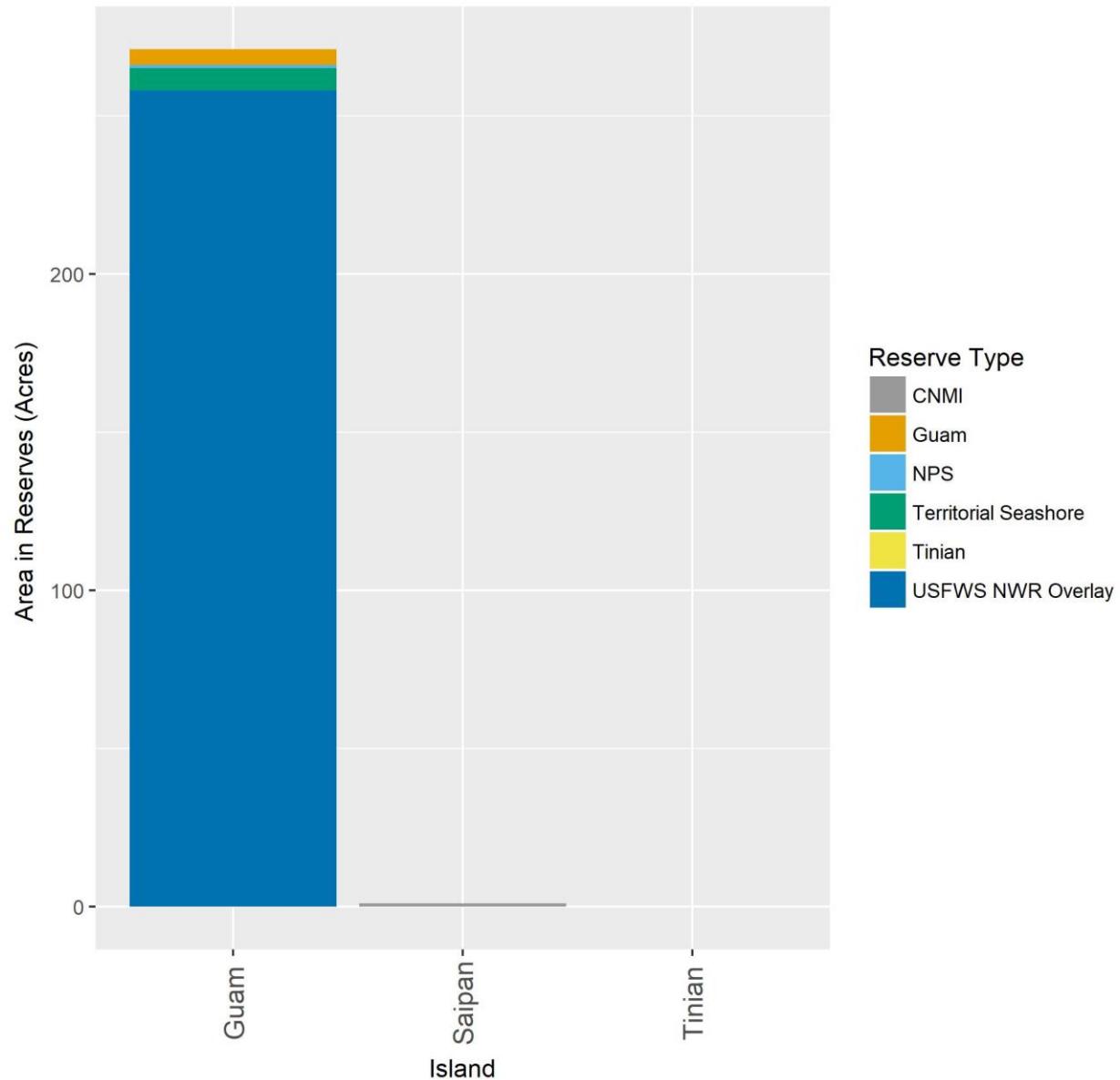
Secondary and Mixed Forest

Secondary and Mixed Forest Reserve Type Summary



## Wetlands

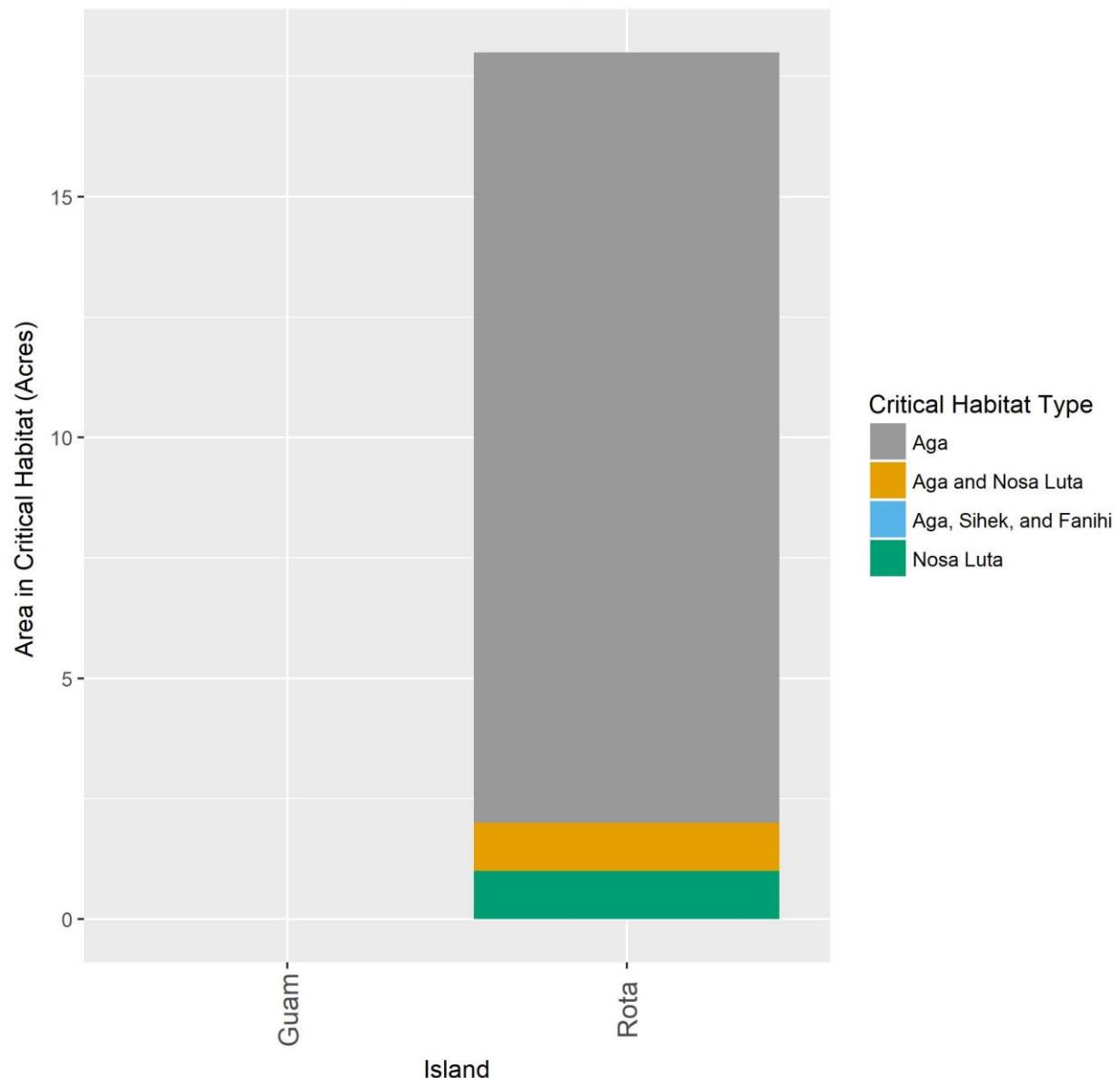
### Wetland Reserve Type Summary



Critical Habitat

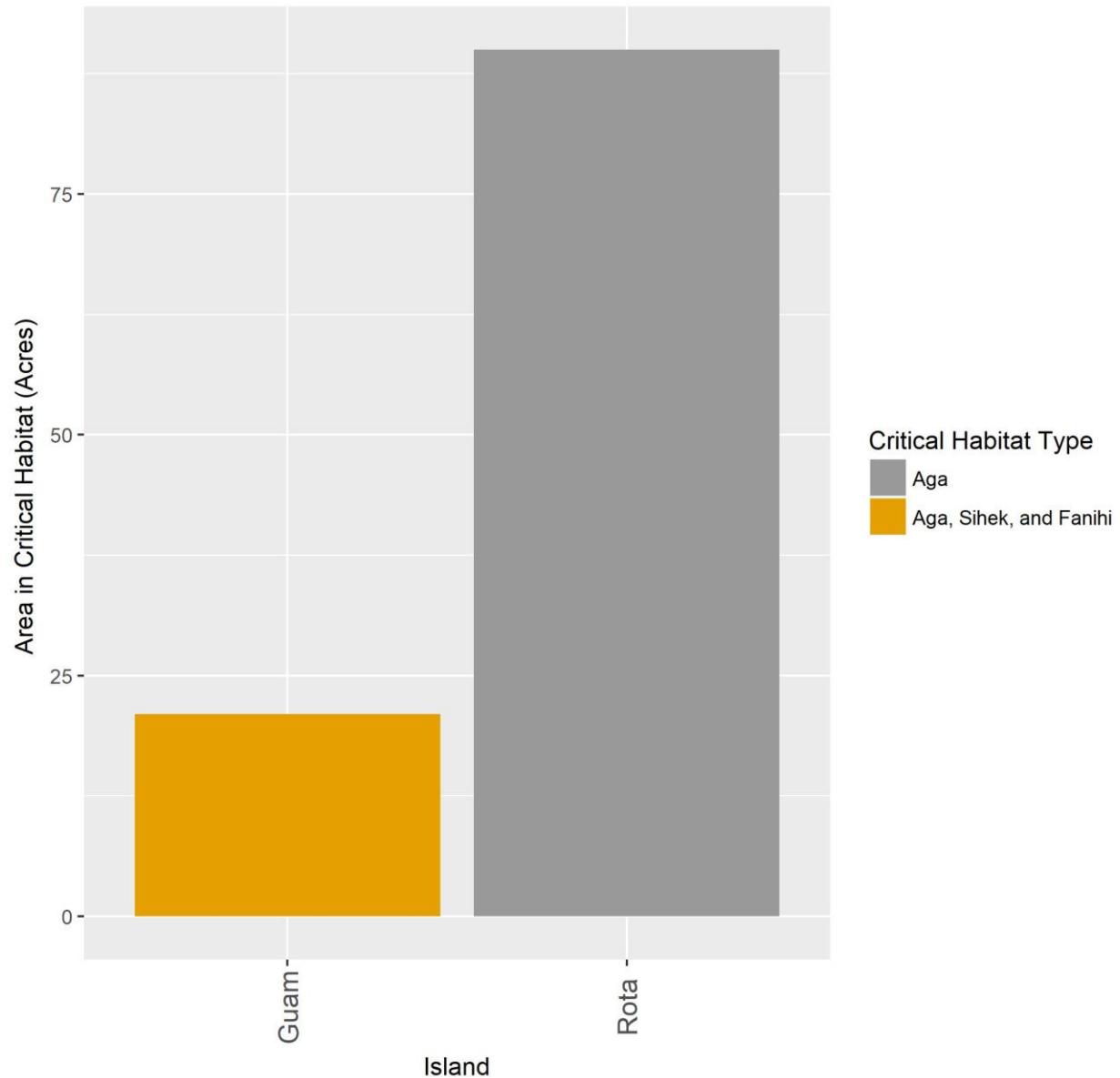
Barren

### Barren Critical Habitat Type Summary



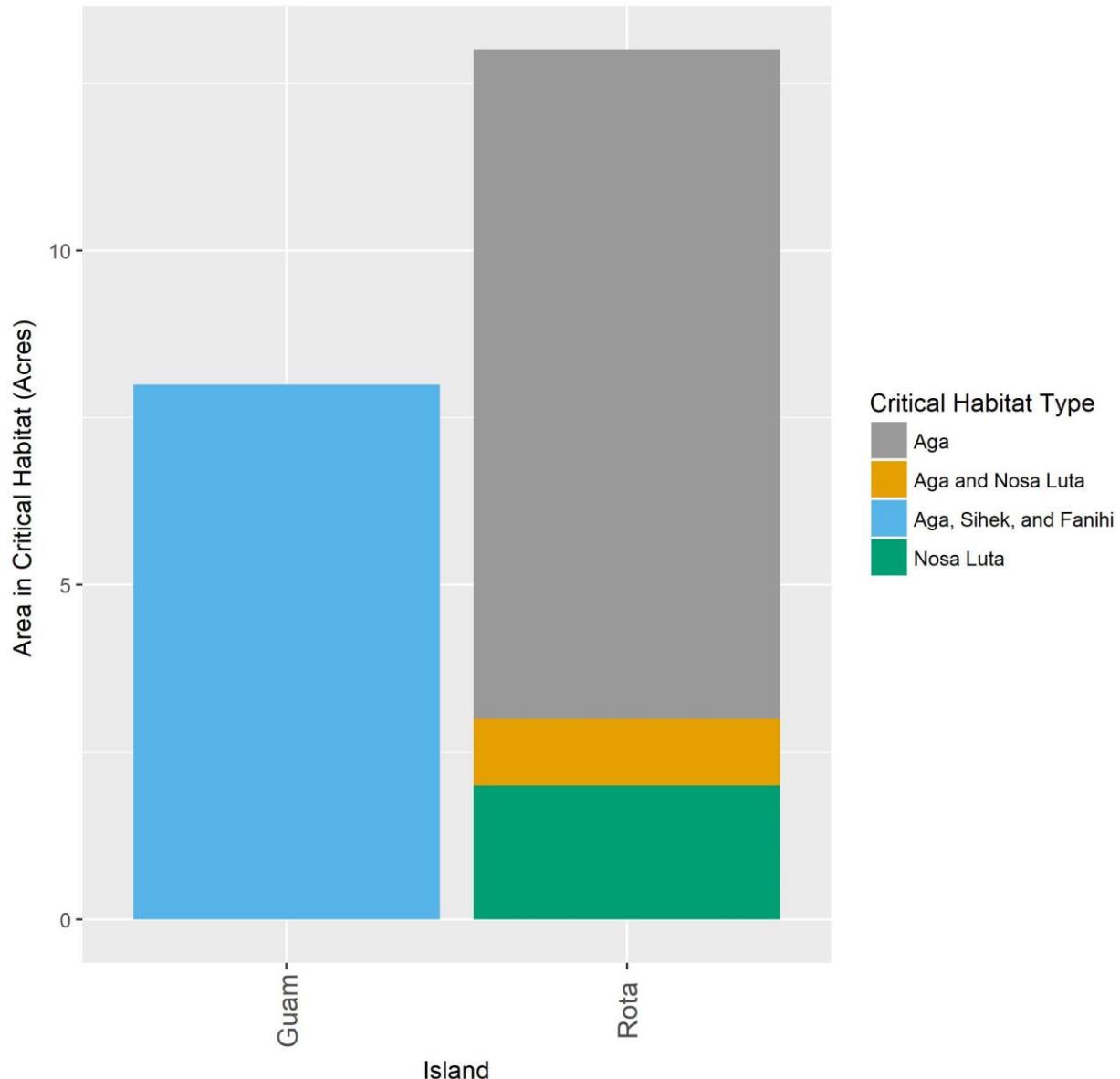
Coastal

### Coastal Critical Habitat Type Summary



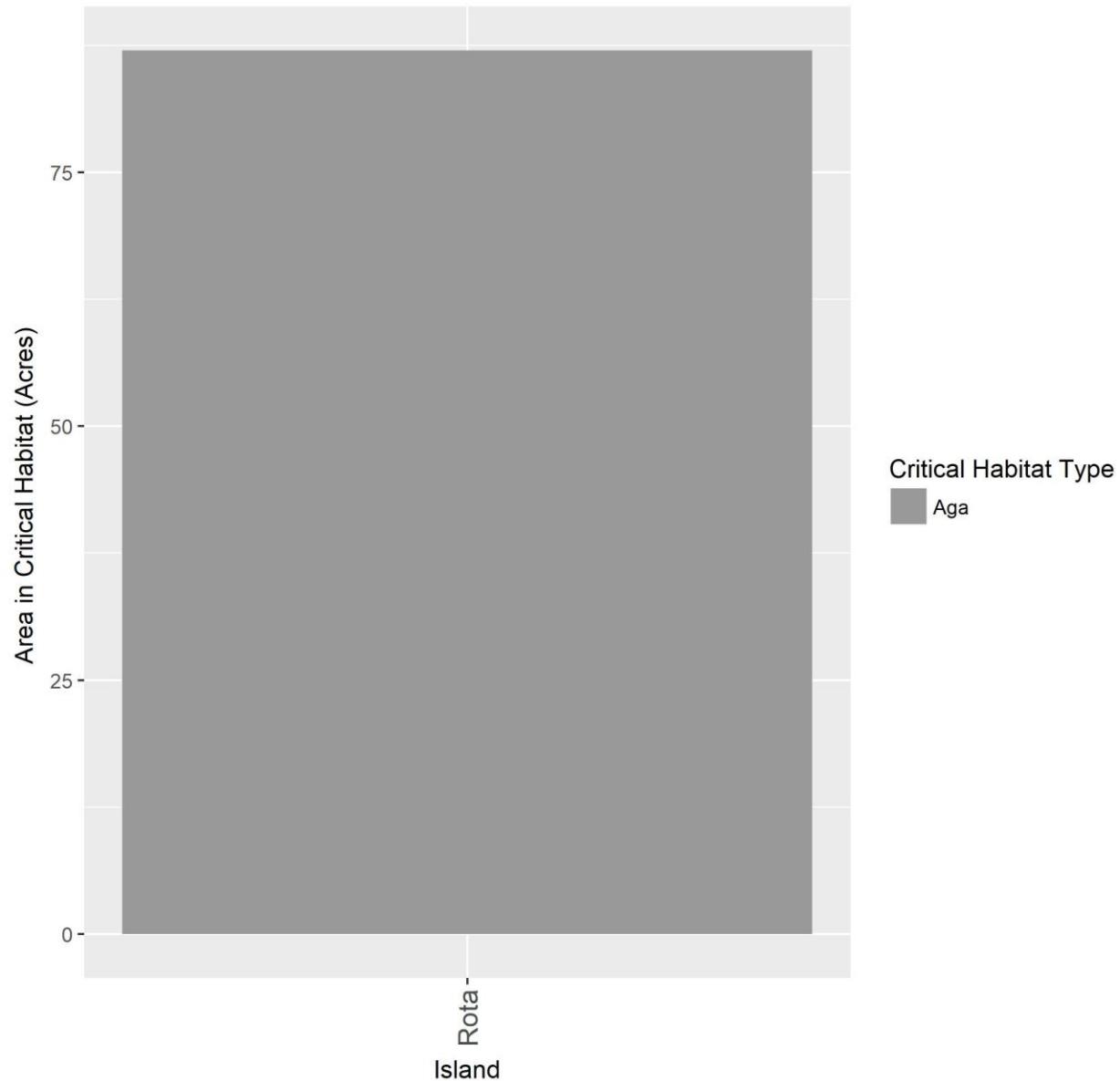
Developed

### Developed Critical Habitat Type Summary



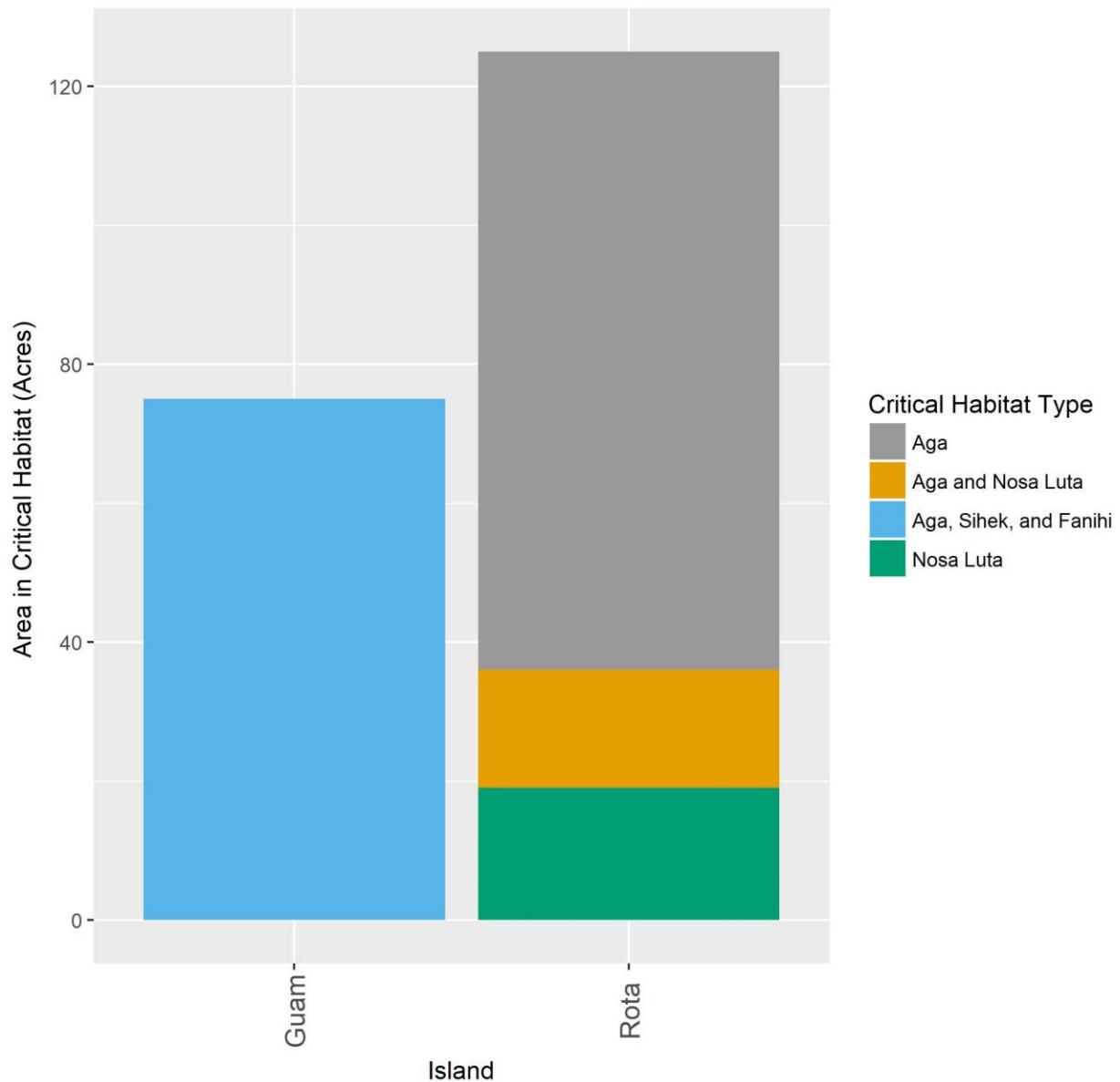
Leucaena Forest

Leucaena Forest Critical Habitat Type Summary



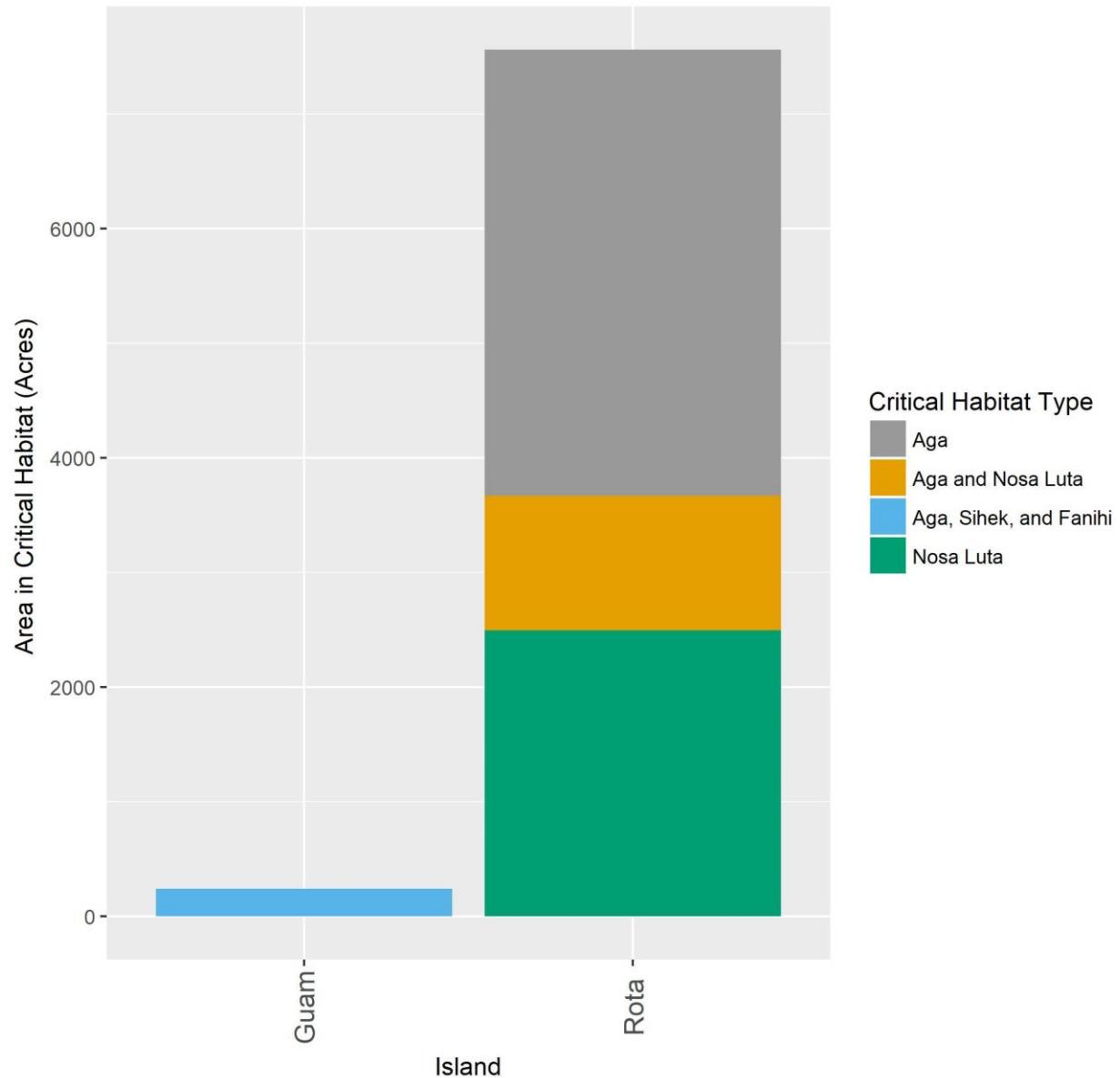
## Monoculture Forest

### Monoculture Forest Critical Habitat Type Summary



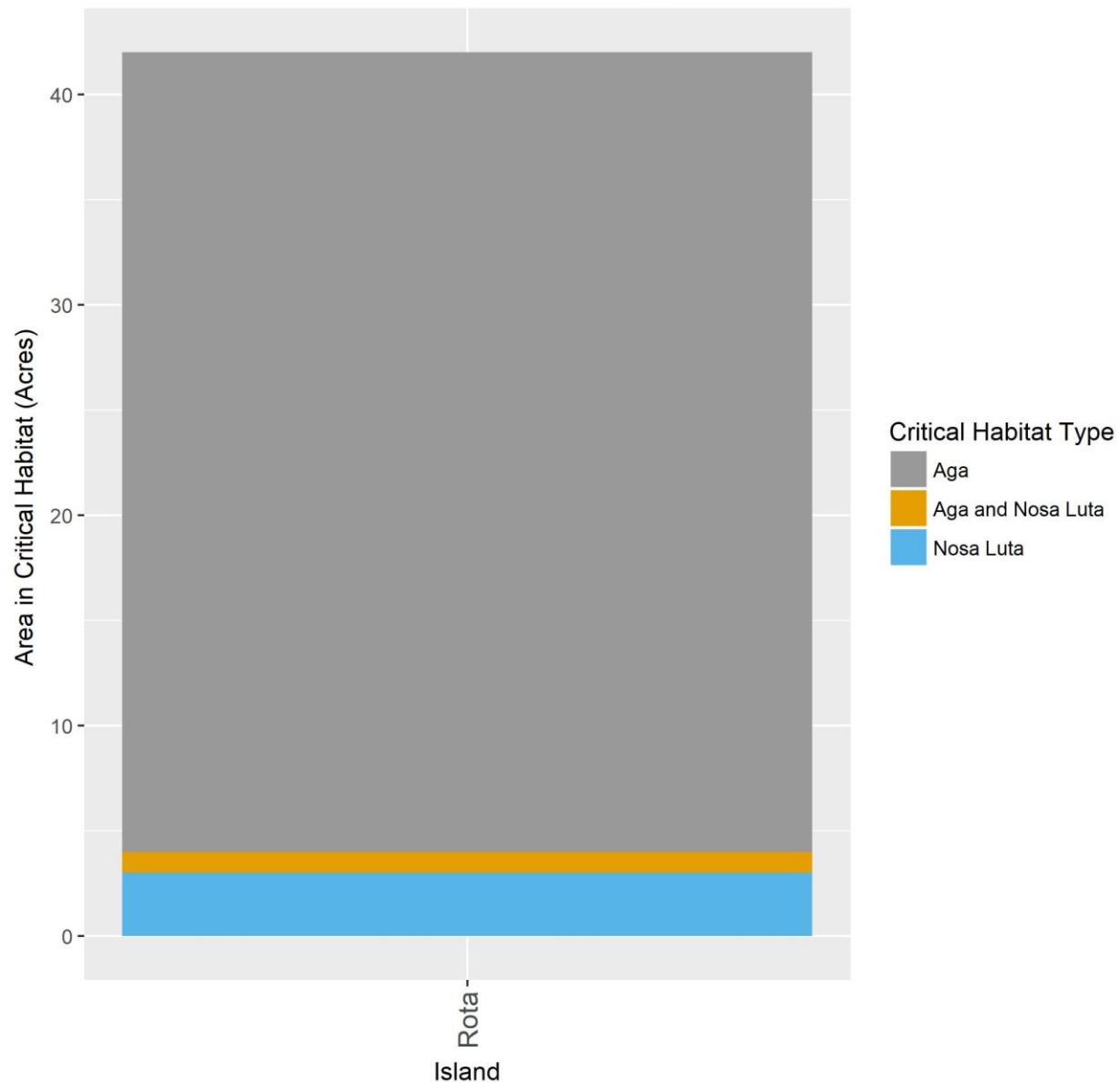
Native Forest

Native Forest Critical Habitat Type Summary



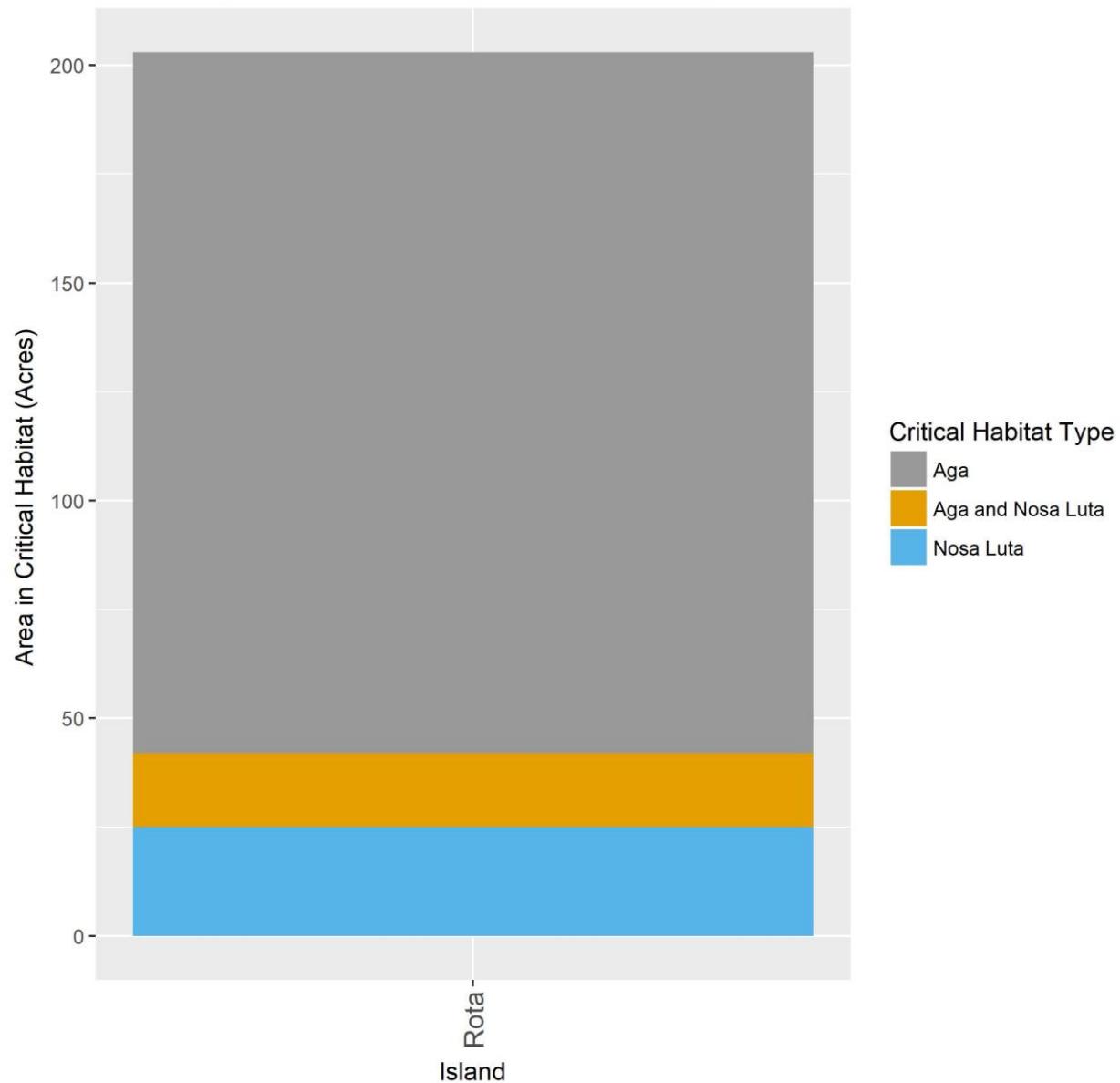
Savanna and Grasslands

Savanna and Grasslands Critical Habitat Type Summary



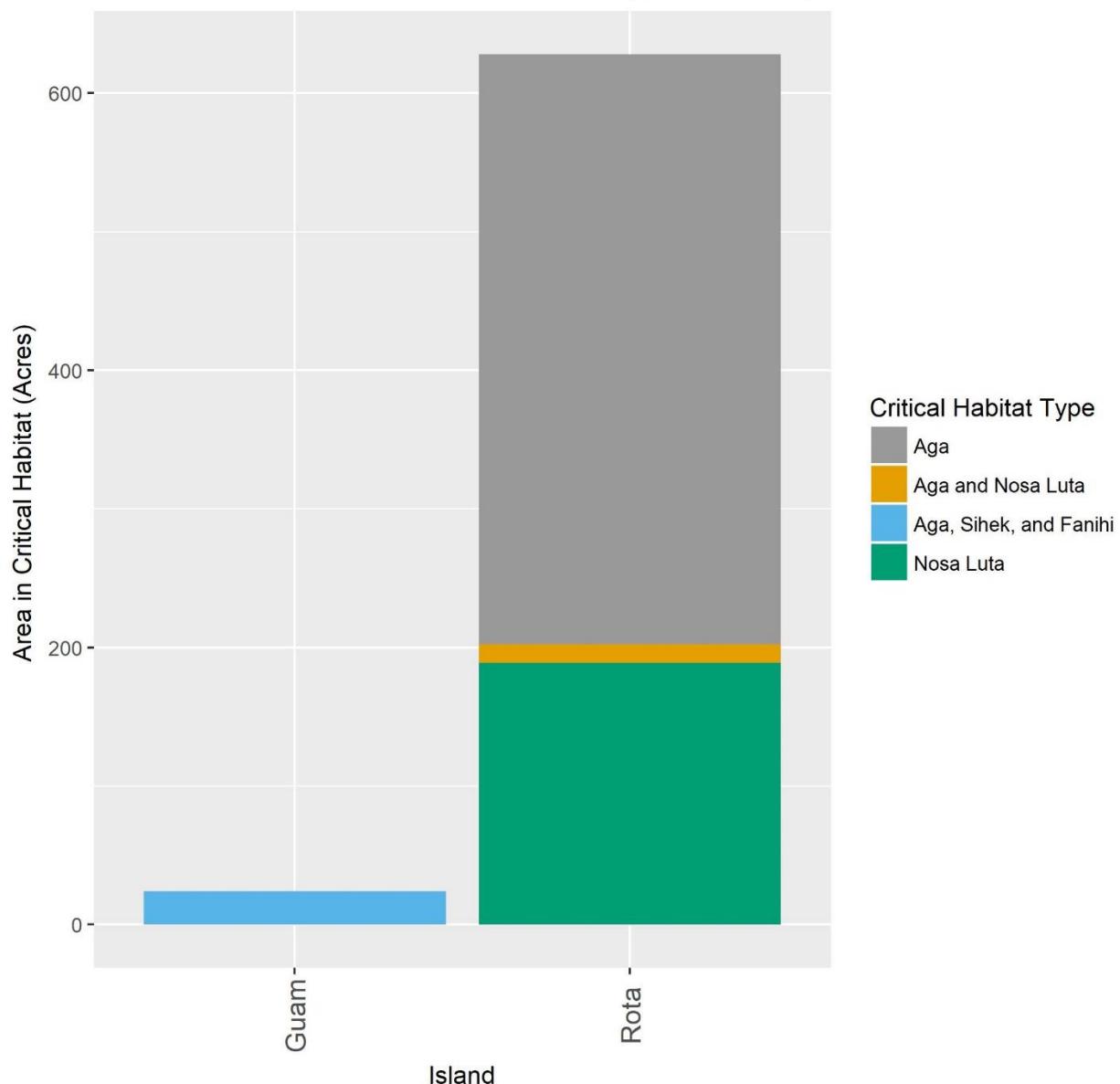
Scrub and Herbaceous

Secondary and Mixed Forest Critical Habitat Type Summary



## Secondary and Mixed Forest

### Scrub and Herbaceous Critical Habitat Type Summary

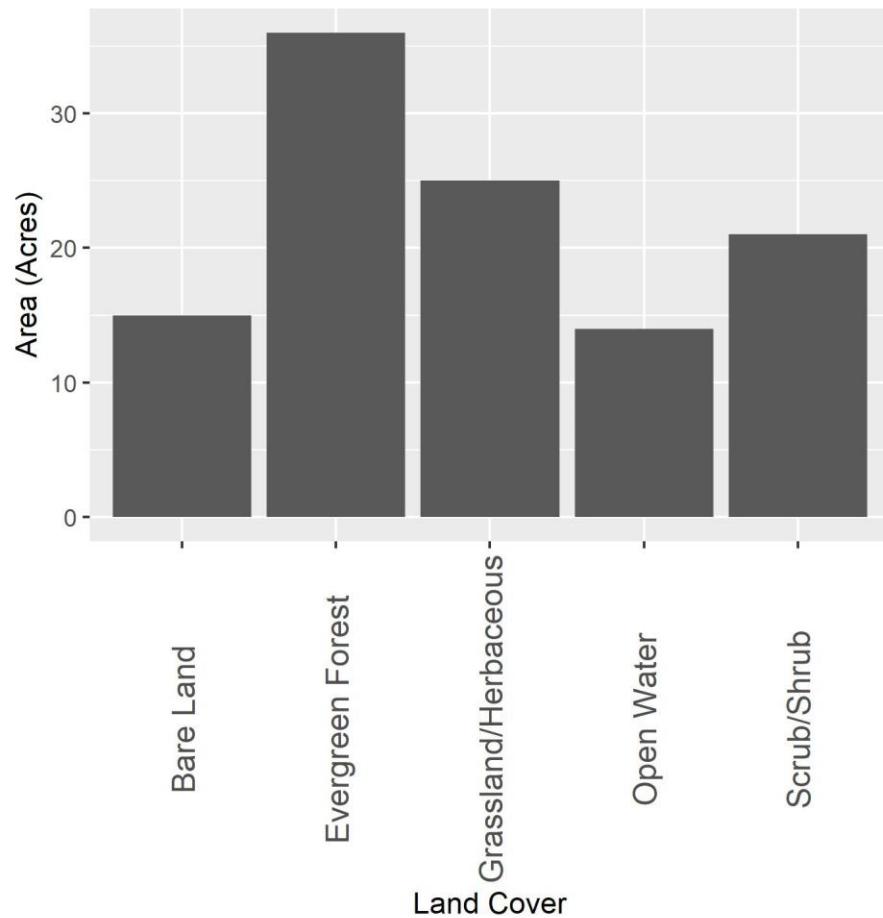


## Wetlands

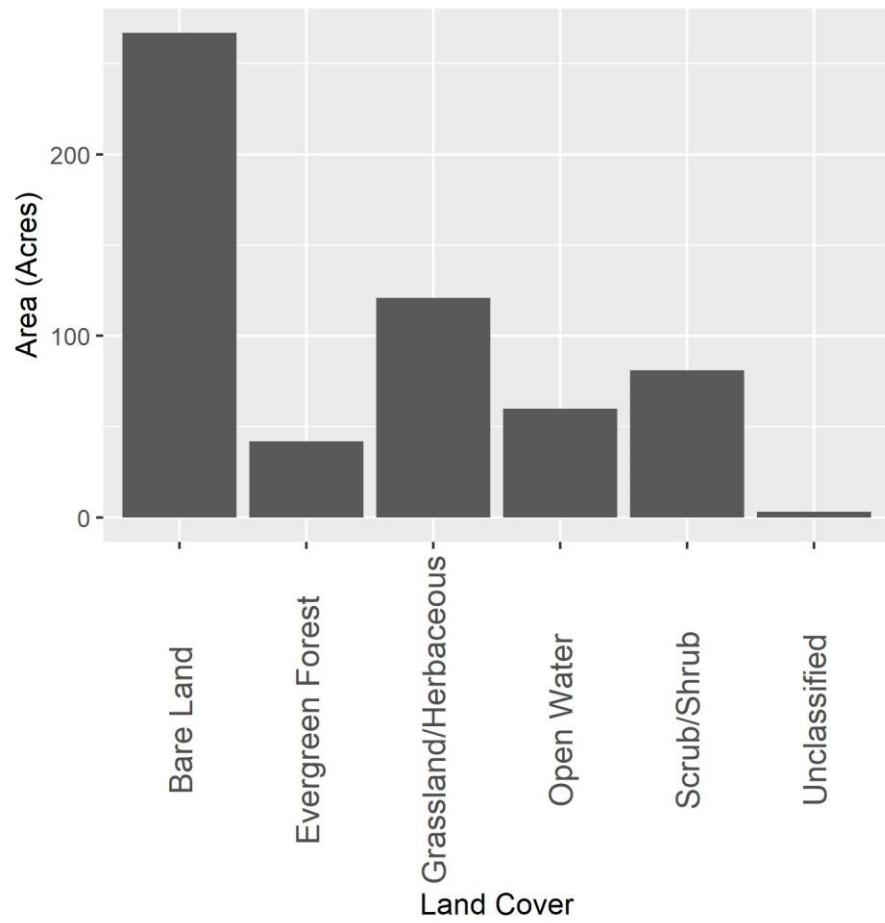
No wetlands are included in Critical Habitat Areas (according to land cover layers).

CCAP Land Cover Summaries by Island and Year

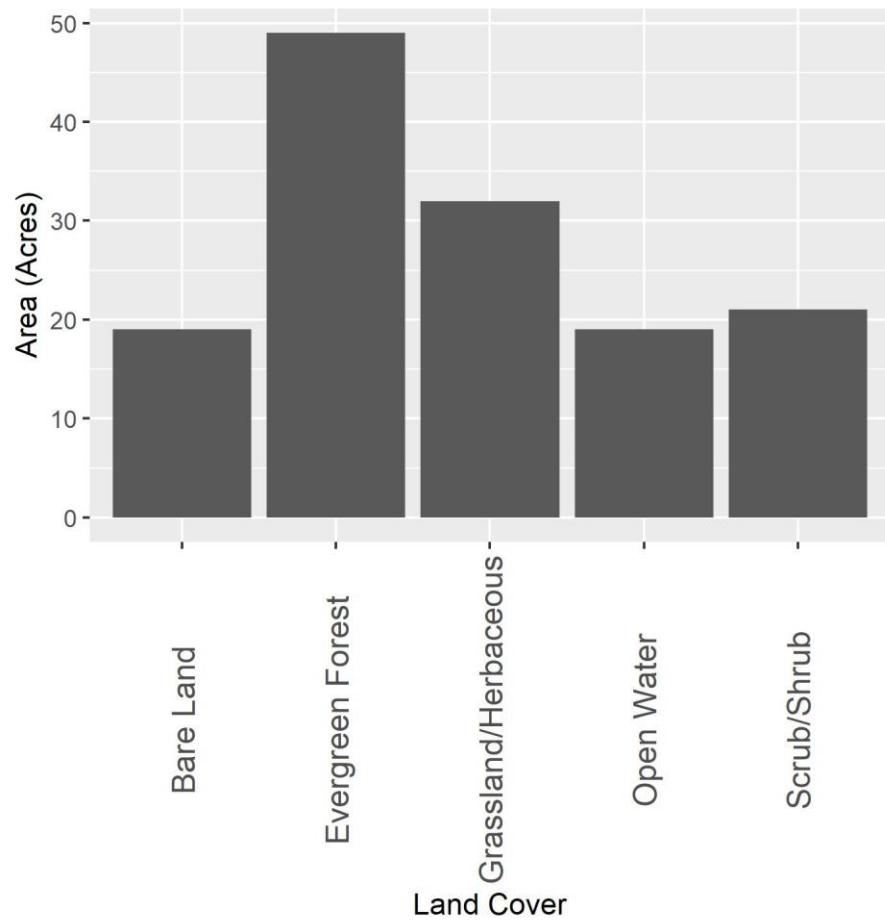
Alamagan, 2007, CCAP Land Cover Summary



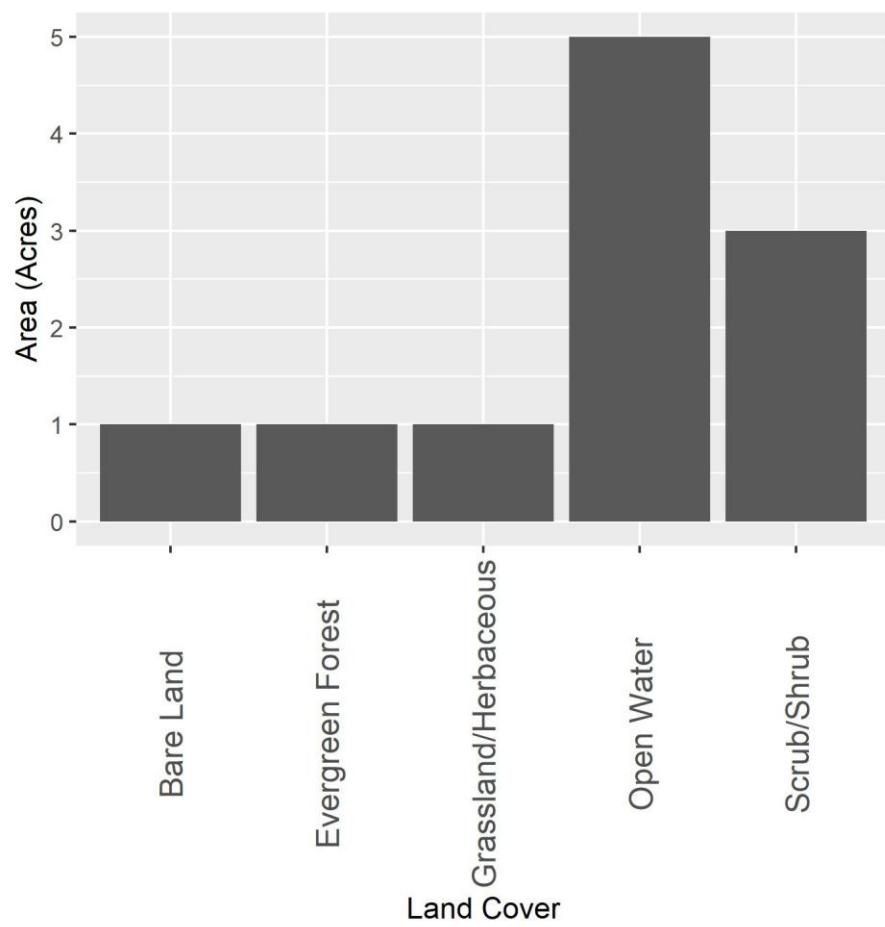
## Anatahan, 2005, CCAP Land Cover Summary



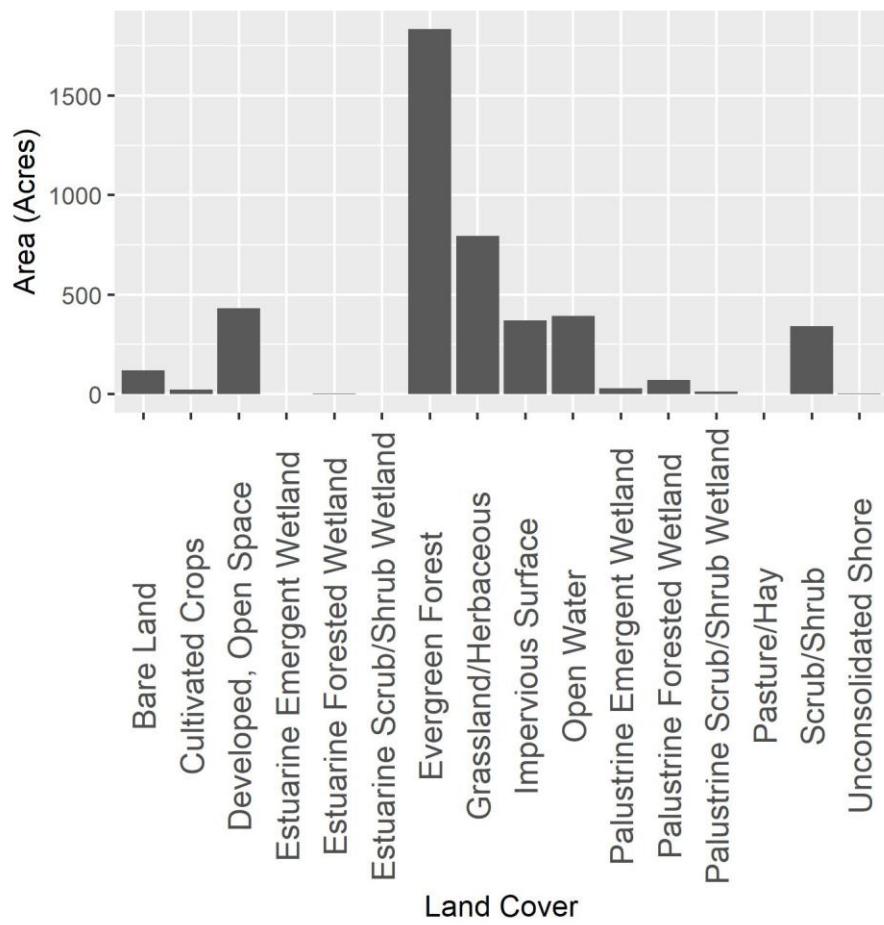
### Asuncion, 2004, CCAP Land Cover Summary



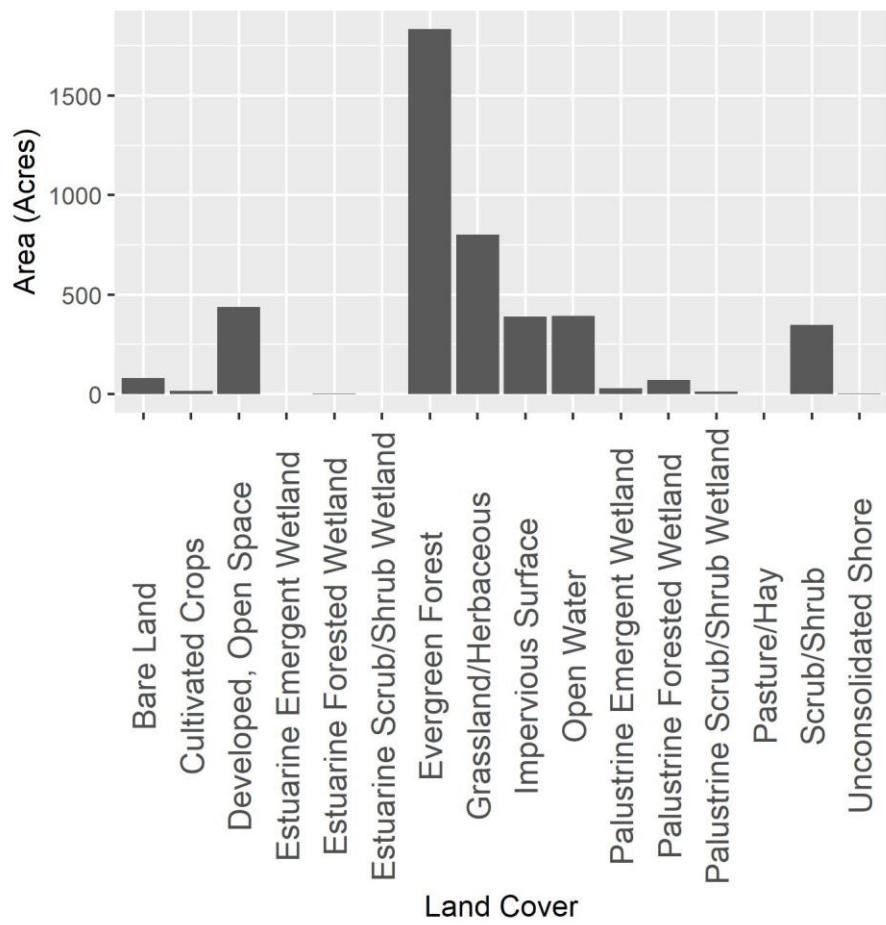
## FDM, 2004, CCAP Land Cover Summary



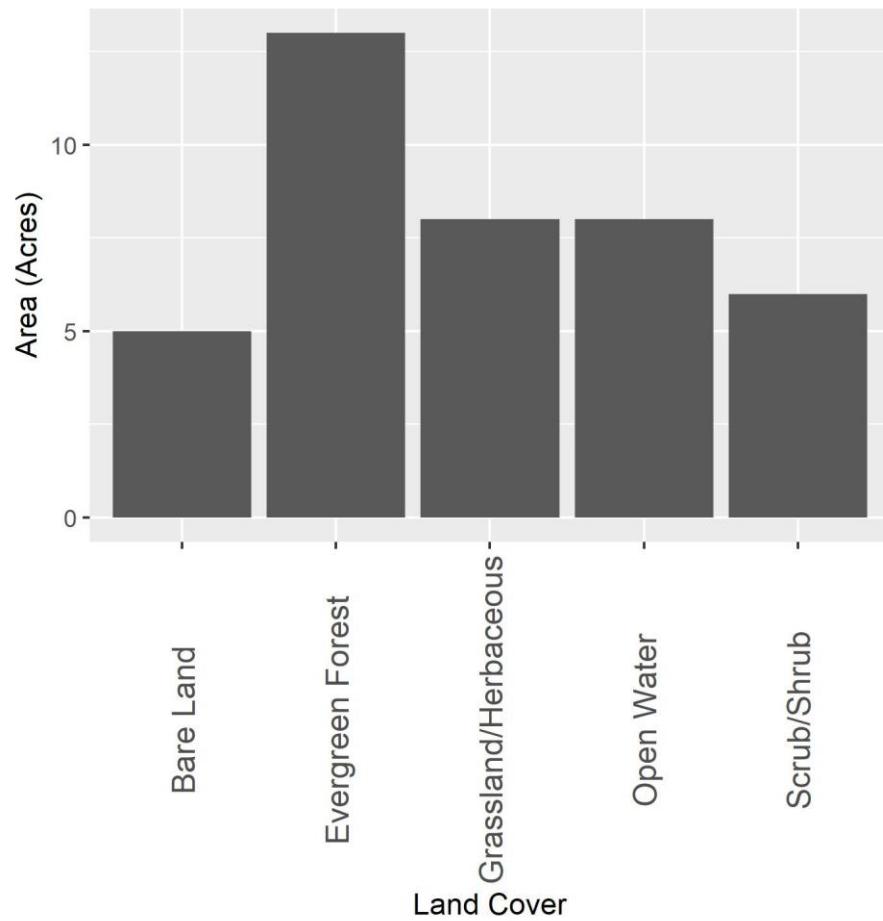
## Guam, 2005, CCAP Land Cover Summary



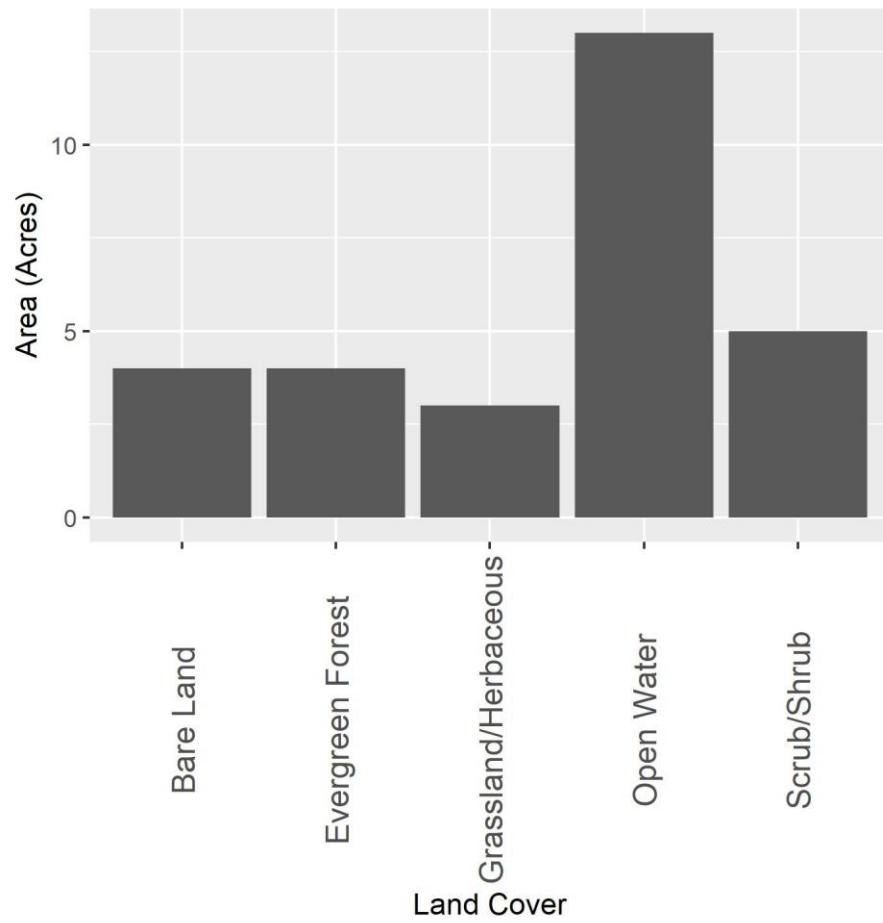
## Guam, 2011, CCAP Land Cover Summary



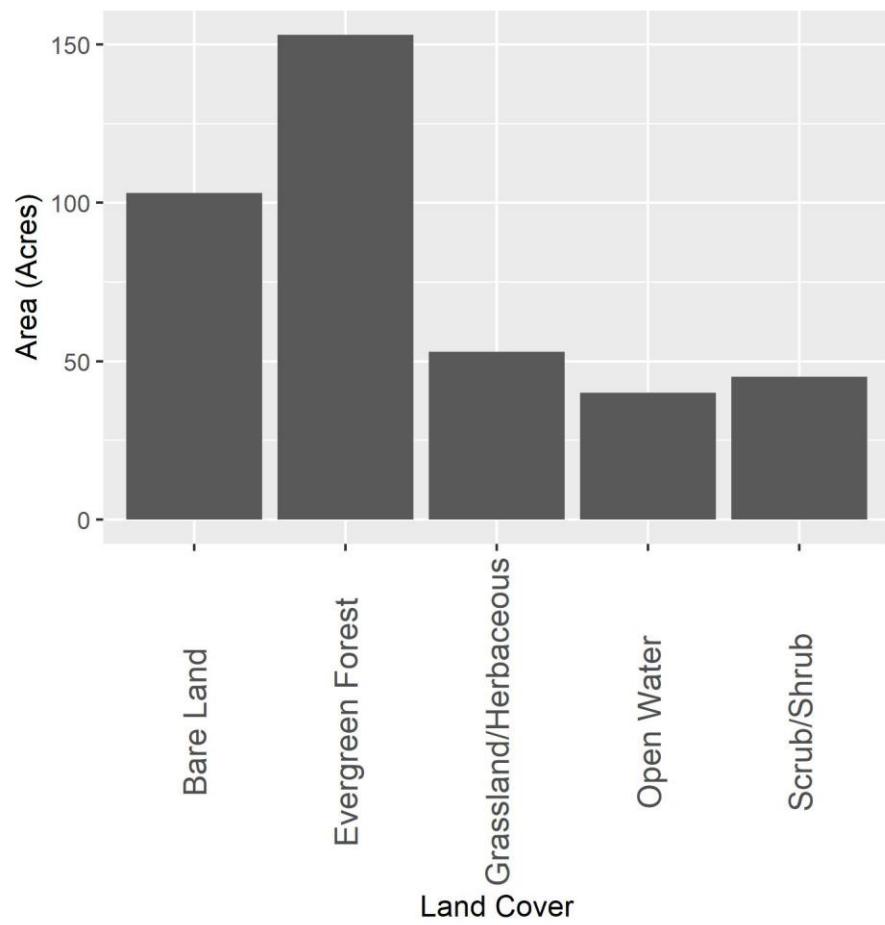
## Guguan, 2004, CCAP Land Cover Summary



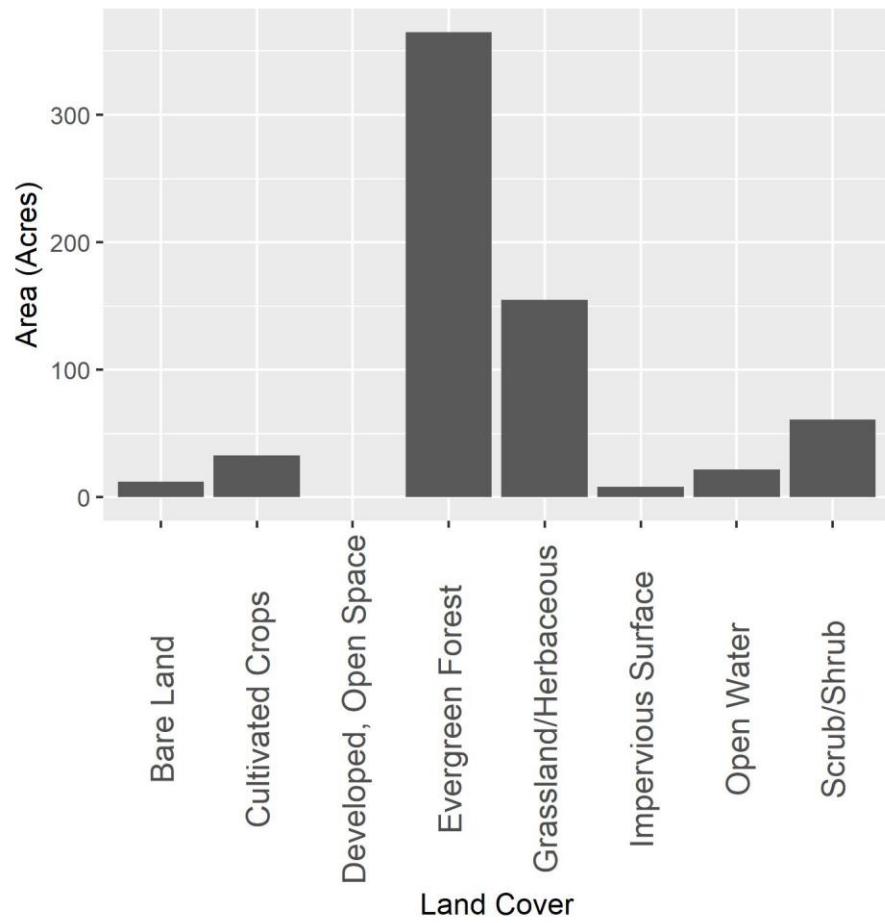
## Maug, 2003, CCAP Land Cover Summary



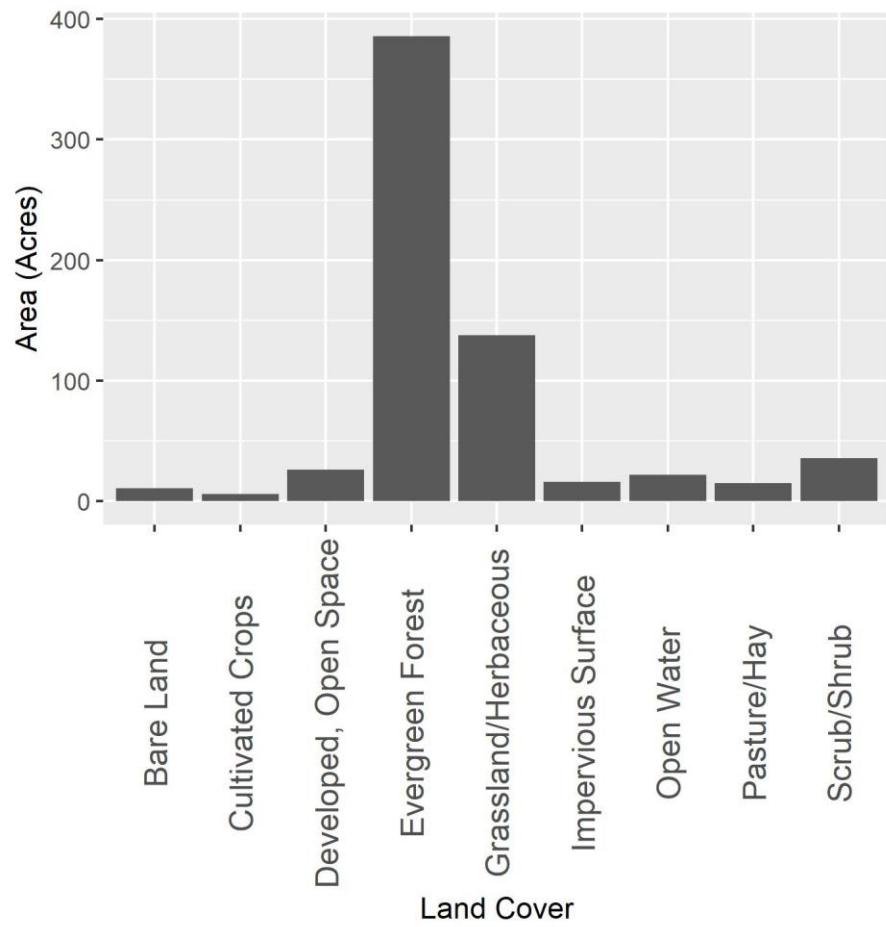
### Pagan, 2005, CCAP Land Cover Summary



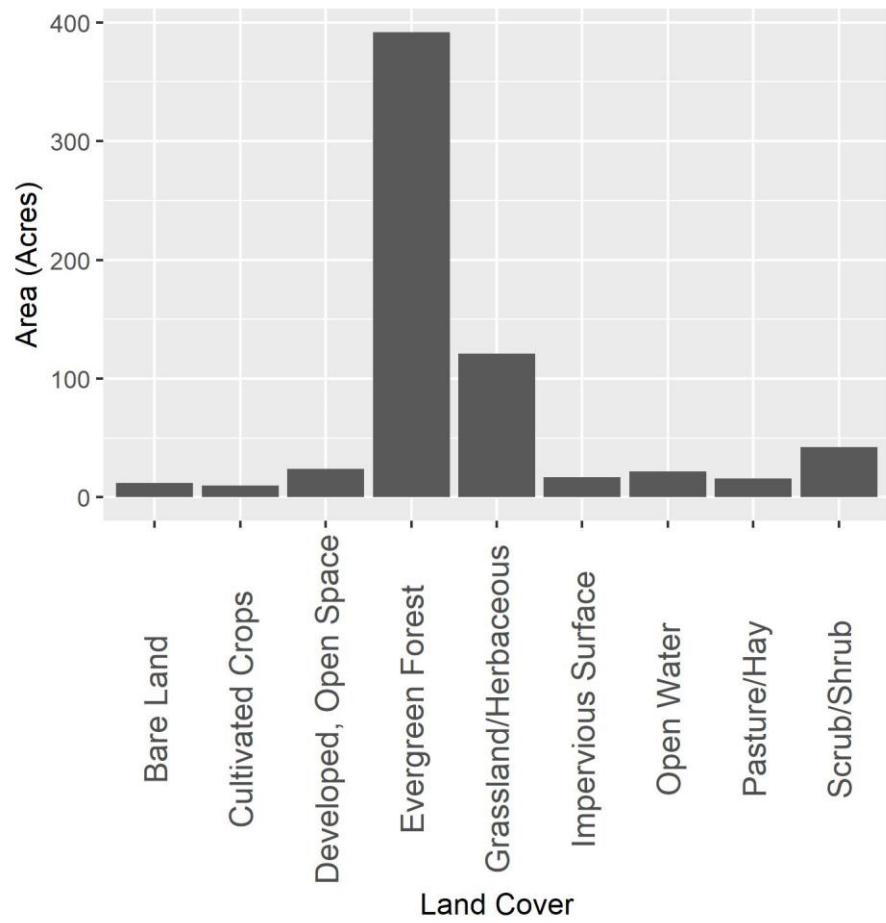
## Rota, 1946, CCAP Land Cover Summary



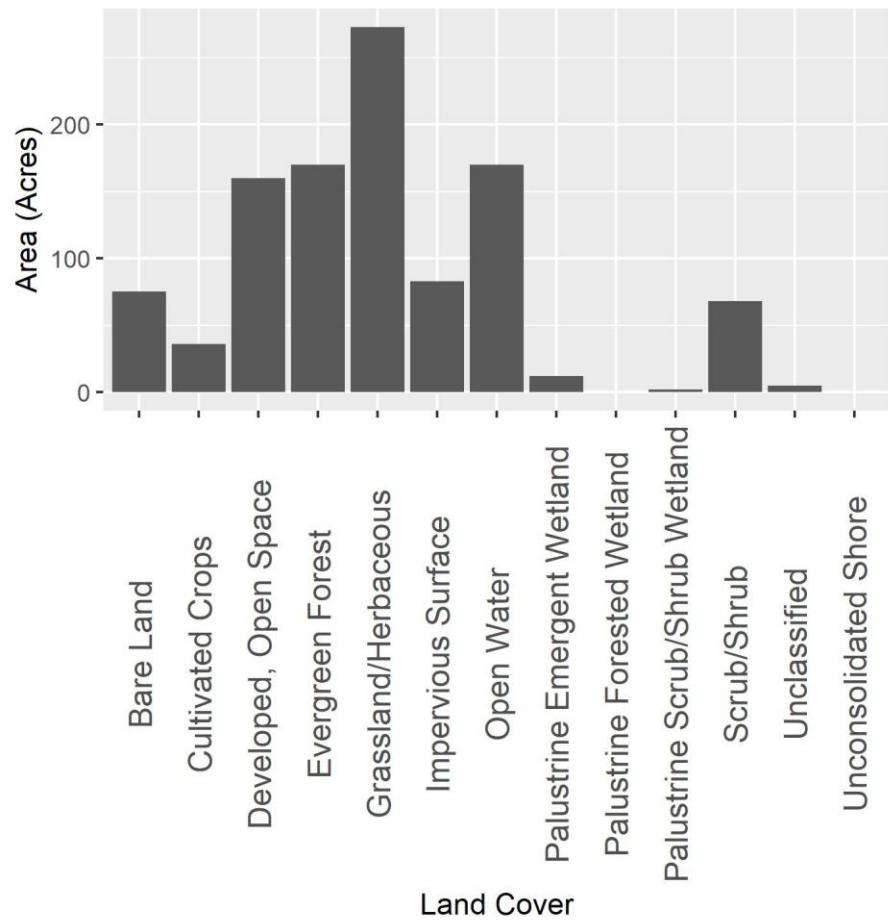
### Rota, 2005, CCAP Land Cover Summary



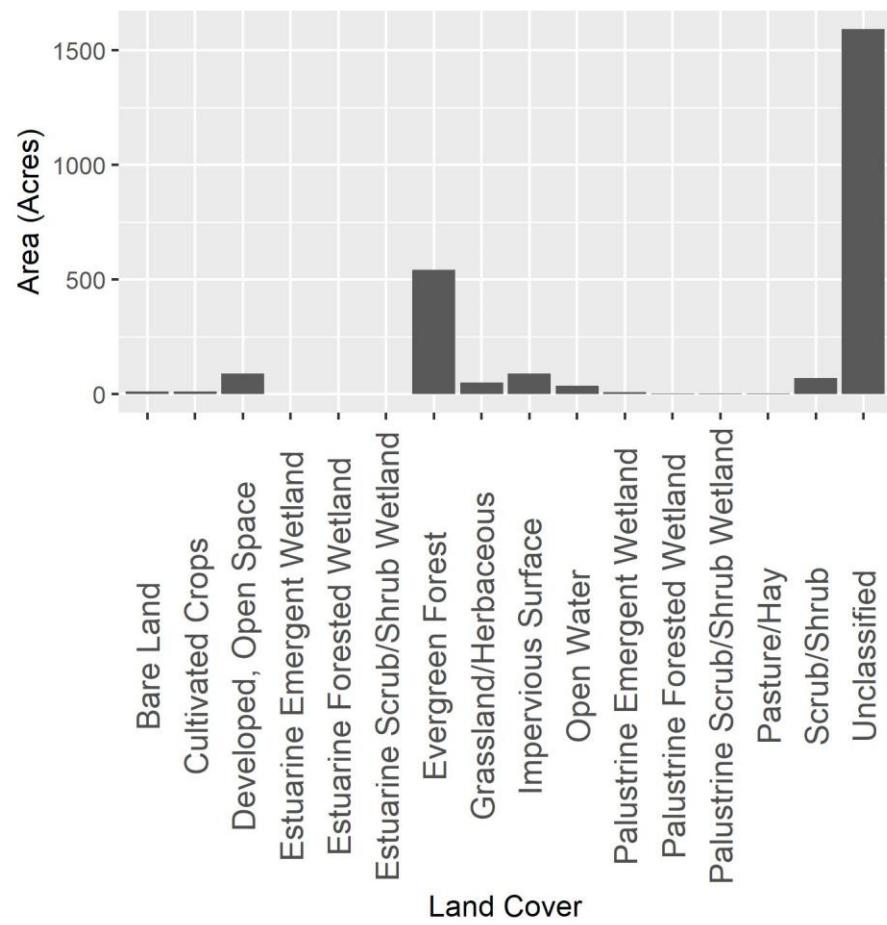
### Rota, 2014, CCAP Land Cover Summary



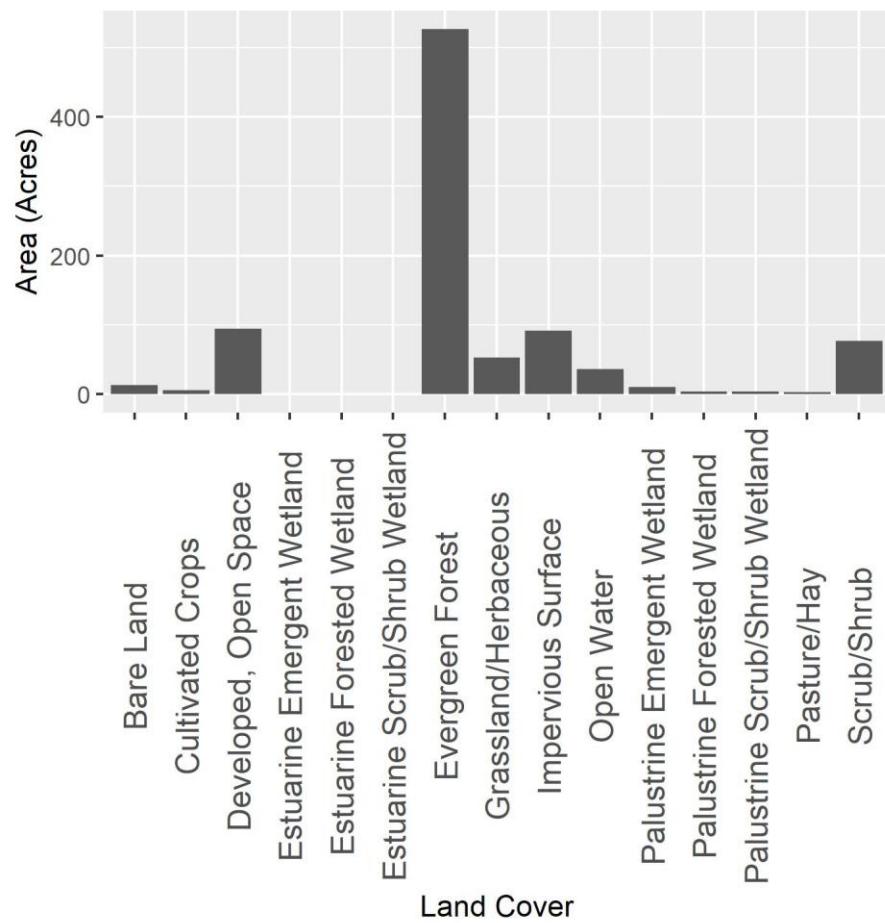
## Saipan, 1945, CCAP Land Cover Summary



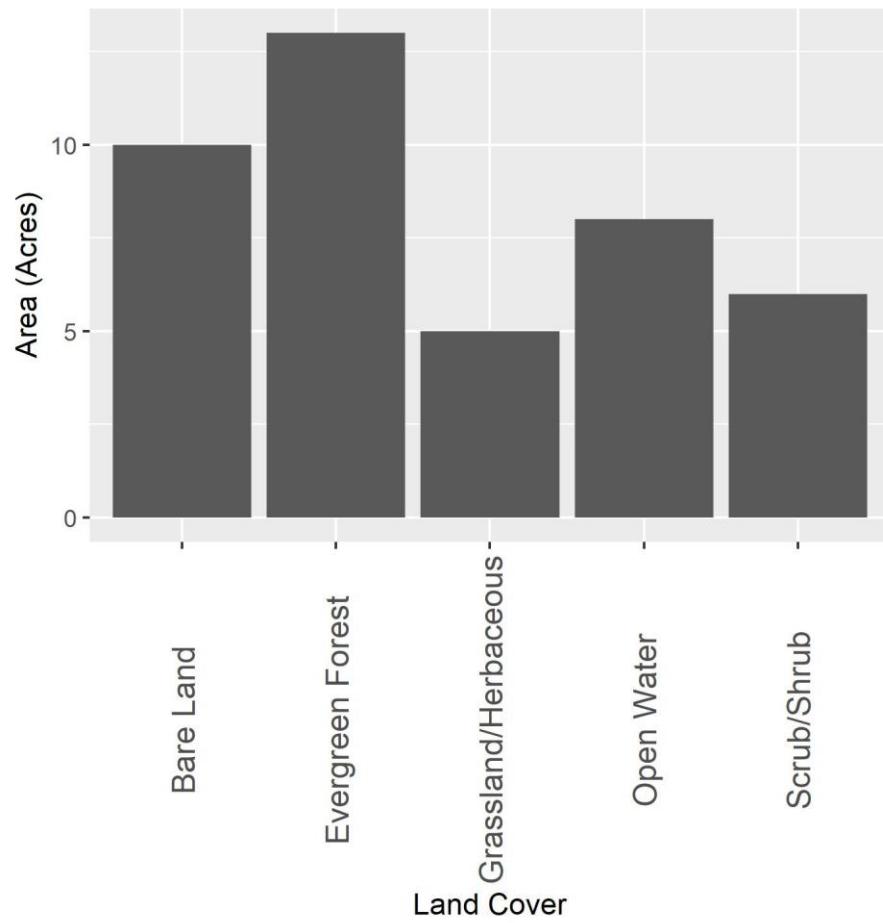
### Saipan, 2005, CCAP Land Cover Summary



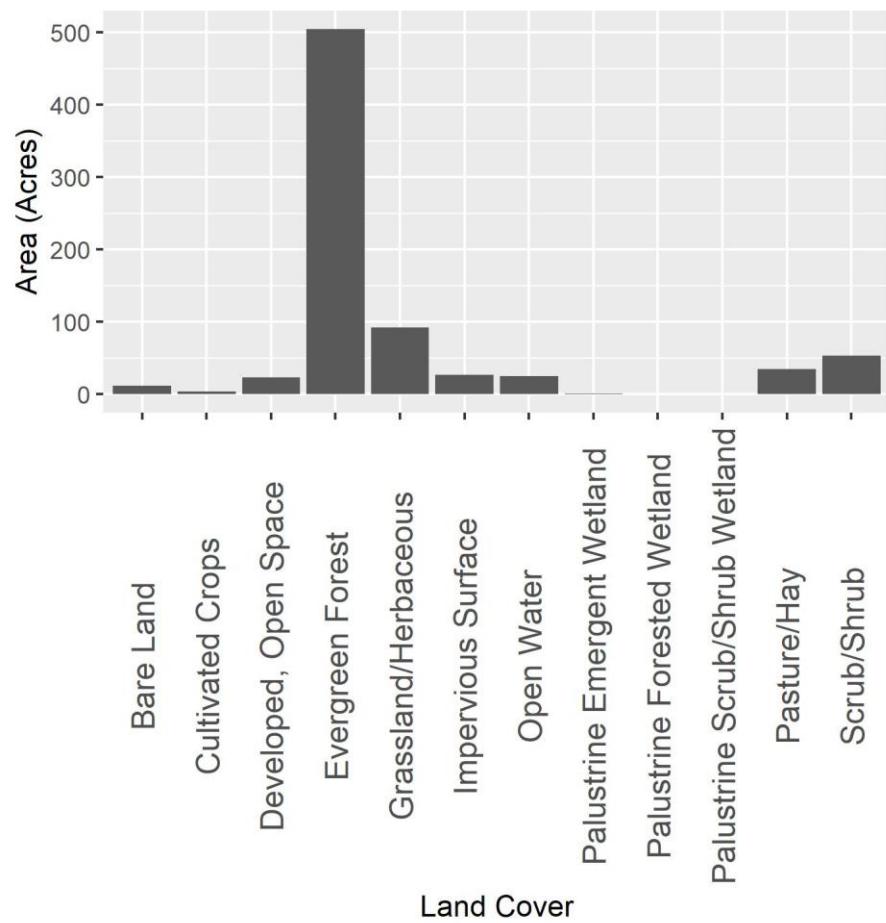
## Saipan, 2016, CCAP Land Cover Summary



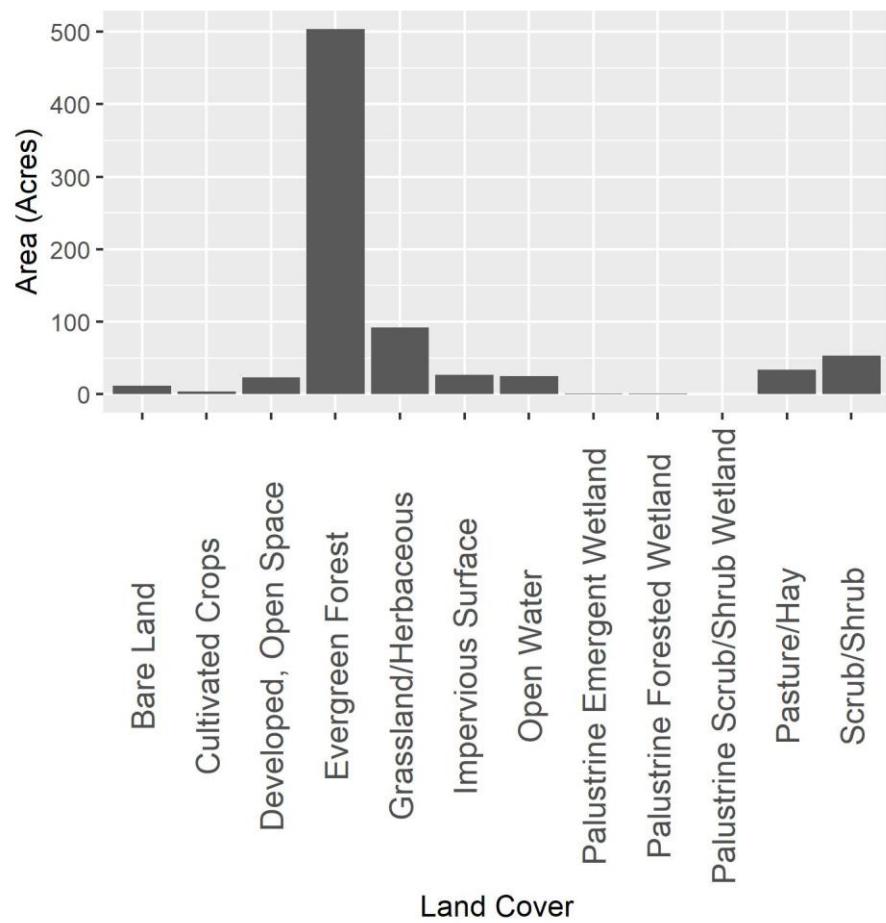
Sarigan, 2006, CCAP Land Cover Summary



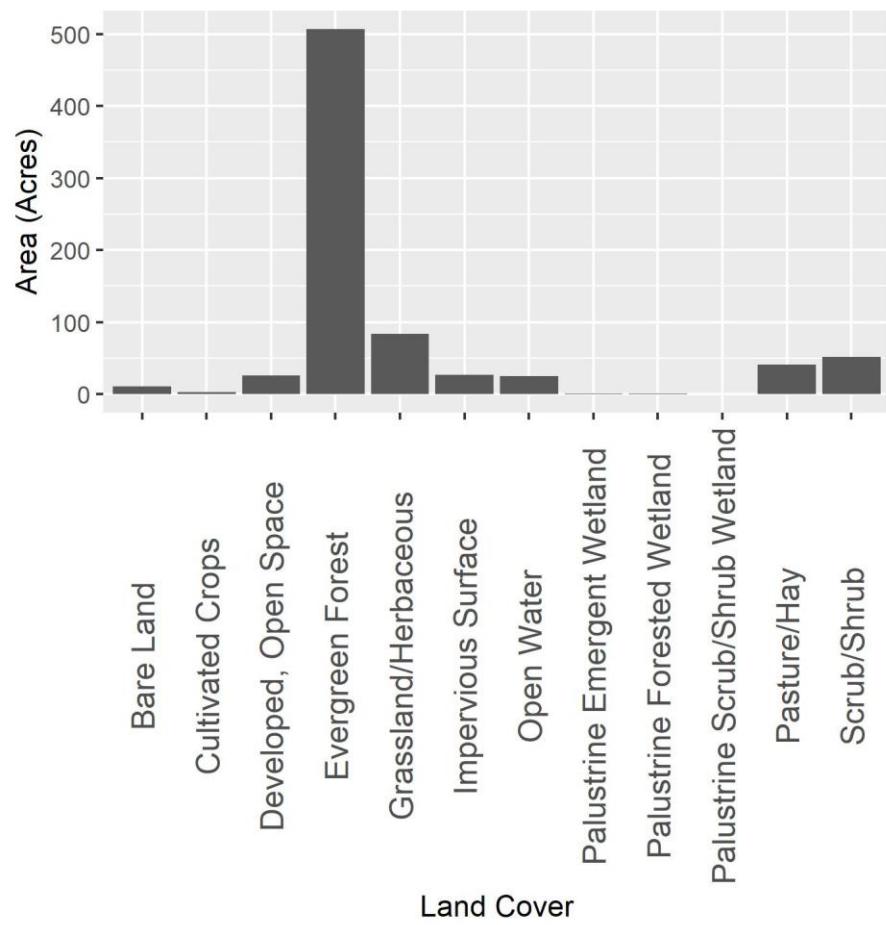
### Tinian, 2005, CCAP Land Cover Summary



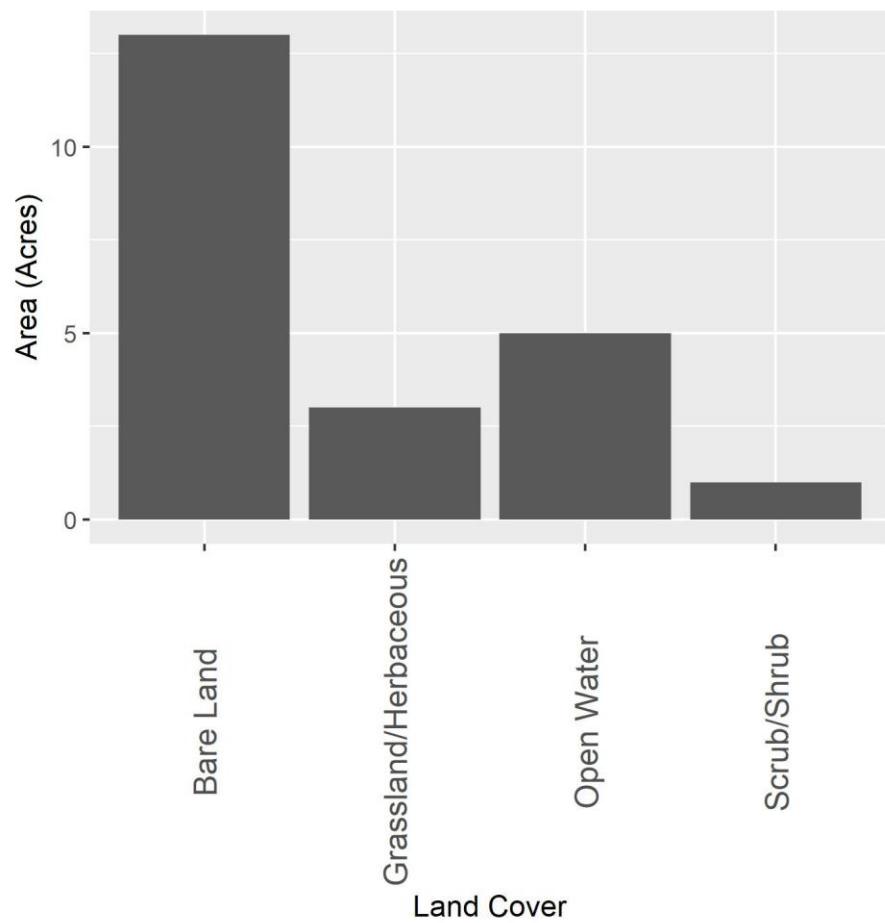
### Tinian, 2006, CCAP Land Cover Summary



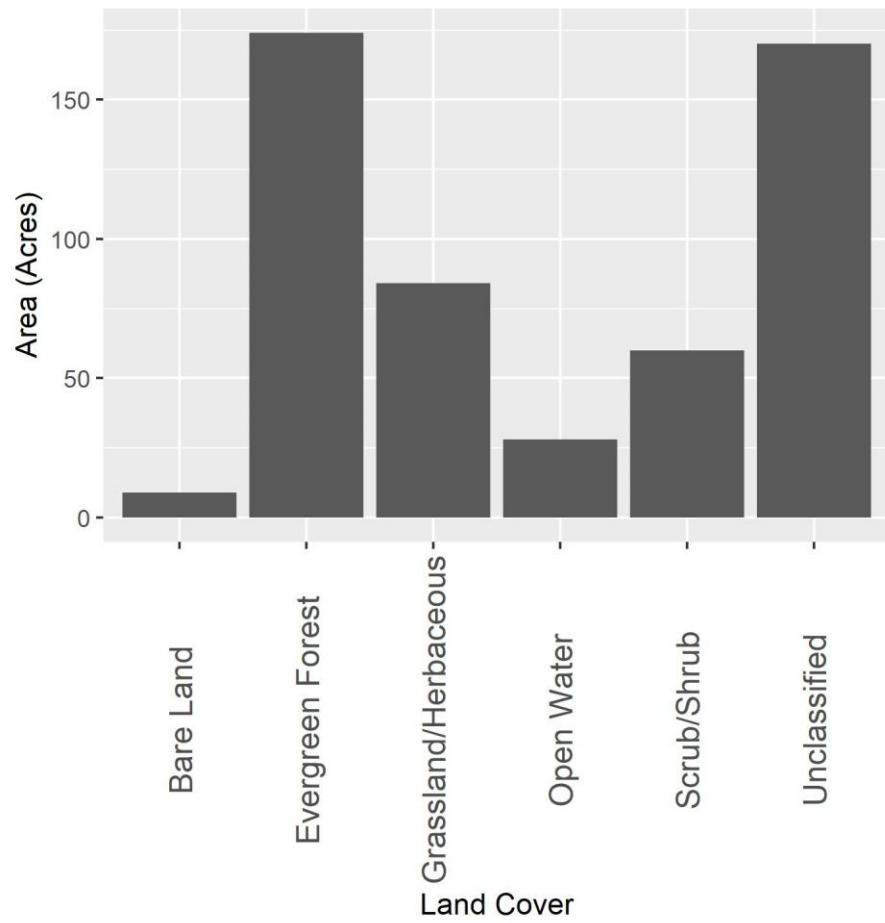
### Tinian, 2014, CCAP Land Cover Summary



Uracus, 2004, CCAP Land Cover Summary



### Agrihan, 2001, CCAP Land Cover Summary



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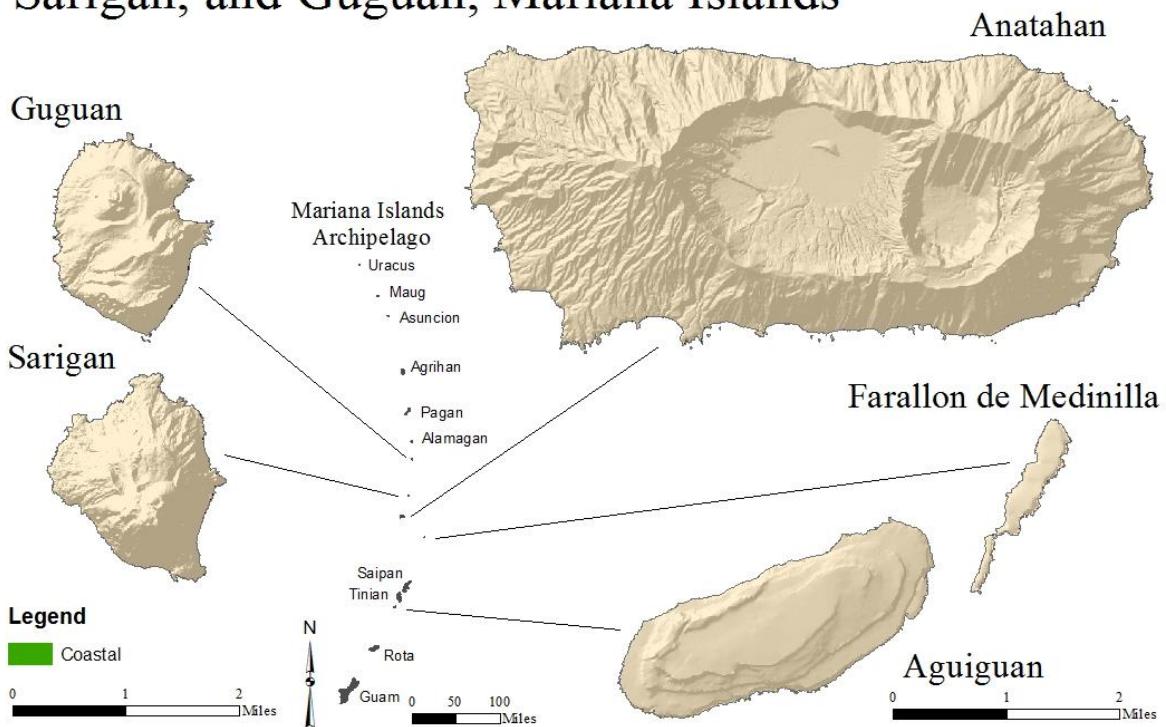
## Appendix A. Marianas Maps

Maps

*Coastal*

## Coastal Habitat

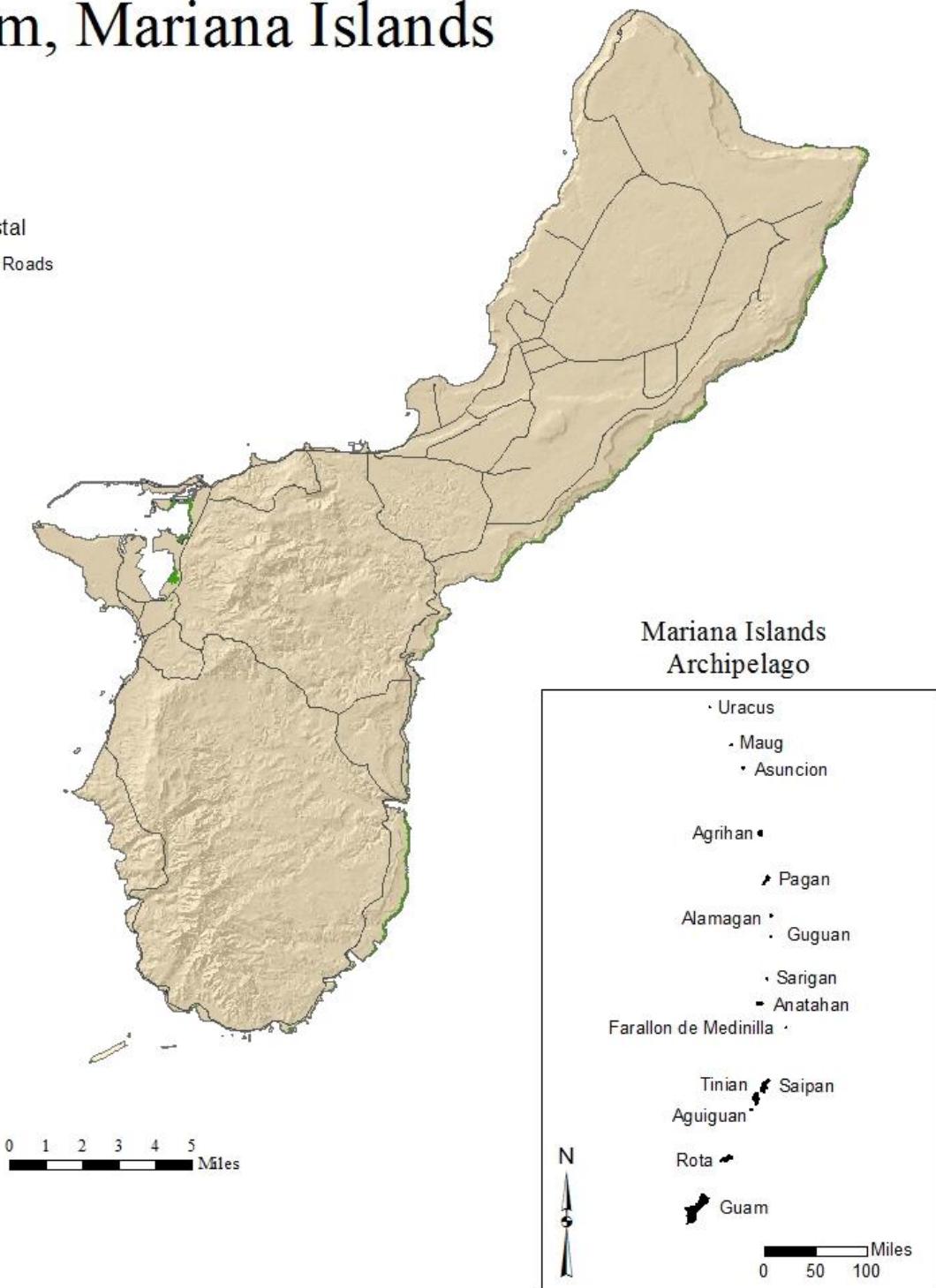
### Aguiguan, Farallon de Medinilla, Anatahan, Sarigan, and Guguan, Mariana Islands



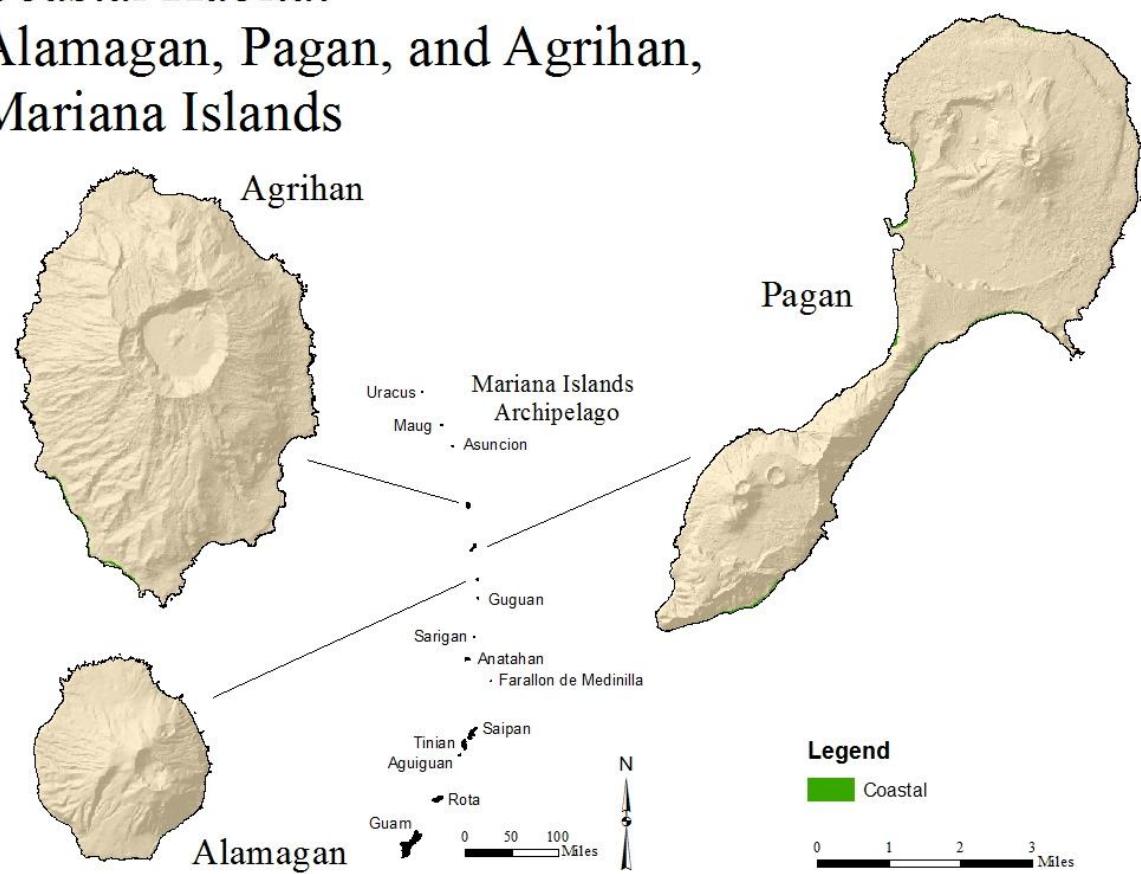
# Coastal Habitat Guam, Mariana Islands

## Legend

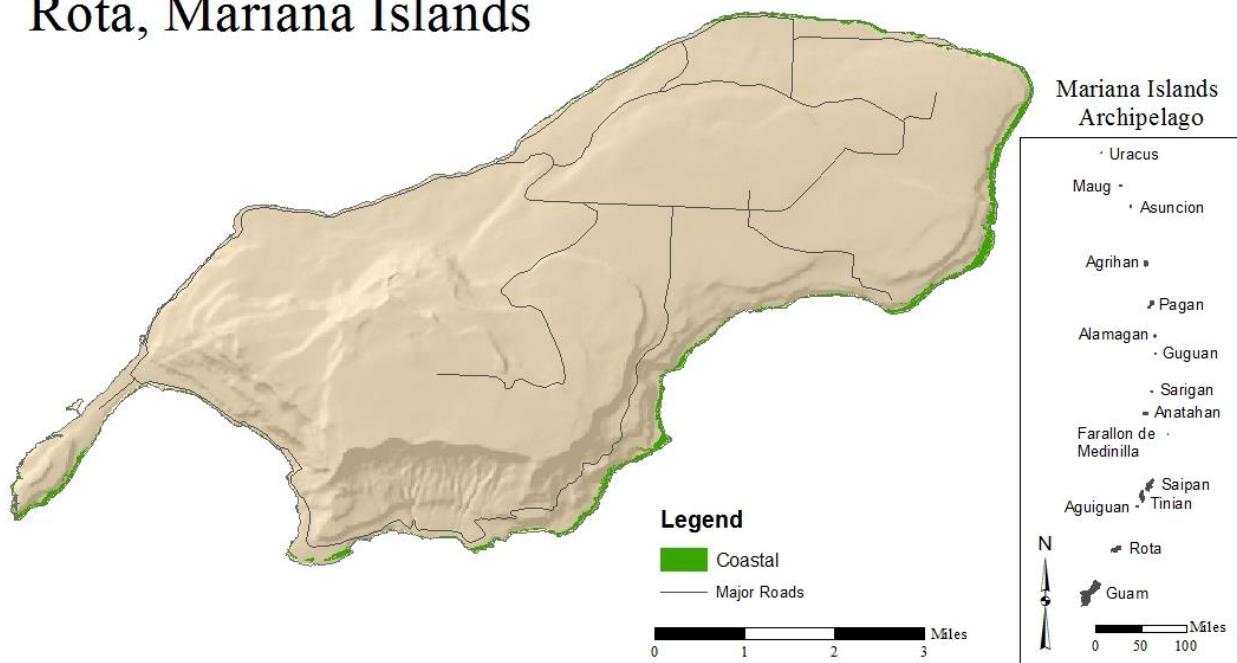
- Coastal
- Major Roads



# Coastal Habitat Alamagan, Pagan, and Agrihan, Mariana Islands



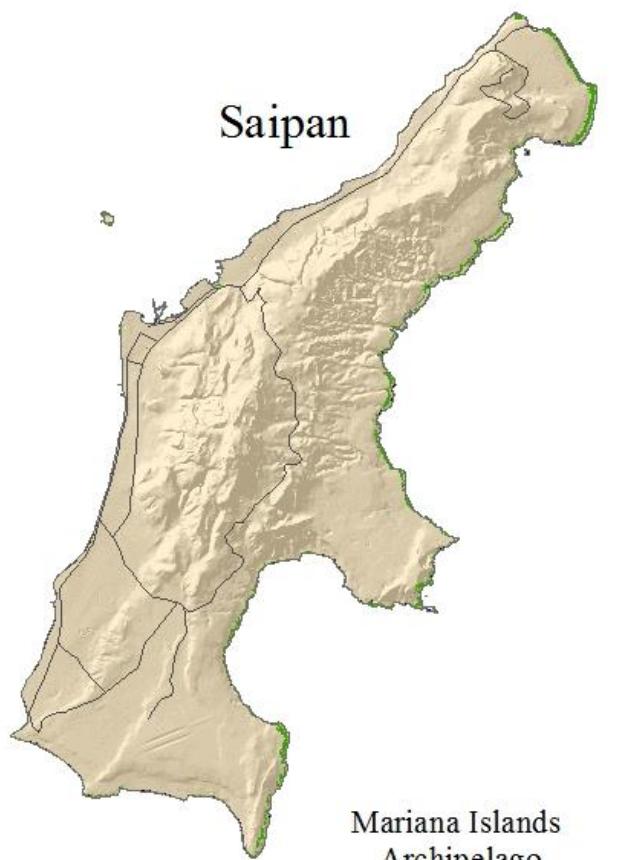
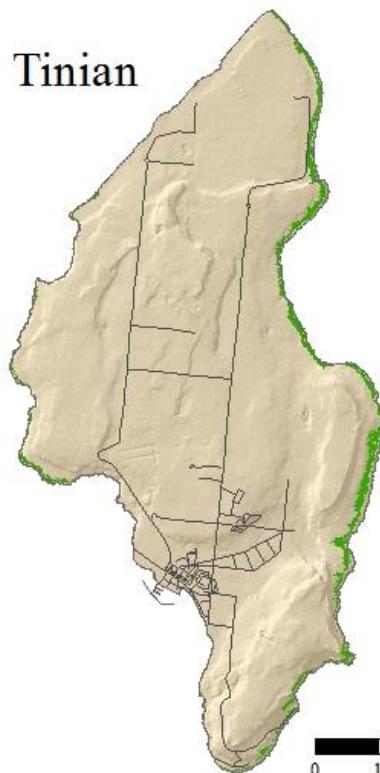
# Coastal Habitat Rota, Mariana Islands



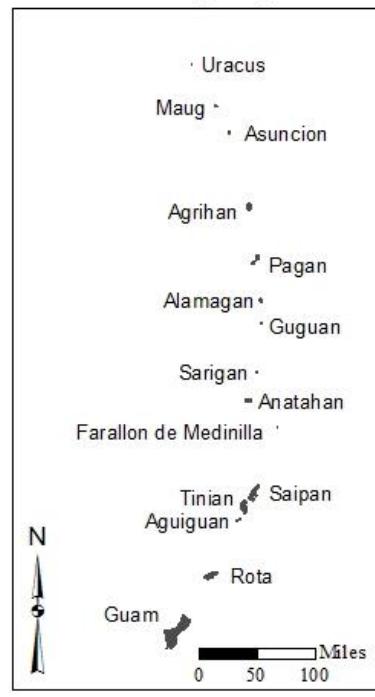
# Coastal Habitat Tinian and Saipan, Mariana Islands

## Legend

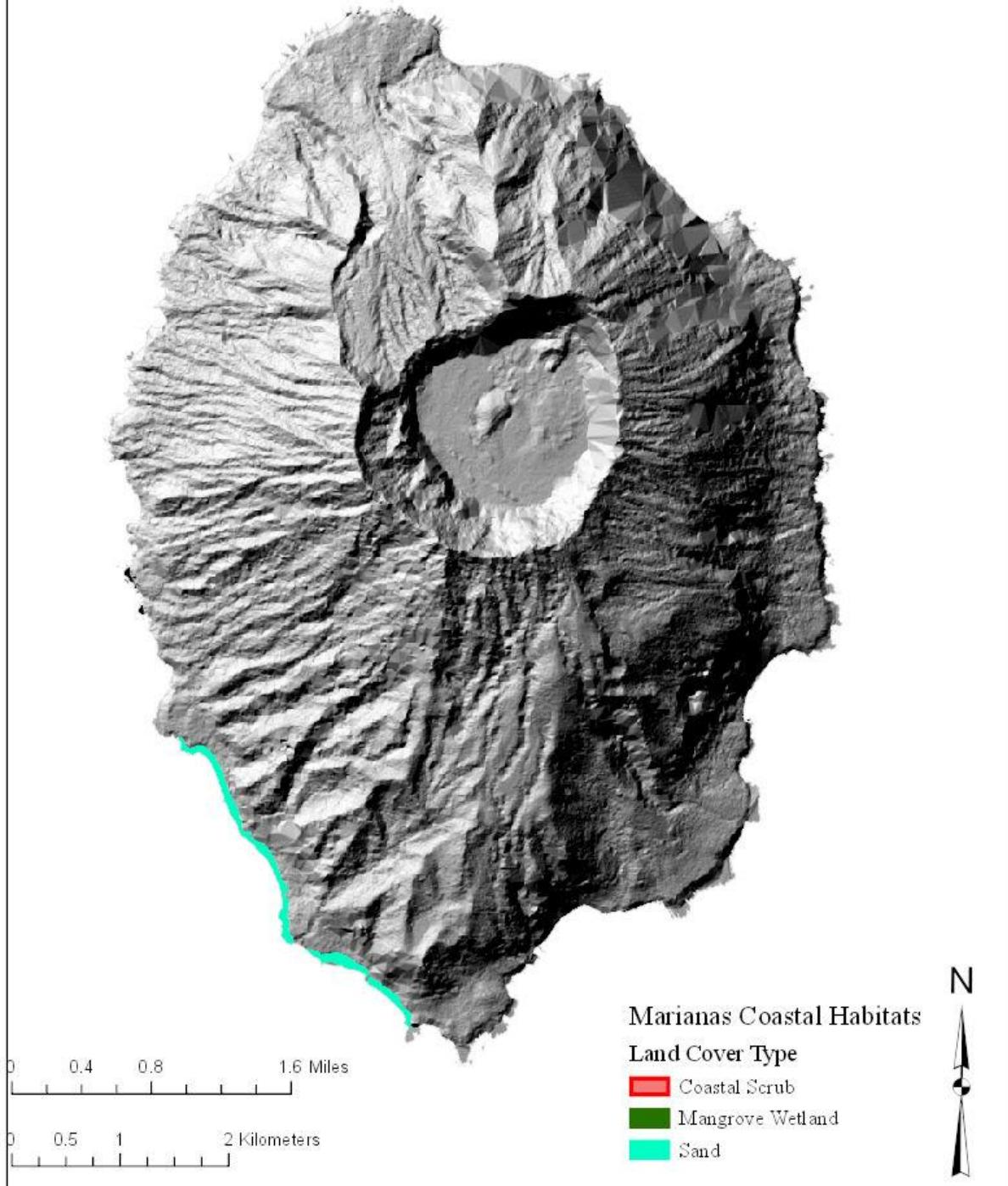
- Coastal
- Major Roads



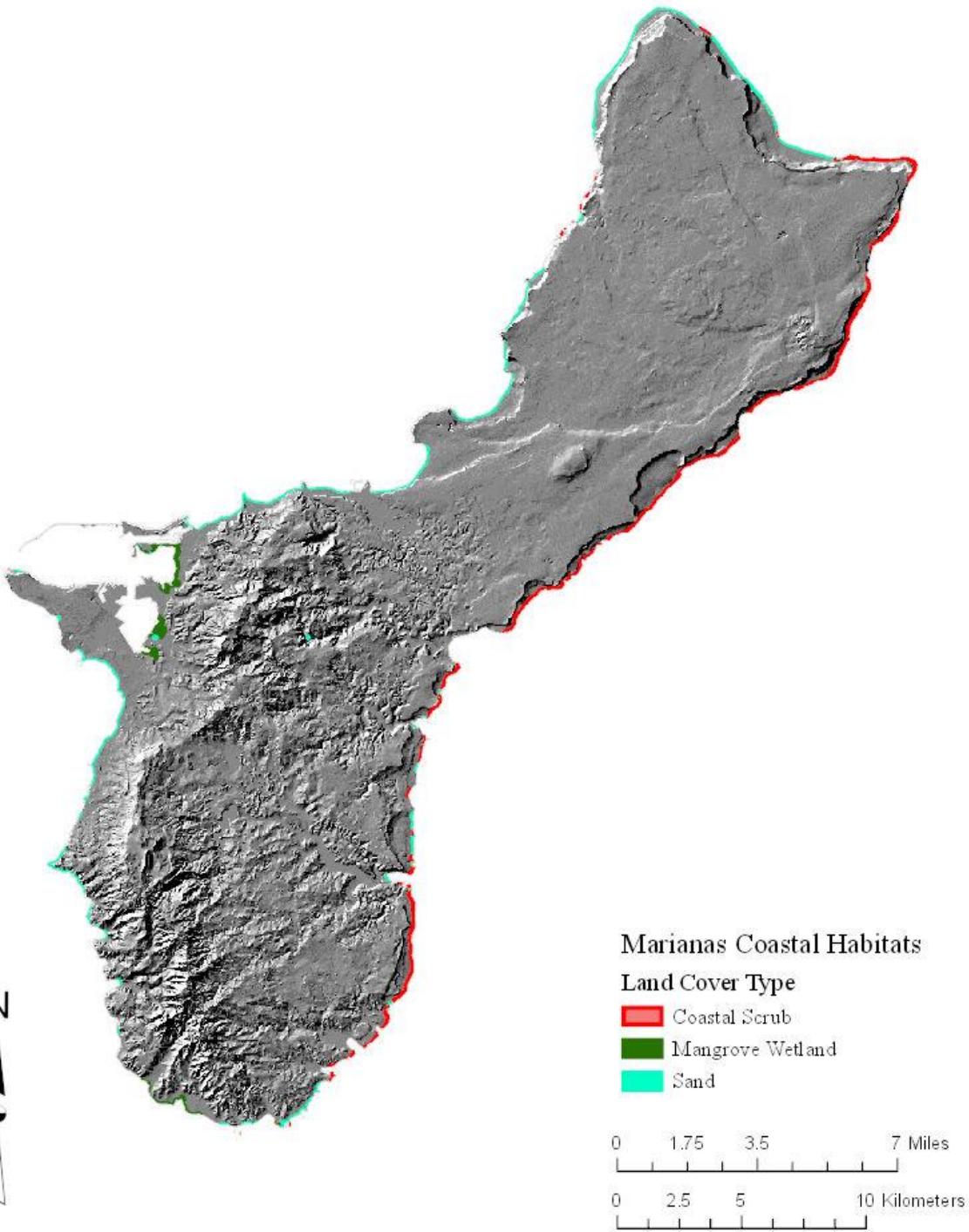
Mariana Islands  
Archipelago



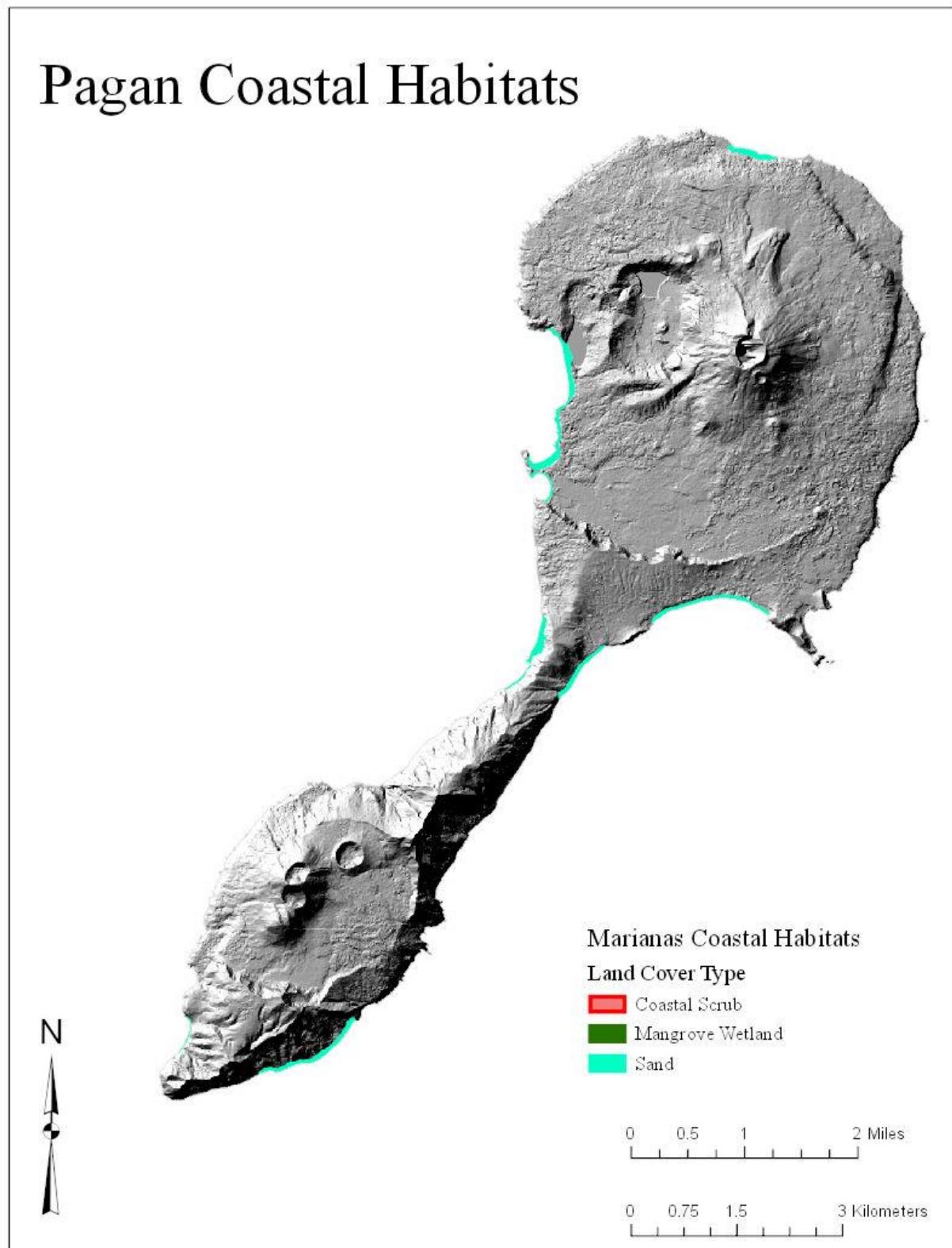
# Agrihan Coastal Habitats



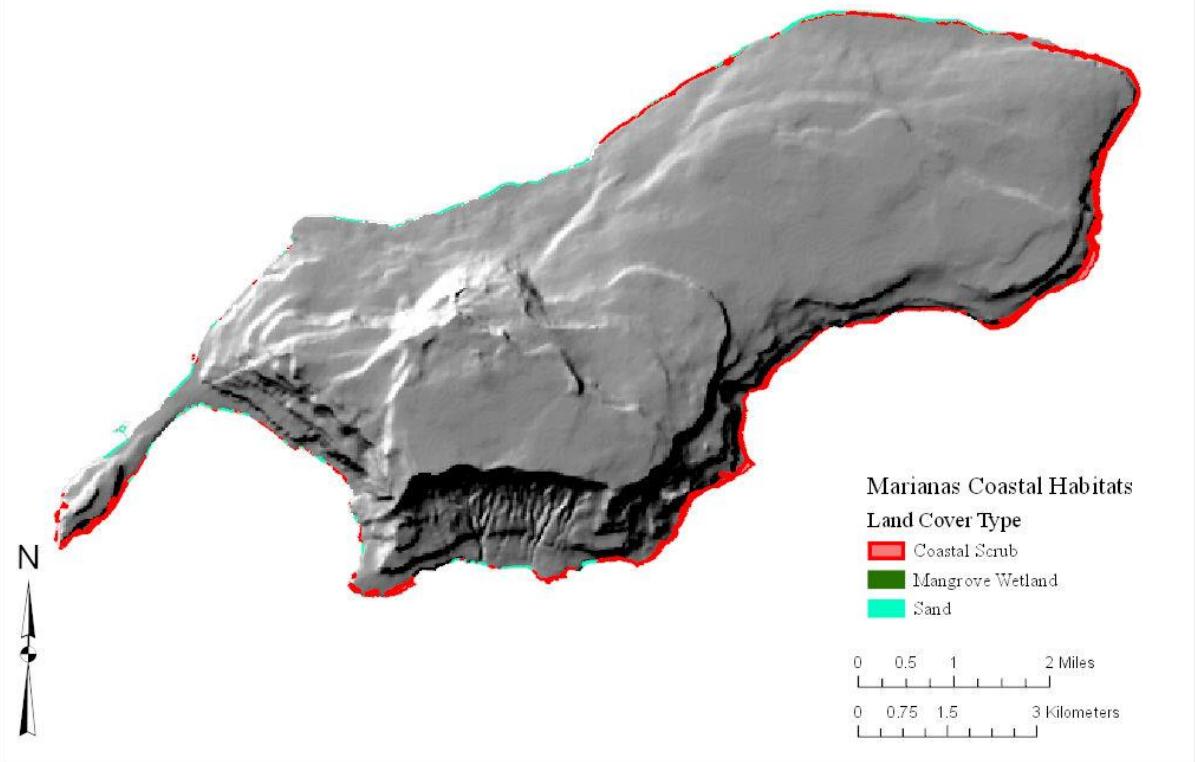
# Guam Coastal Habitats



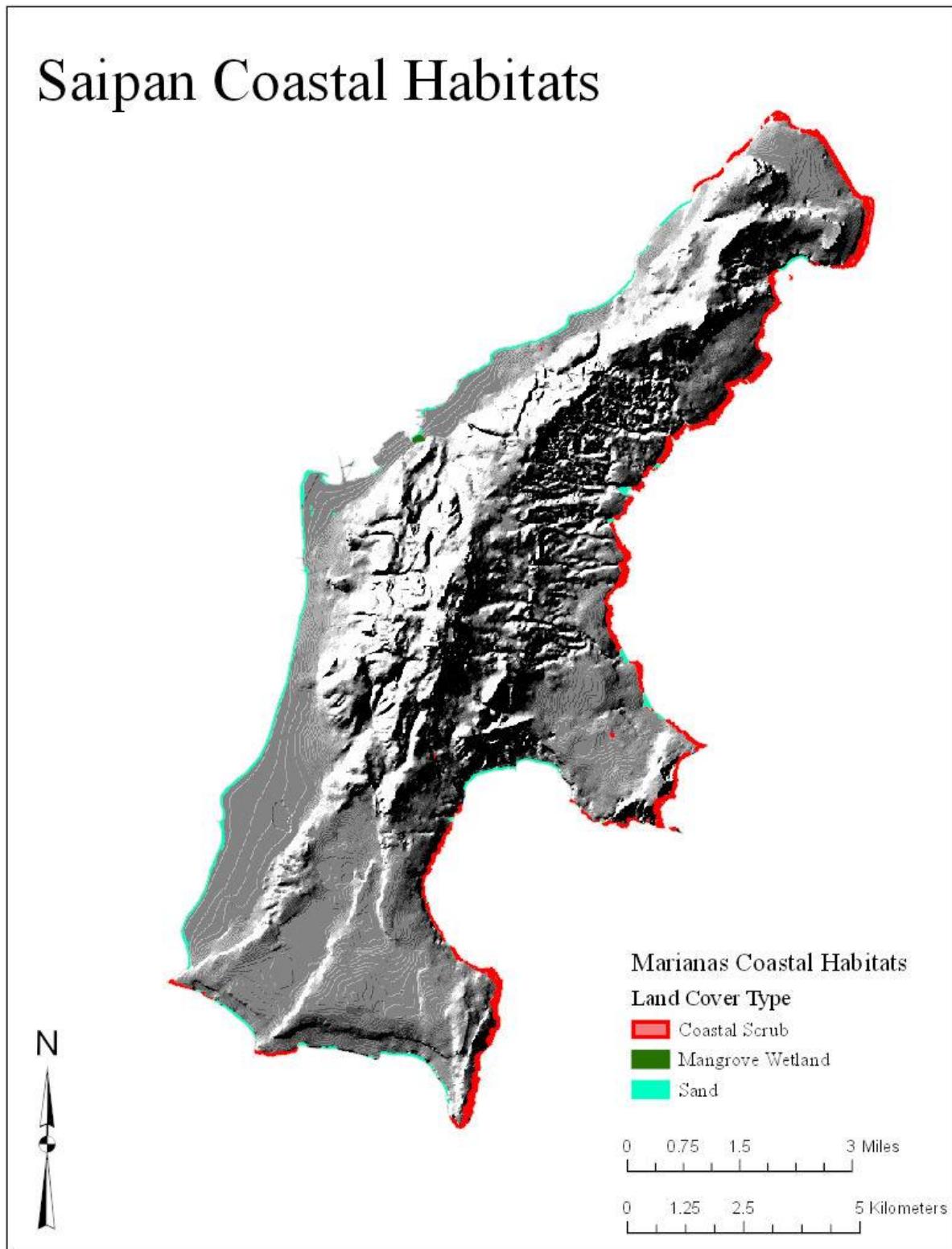
# Pagan Coastal Habitats



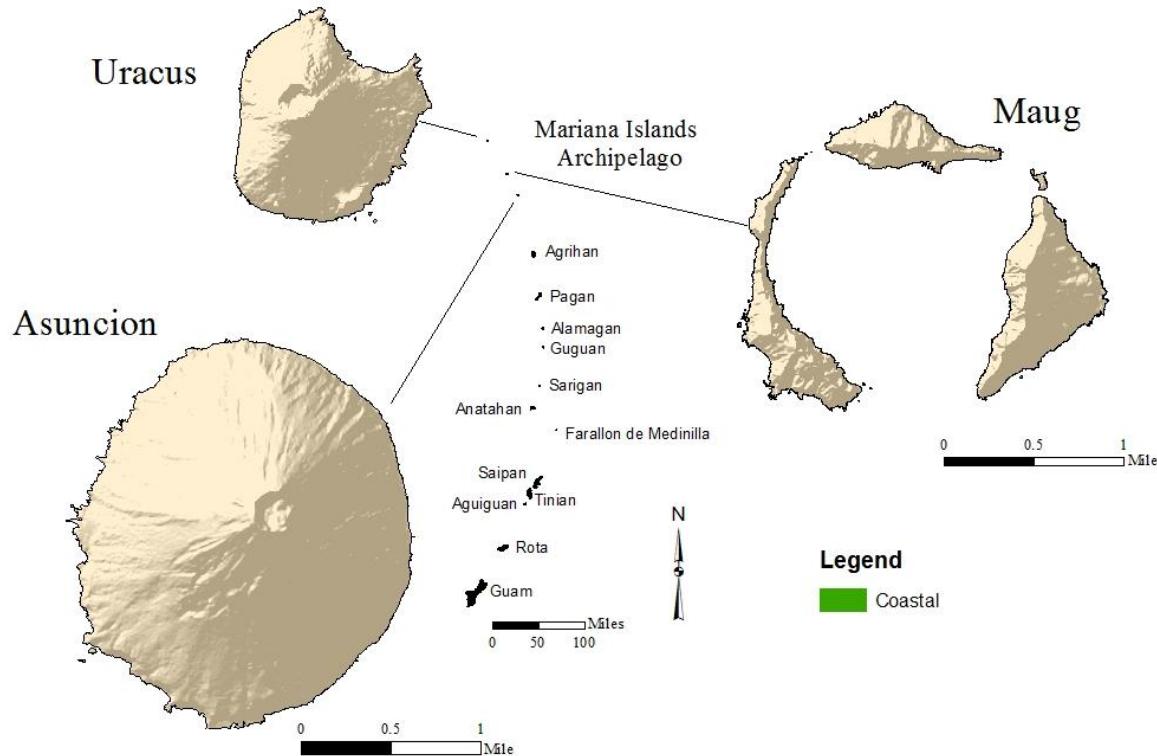
## Rota Coastal Habitats



# Saipan Coastal Habitats



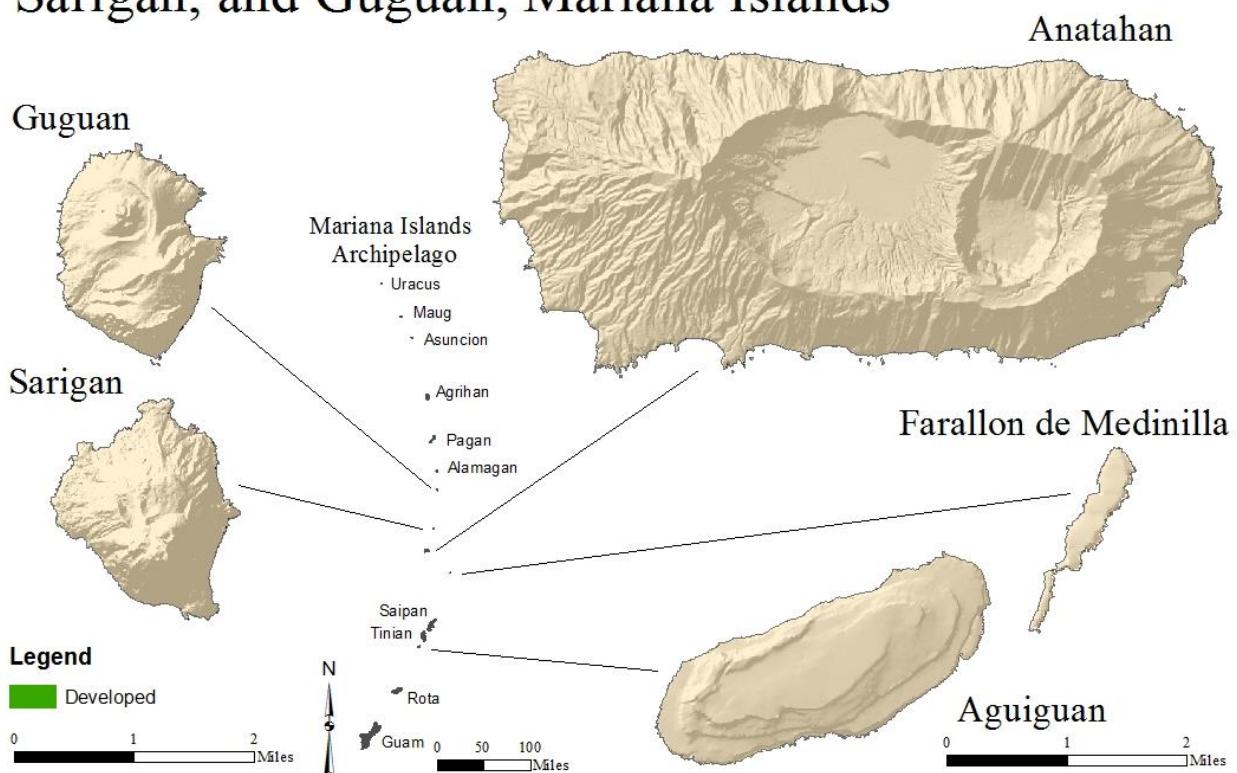
# Coastal Habitat Asuncion, Maug, and Uracus, Mariana Islands



*Developed*

## Developed Habitat

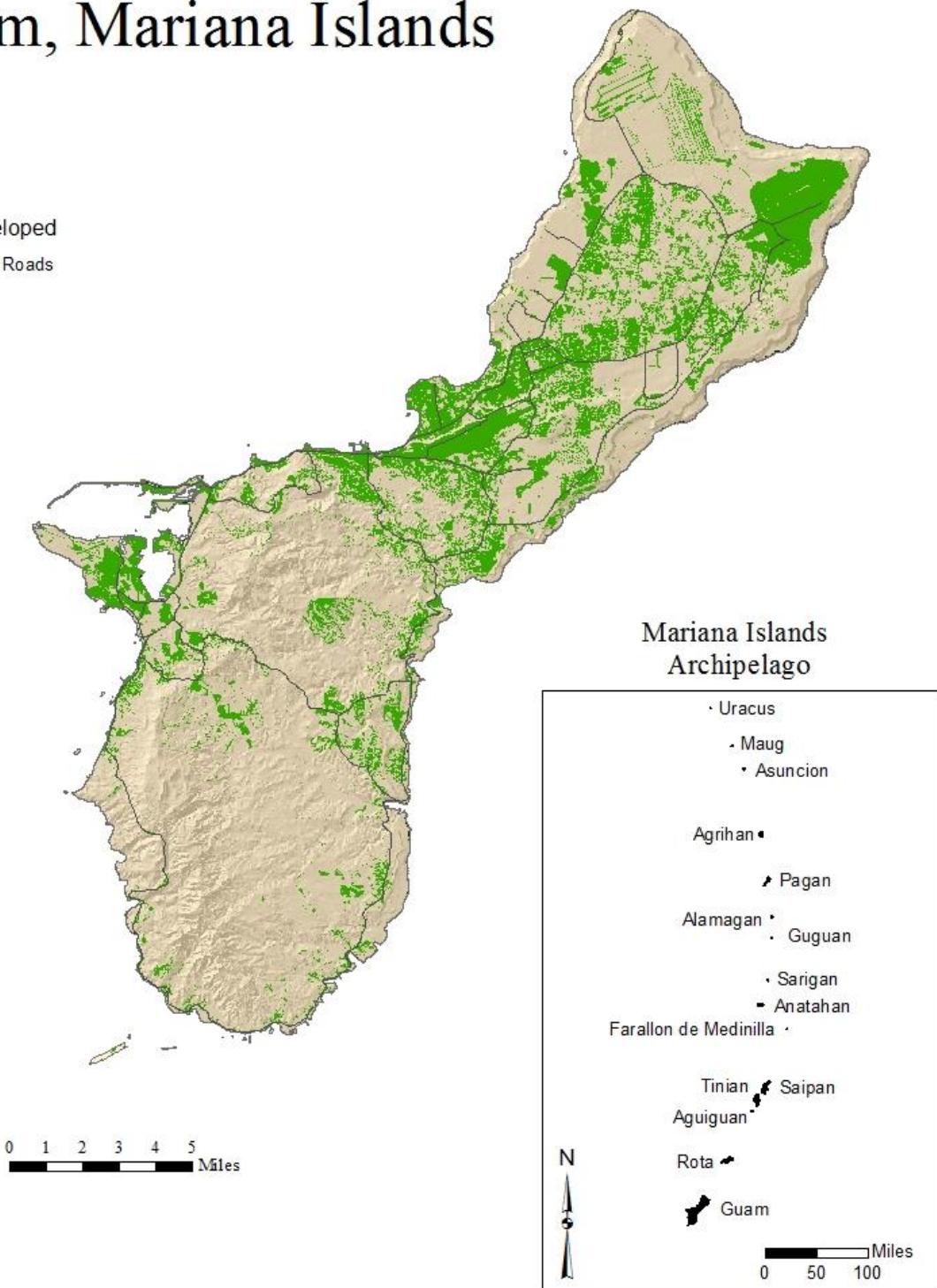
Aguiguan, Farallon de Medinilla, Anatahan,  
Sarigan, and Guguan, Mariana Islands



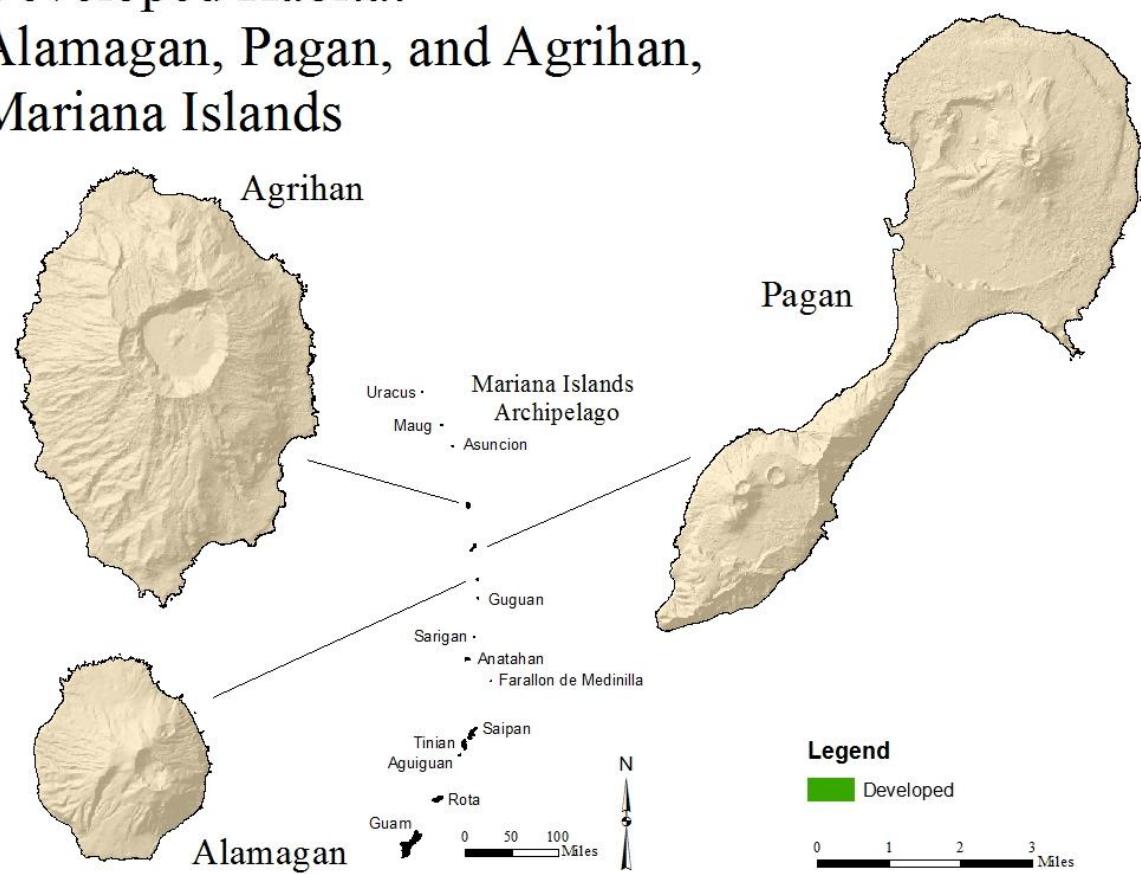
# Developed Habitat Guam, Mariana Islands

## Legend

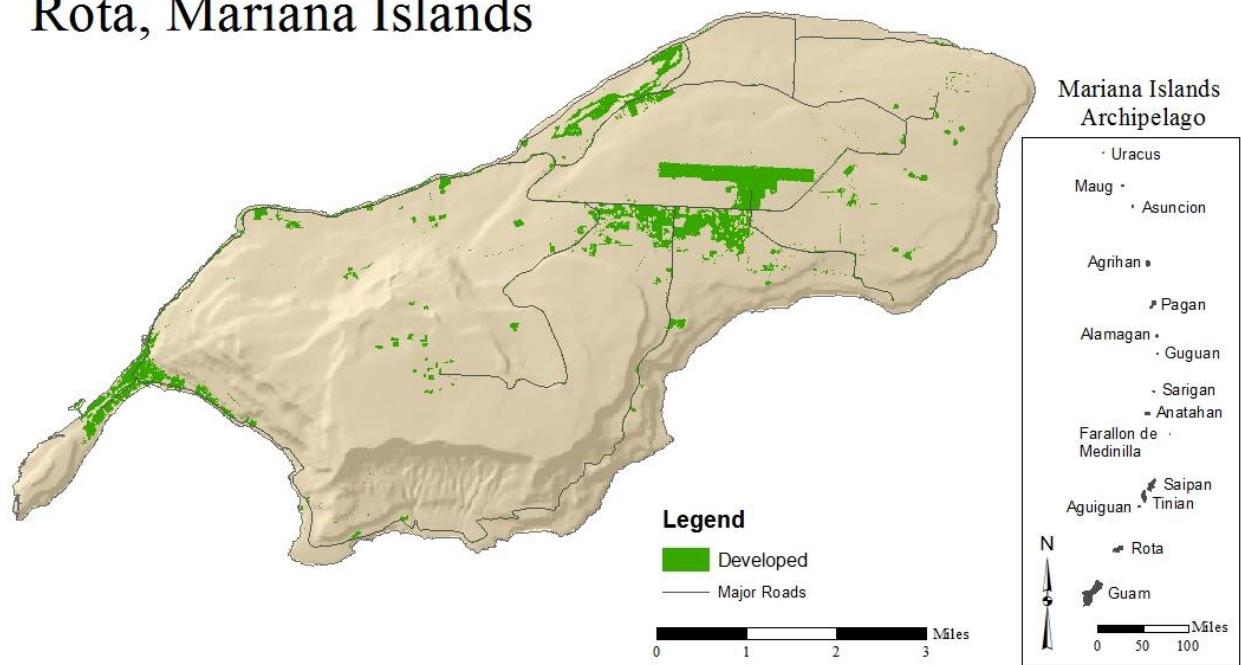
- Developed
- Major Roads



# Developed Habitat Alamagan, Pagan, and Agrihan, Mariana Islands



# Developed Habitat Rota, Mariana Islands

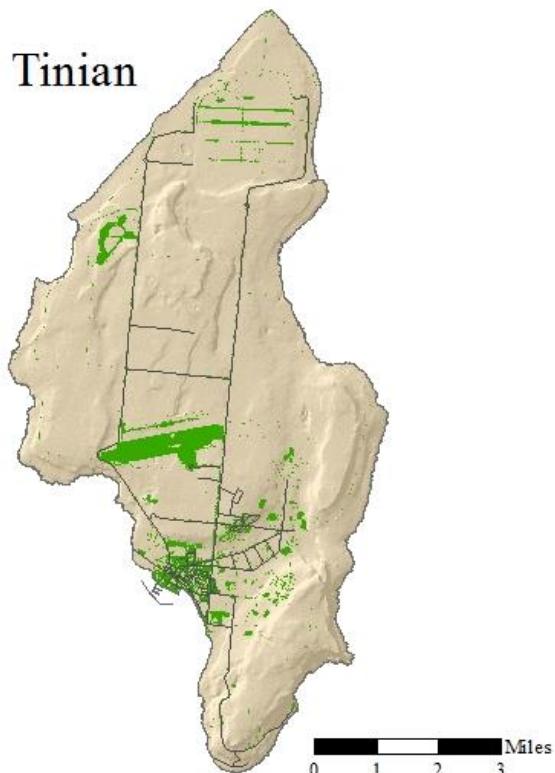


# Developed Habitat Tinian and Saipan, Mariana Islands

## Legend

- Developed
- Major Roads

Tinian



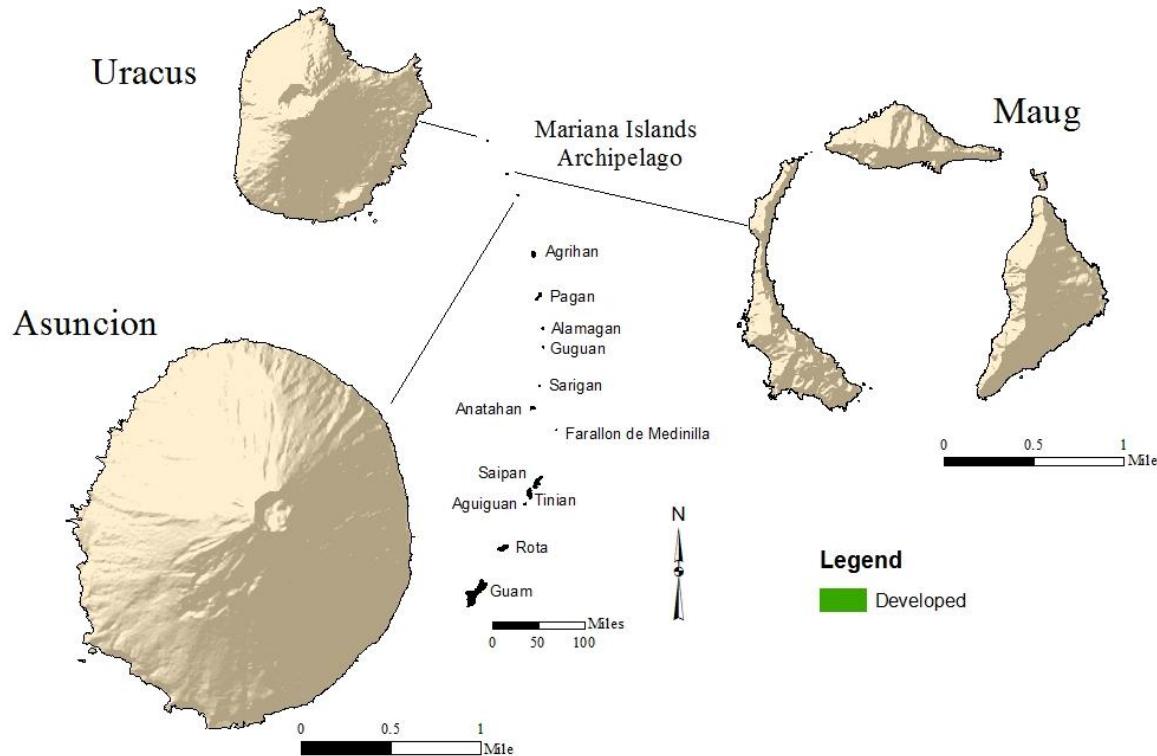
Saipan



Mariana Islands  
Archipelago

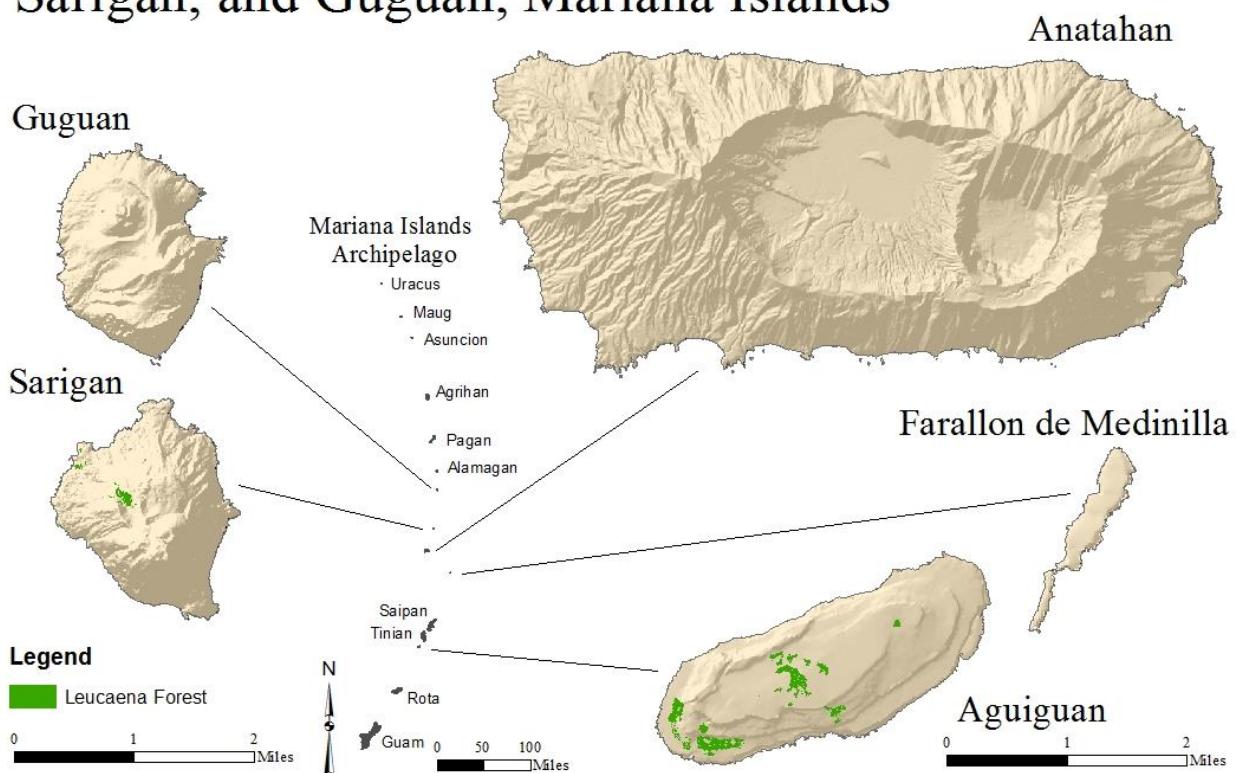


# Developed Habitat Asuncion, Maug, and Uracus, Mariana Islands



*Leucaena Forest*

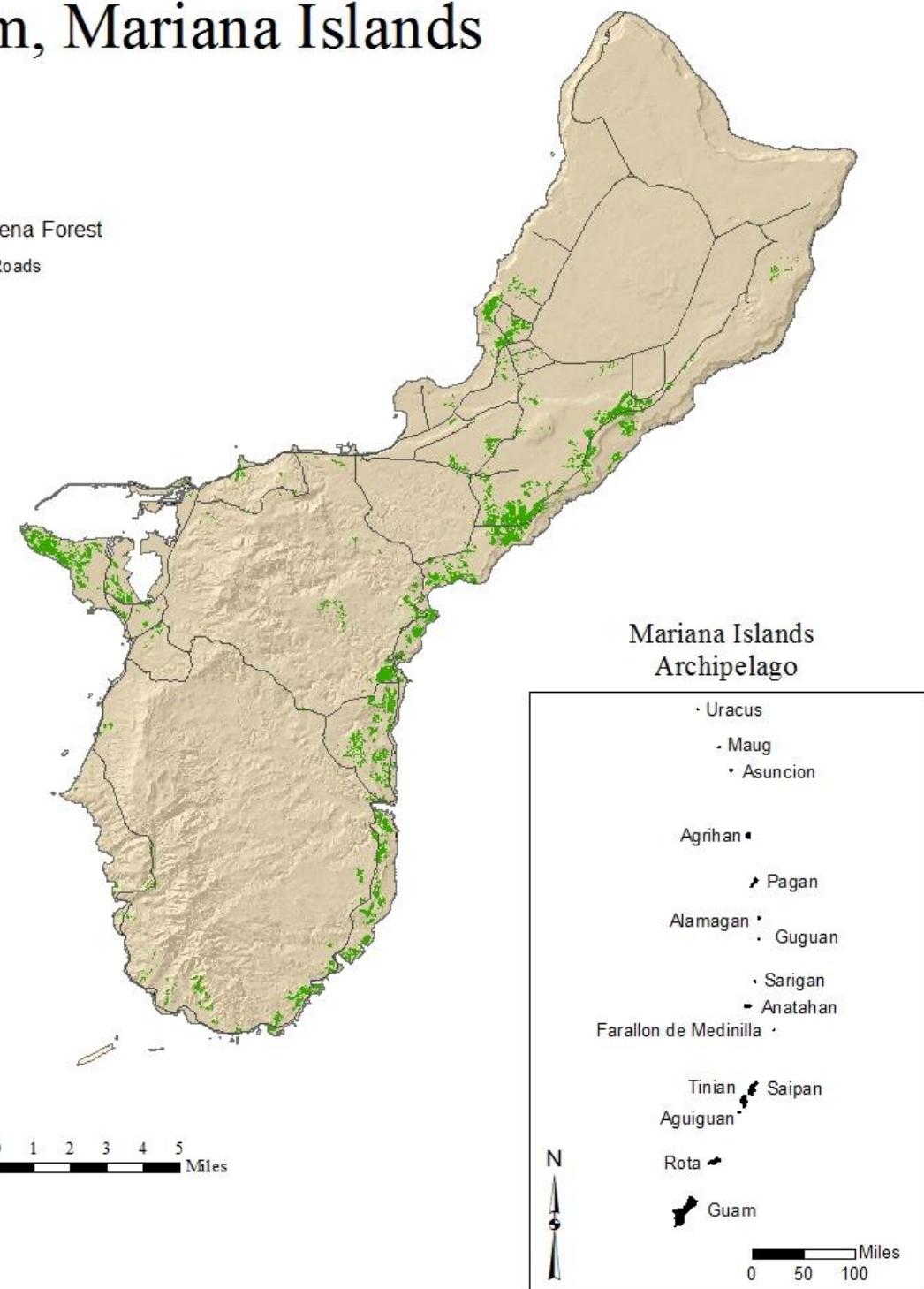
# Leucaena Forest Habitat Aguiguan, Farallon de Medinilla, Anatahan, Sarigan, and Guguan, Mariana Islands



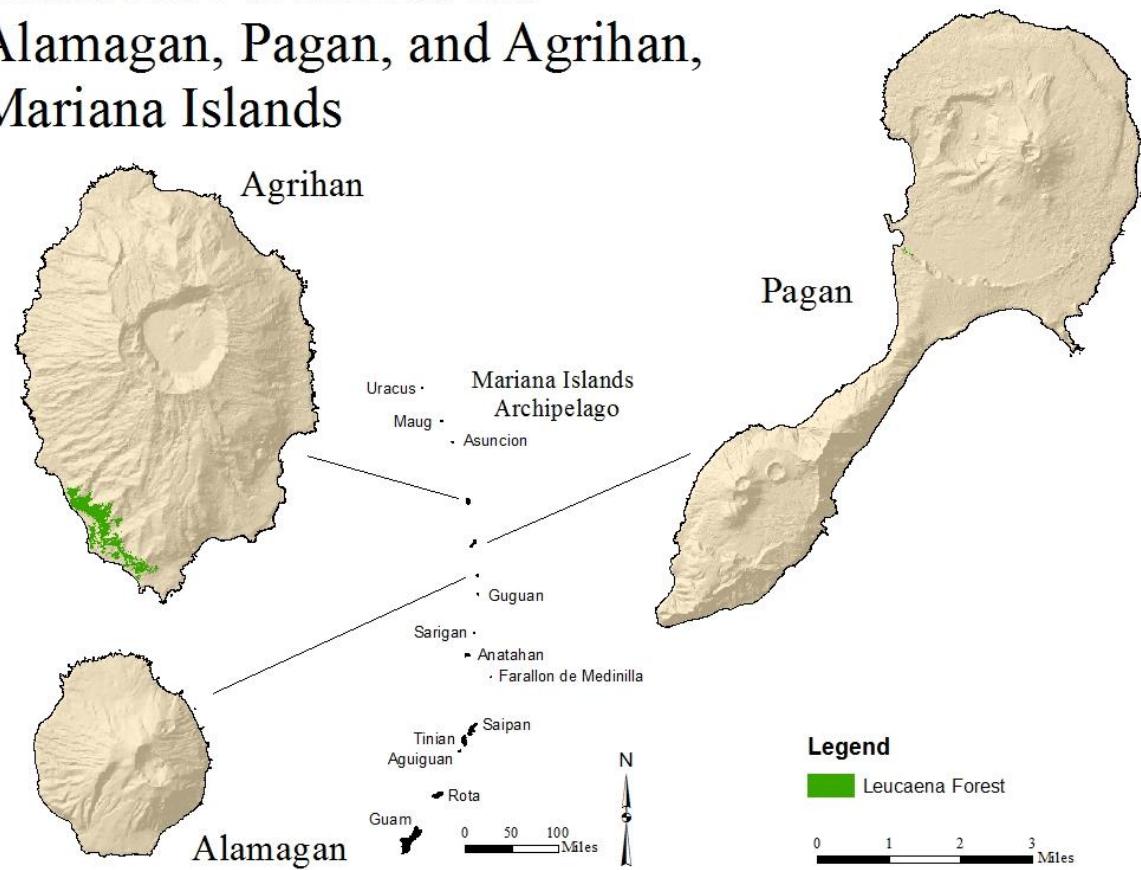
# Leucaena Forest Habitat Guam, Mariana Islands

## Legend

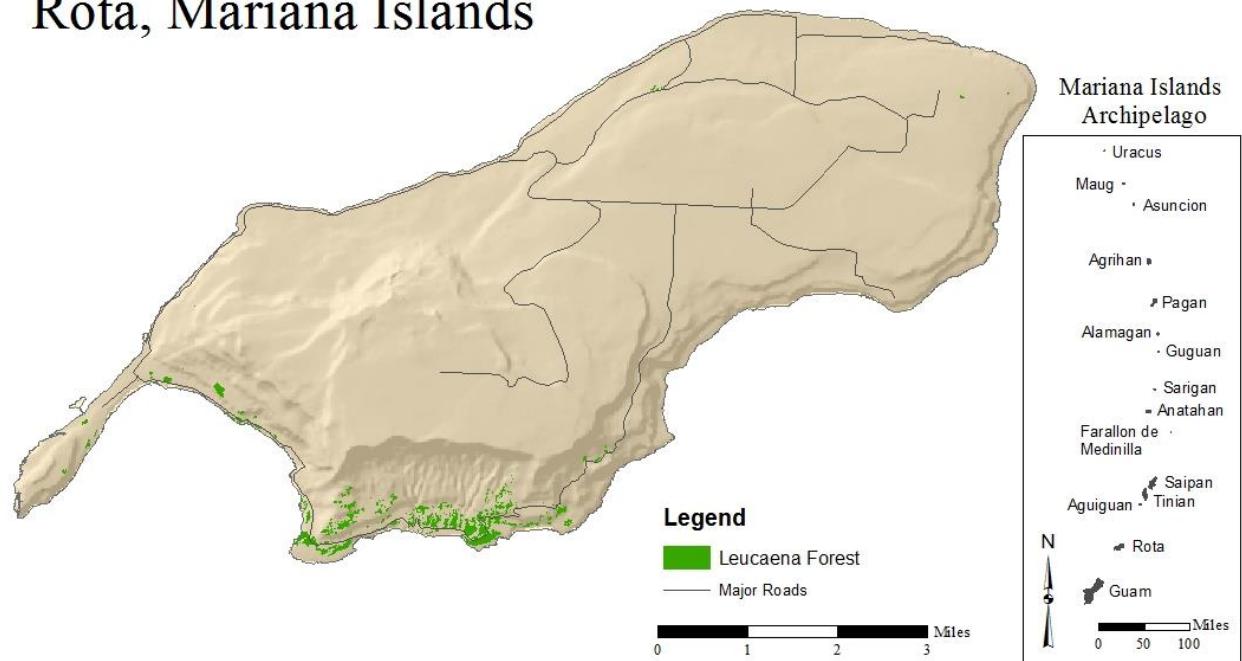
- Leucaena Forest
- Major Roads



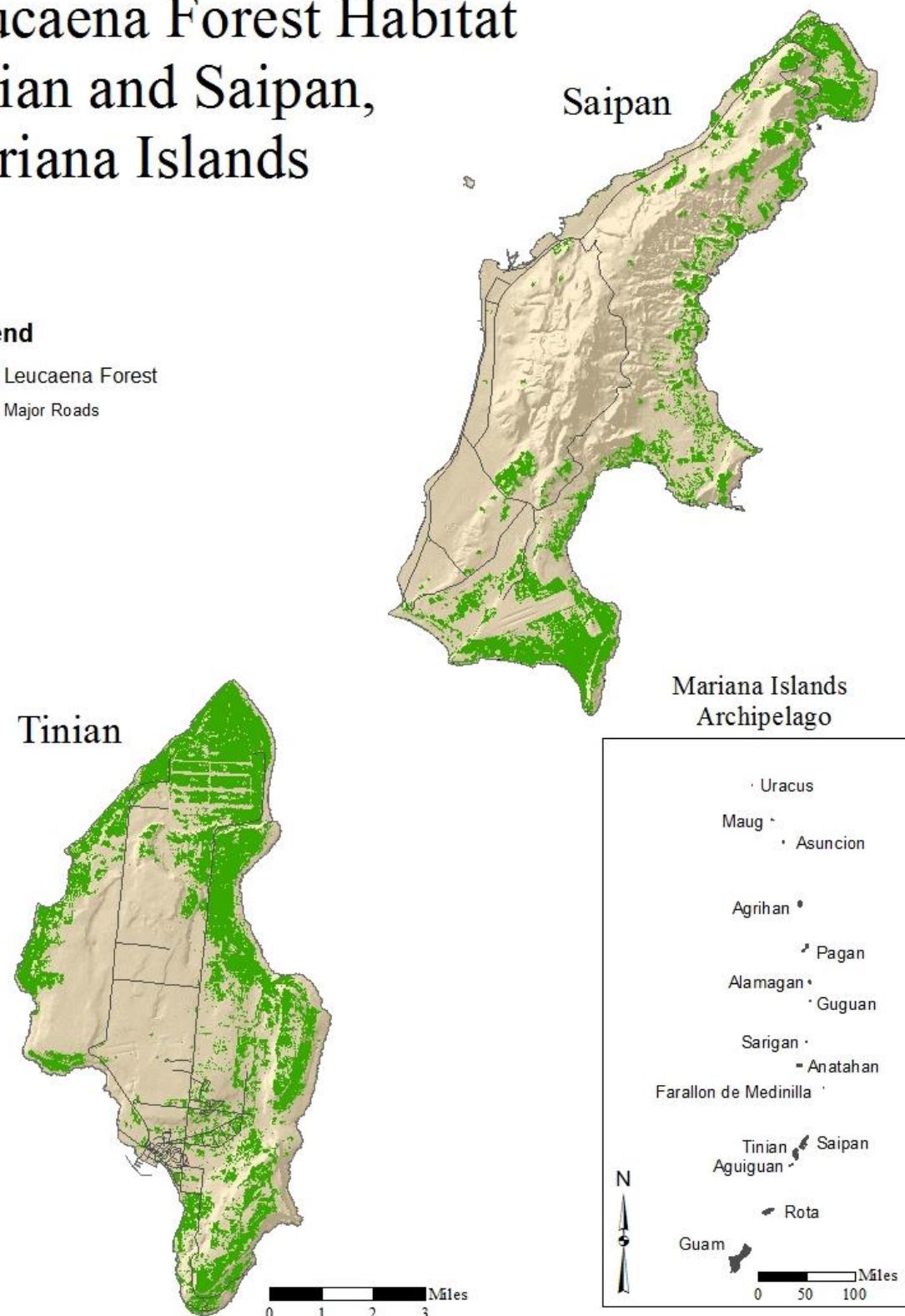
# Leucaena Forest Habitat Alamagan, Pagan, and Agrihan, Mariana Islands



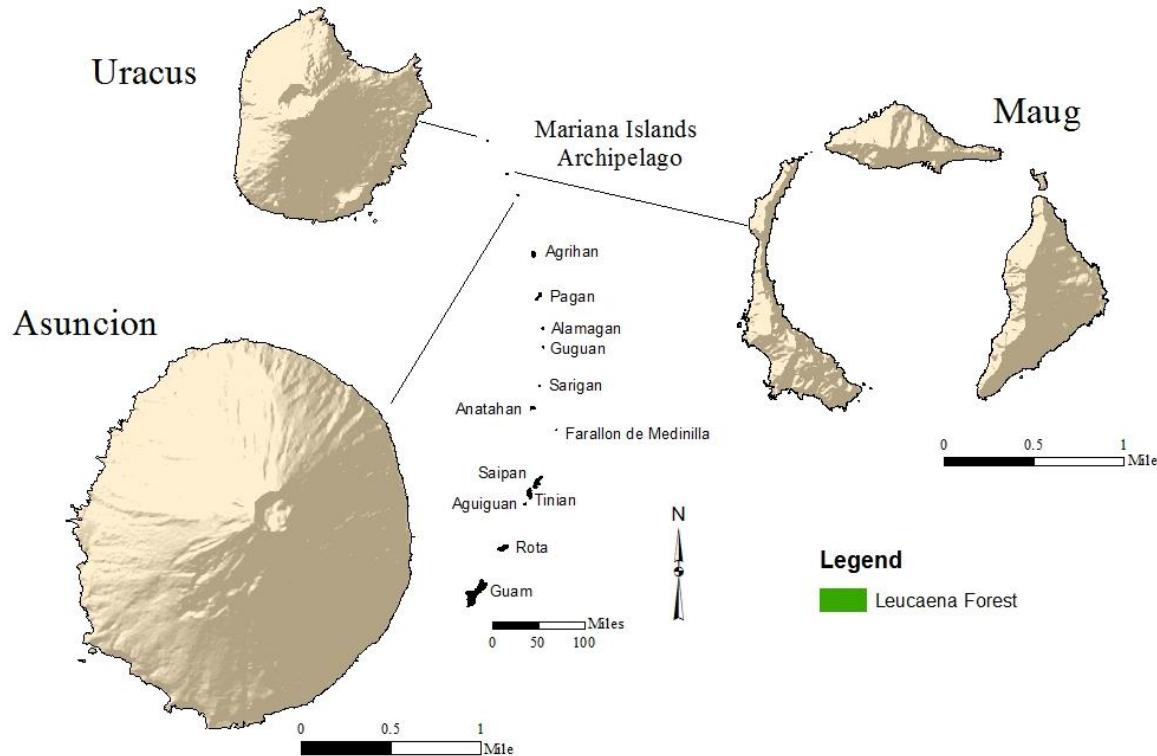
# Leucaena Forest Habitat Rota, Mariana Islands



# Leucaena Forest Habitat Tinian and Saipan, Mariana Islands

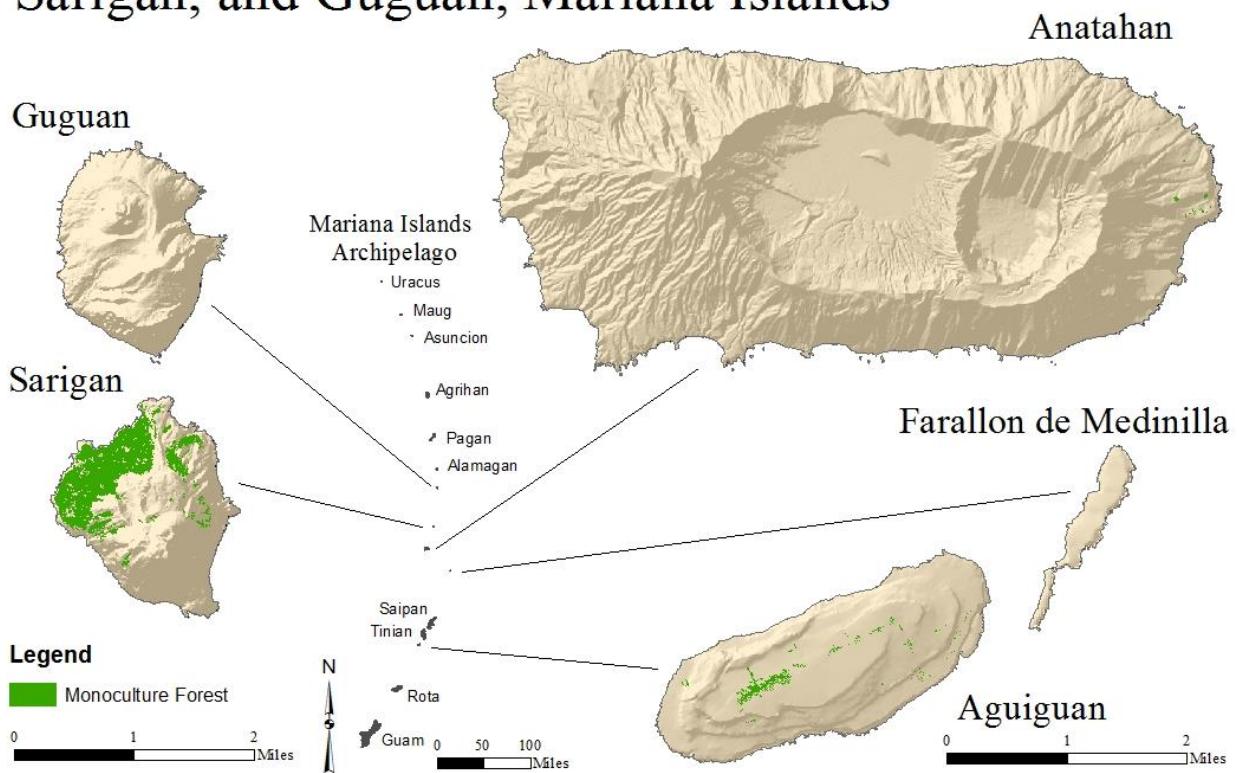


# Leucaena Forest Habitat Asuncion, Maug, and Uracus, Mariana Islands



*Monoculture Forest*

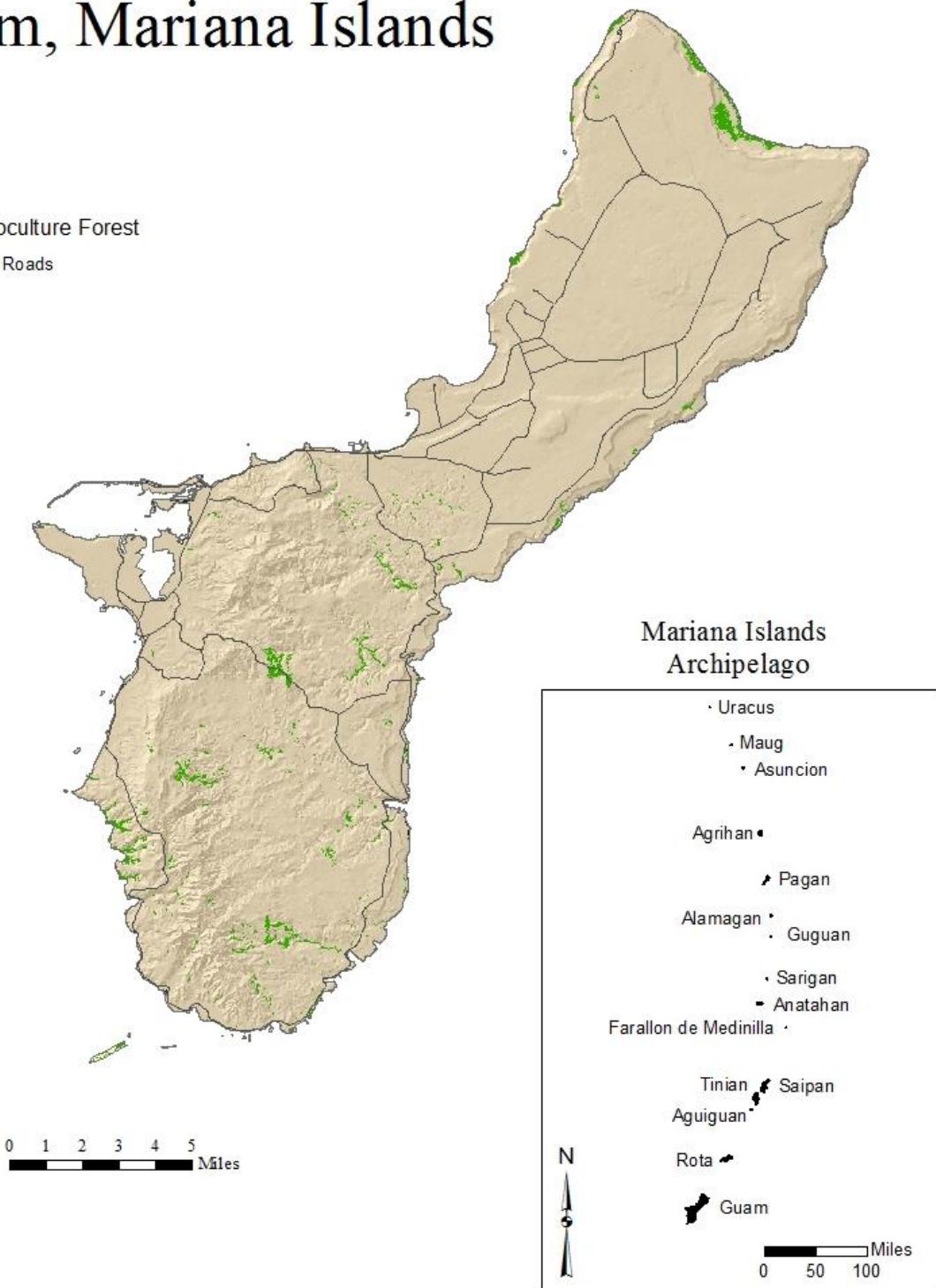
# Monoculture Forest Habitat Aguiguan, Farallon de Medinilla, Anatahan, Sarigan, and Guguan, Mariana Islands



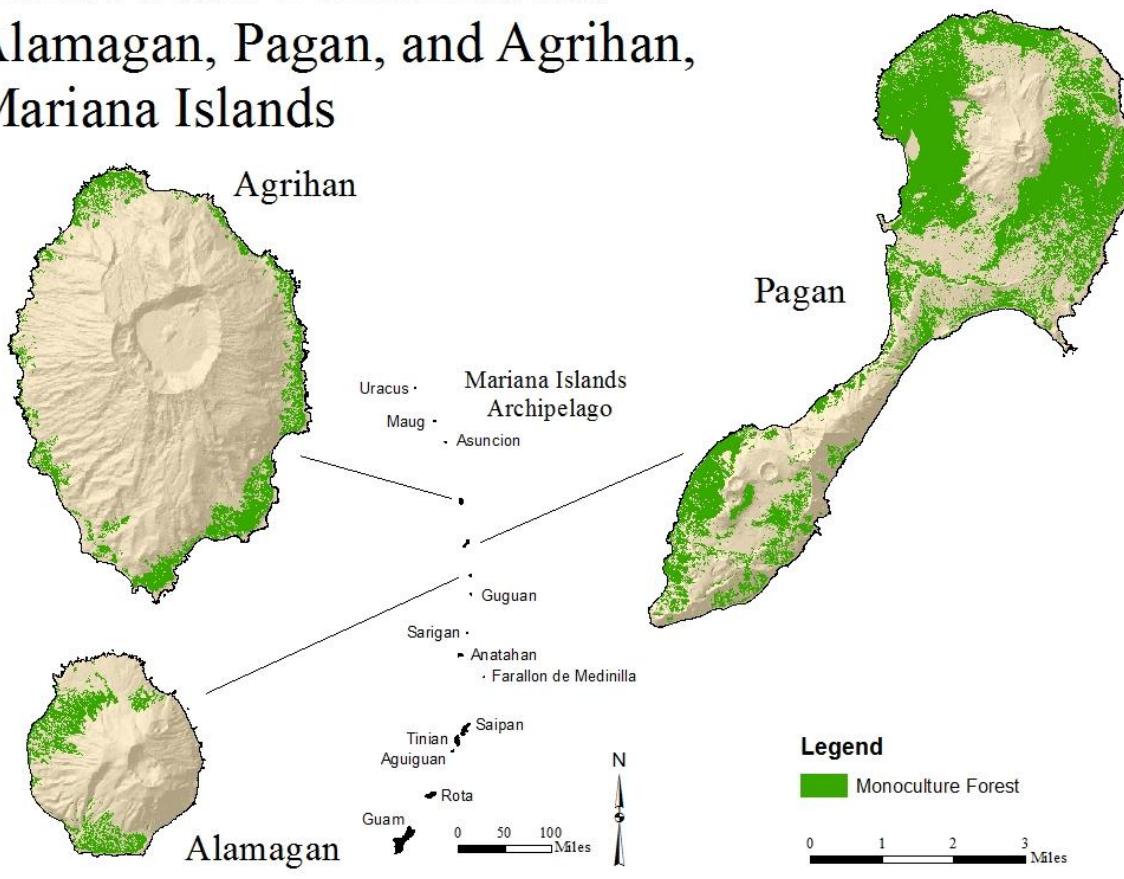
# Monoculture Forest Habitat Guam, Mariana Islands

## Legend

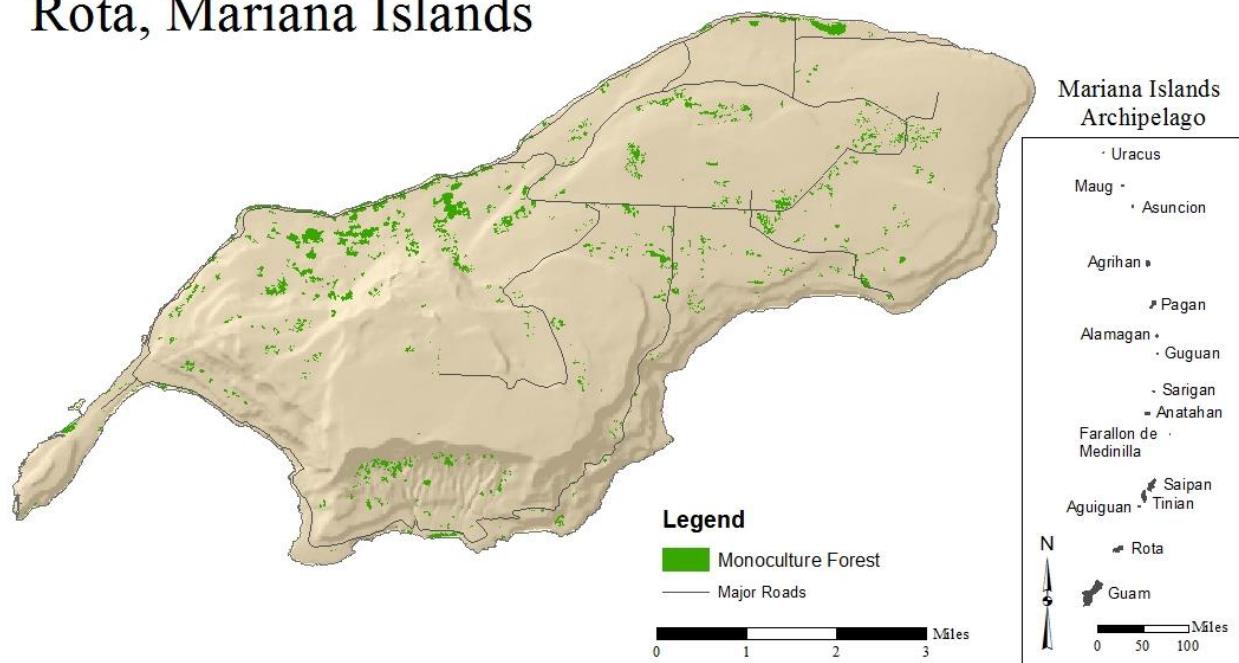
- Monoculture Forest
- Major Roads



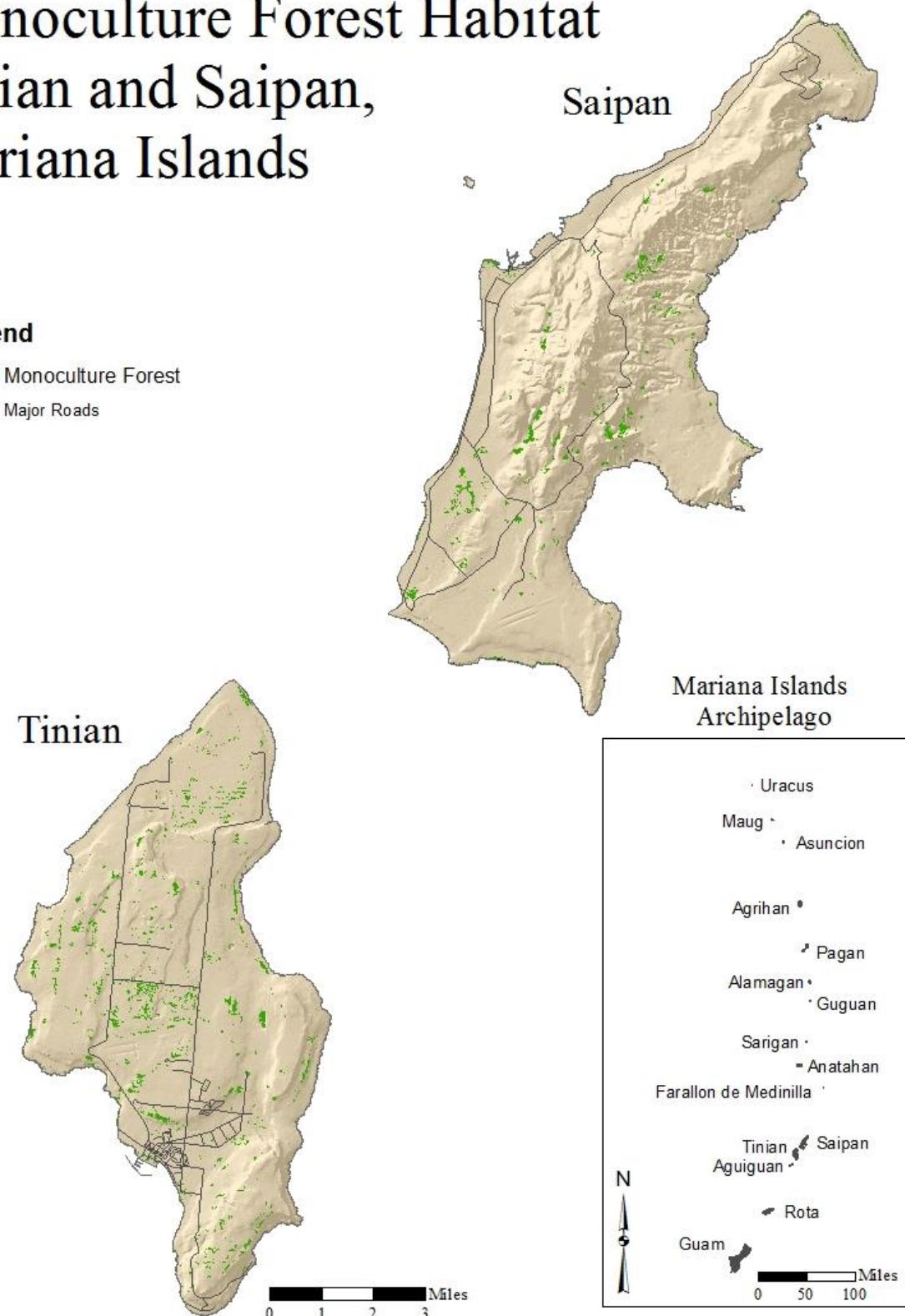
# Monoculture Forest Habitat Alamagan, Pagan, and Agrihan, Mariana Islands



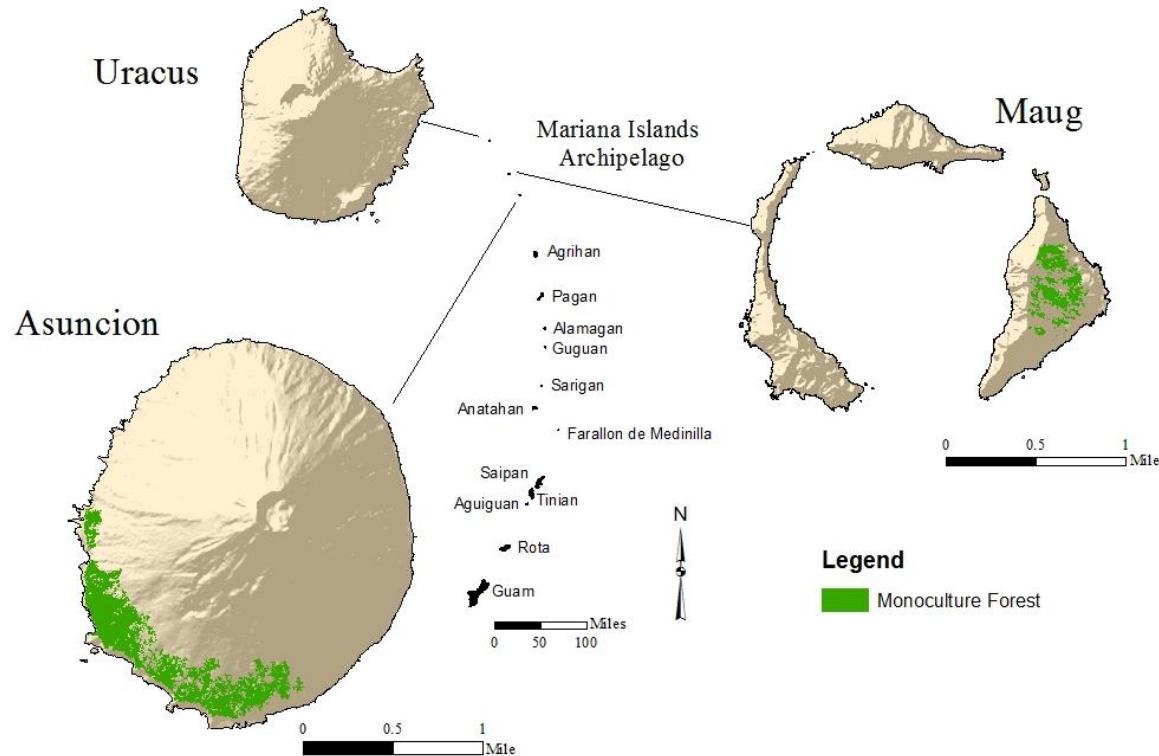
# Monoculture Forest Habitat Rota, Mariana Islands



# Monoculture Forest Habitat Tinian and Saipan, Mariana Islands

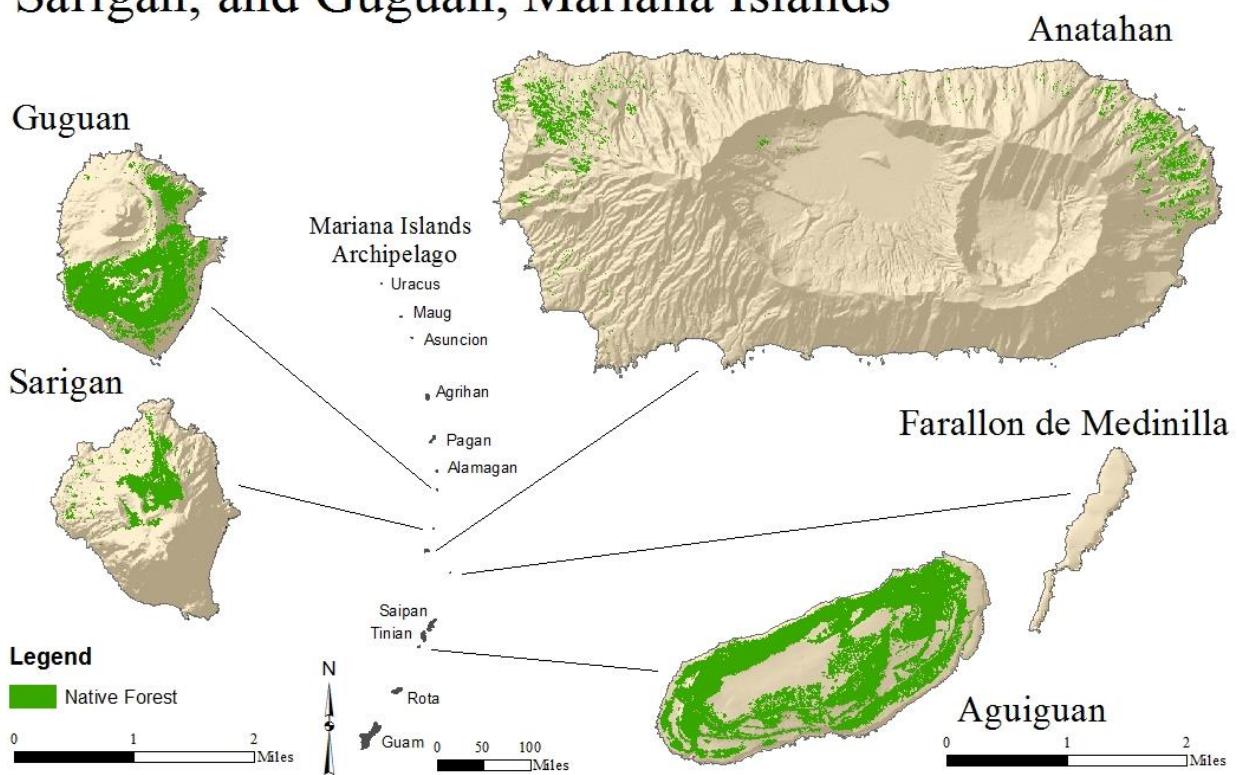


# Monoculture Forest Habitat Asuncion, Maug, and Uracus, Mariana Islands



*Native Forest*

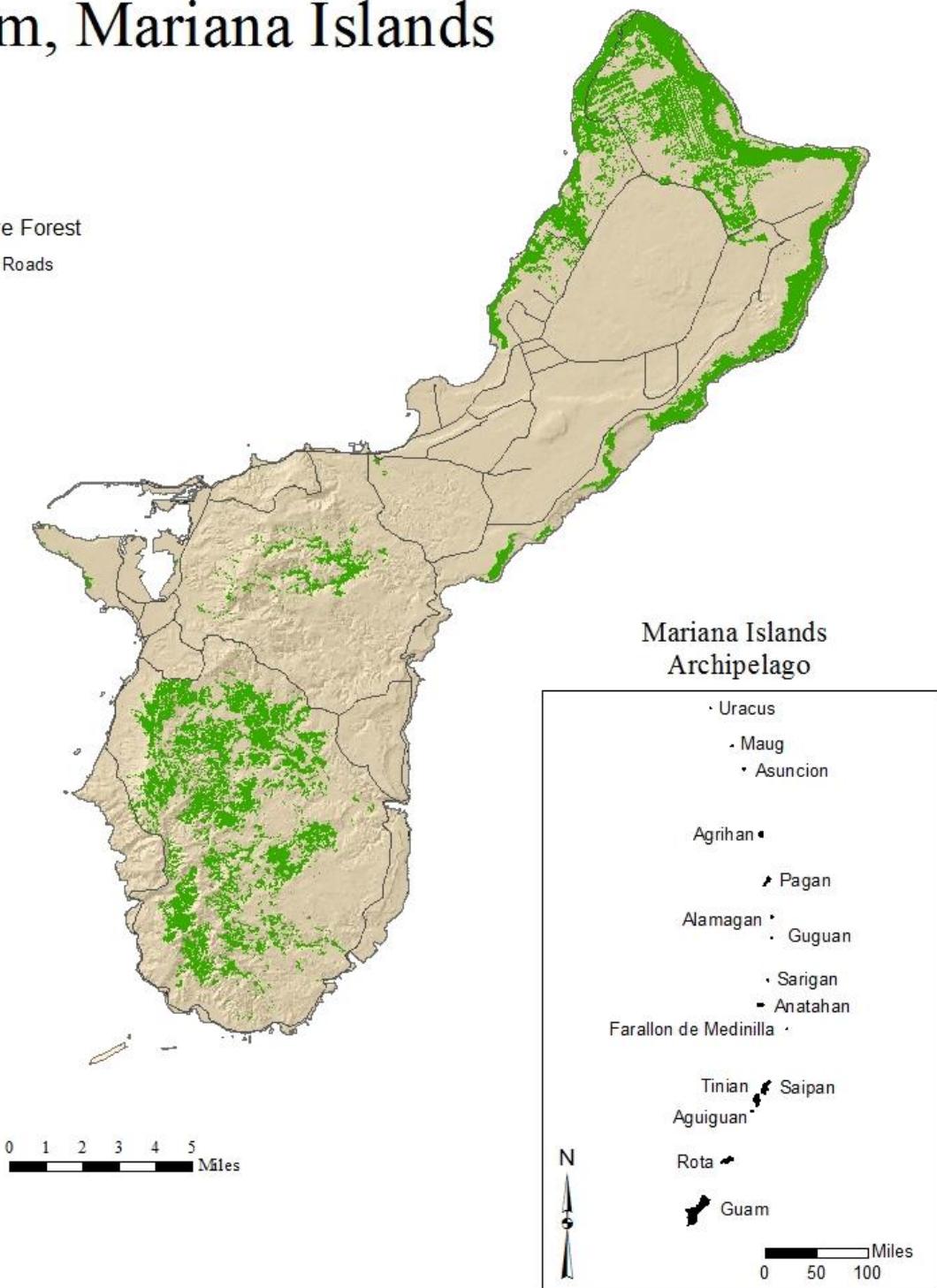
# Native Forest Habitat Aguiguan, Farallon de Medinilla, Anatahan, Sarigan, and Guguan, Mariana Islands



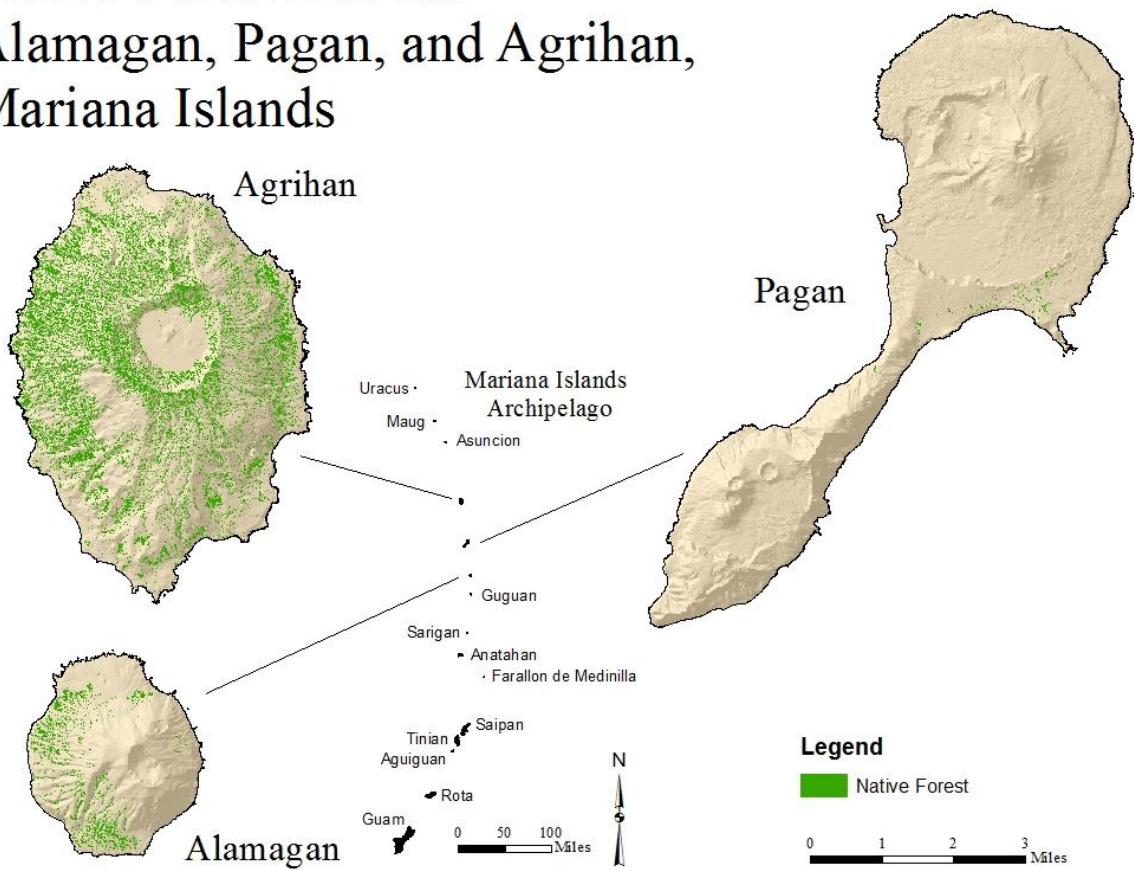
# Native Forest Habitat Guam, Mariana Islands

## Legend

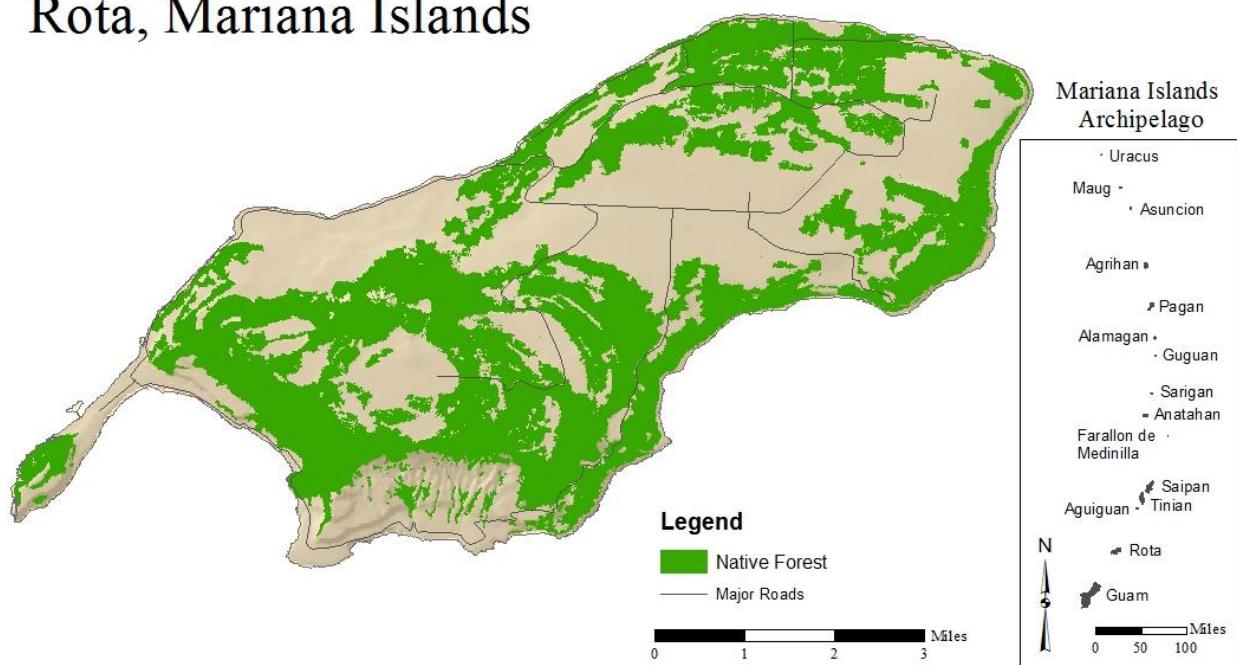
- Native Forest
- Major Roads



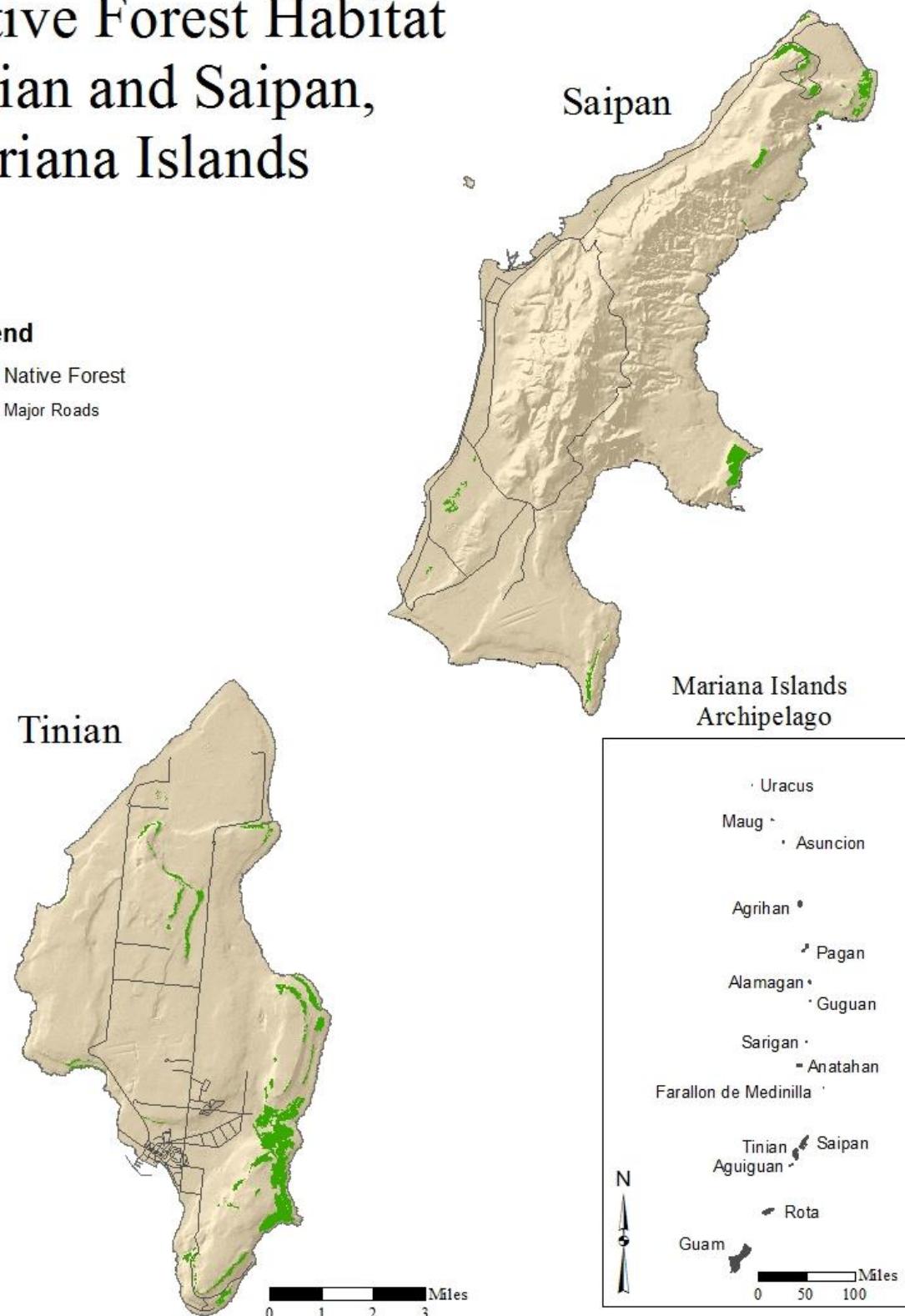
# Native Forest Habitat Alamagan, Pagan, and Agrihan, Mariana Islands



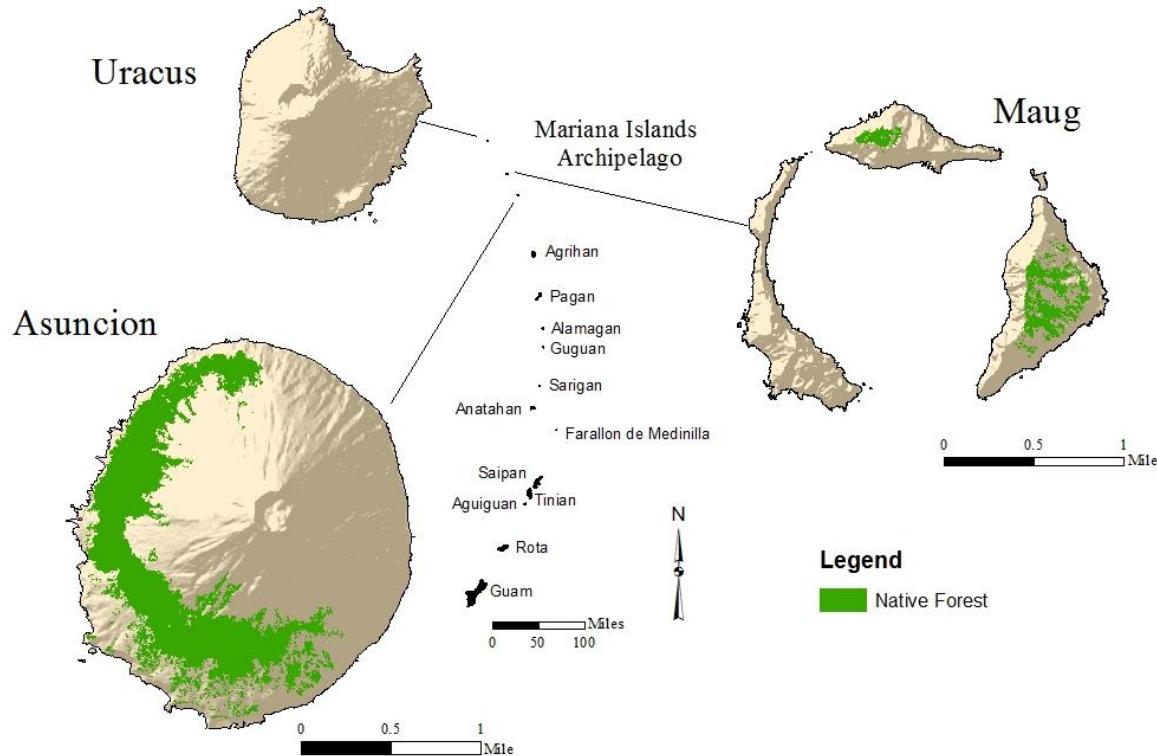
# Native Forest Habitat Rota, Mariana Islands



# Native Forest Habitat Tinian and Saipan, Mariana Islands

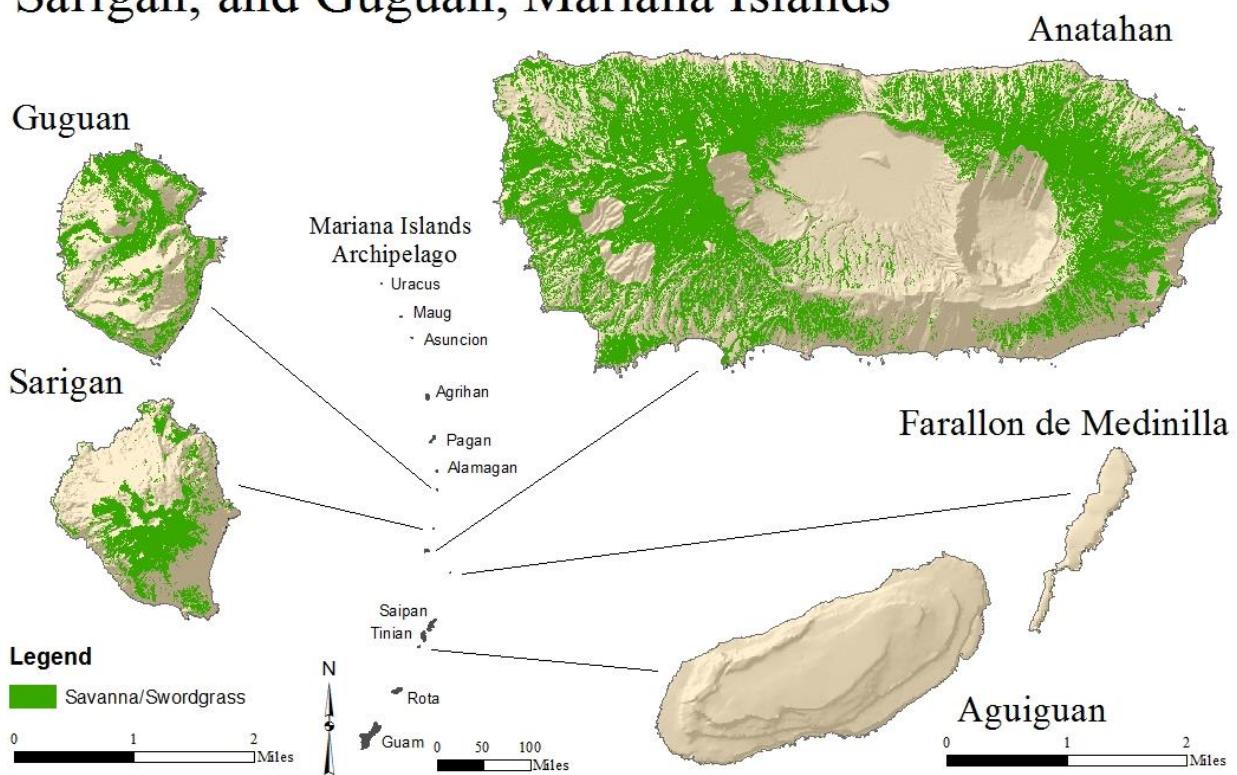


# Native Forest Habitat Asuncion, Maug, and Uracus, Mariana Islands



*Savanna and Grasslands*

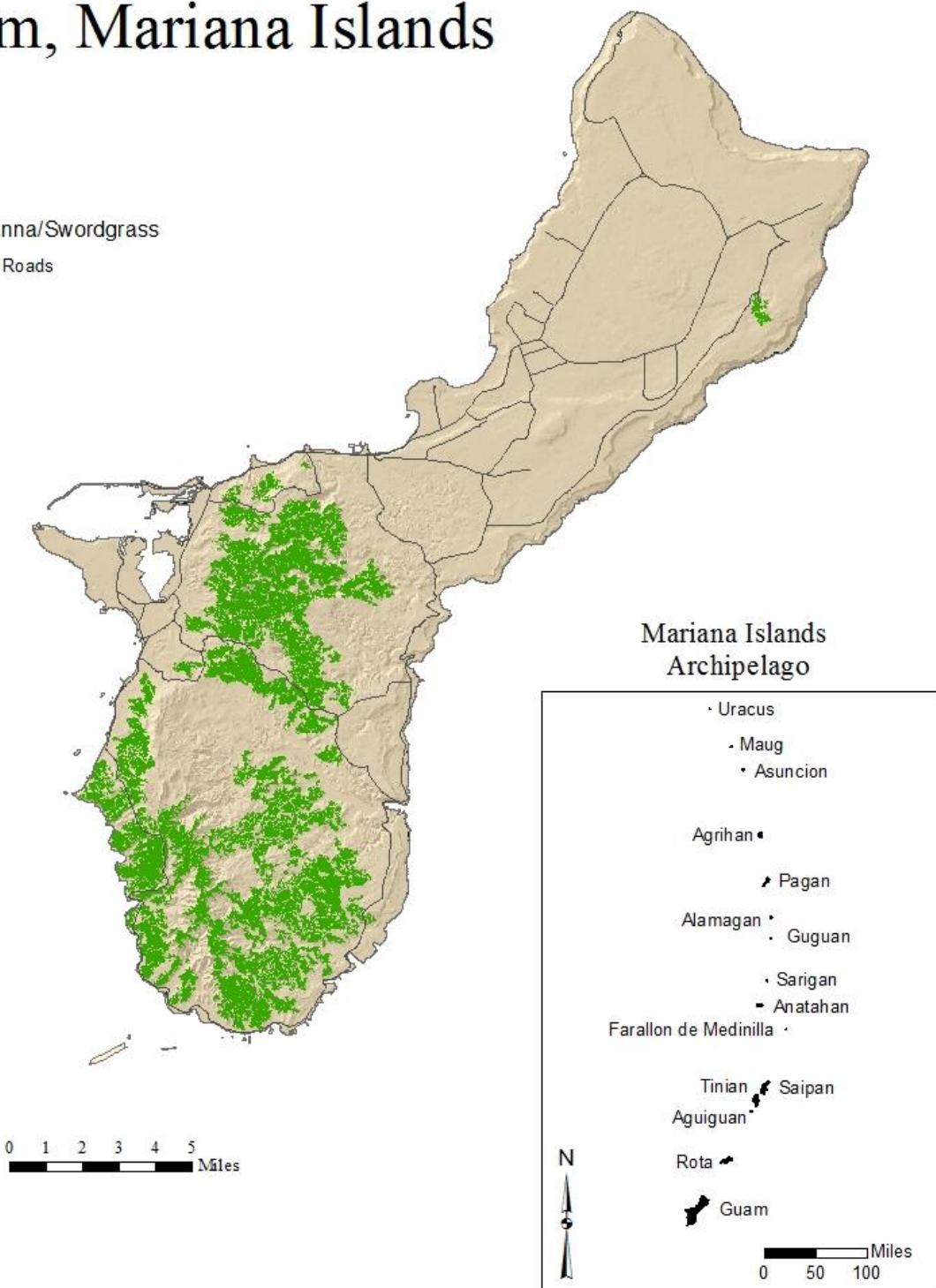
# Savanna/Swordgrass Habitat Aguiguan, Farallon de Medinilla, Anatahan, Sarigan, and Guguan, Mariana Islands



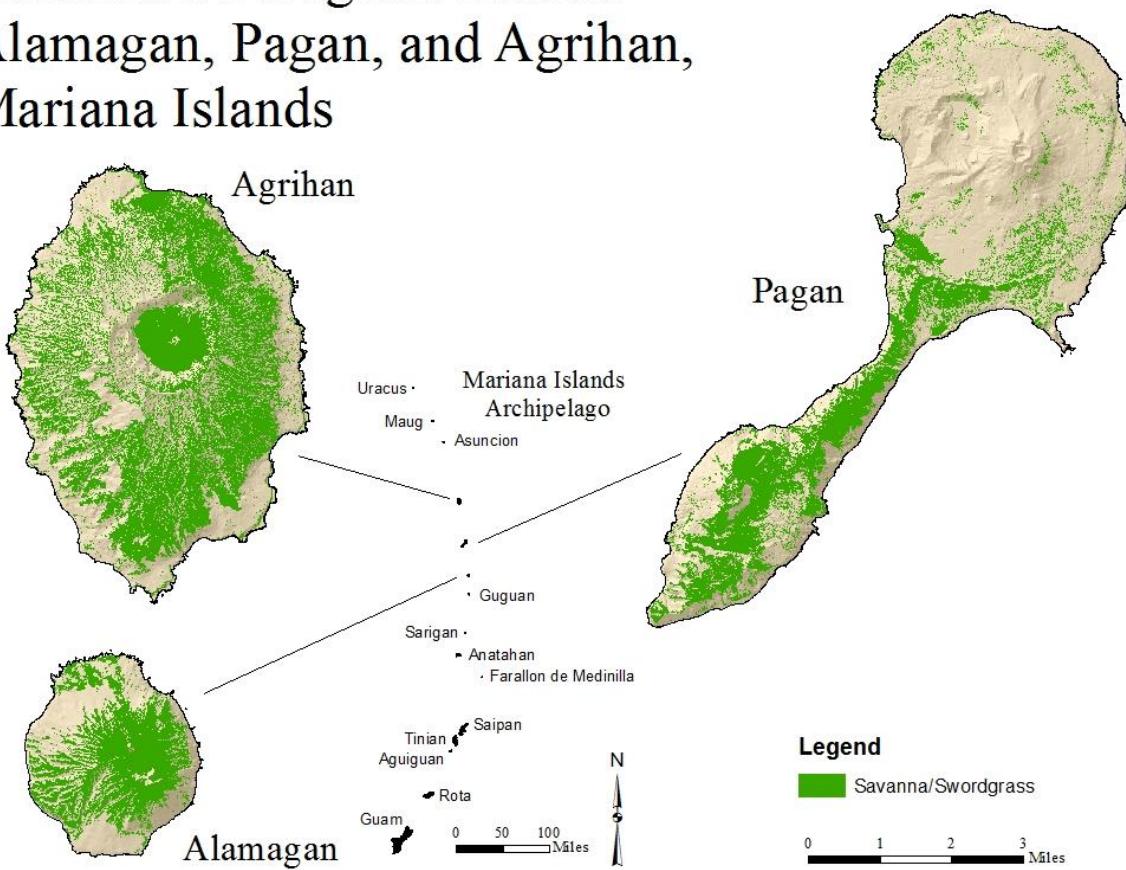
# Savanna/Swordgrass Habitat Guam, Mariana Islands

## Legend

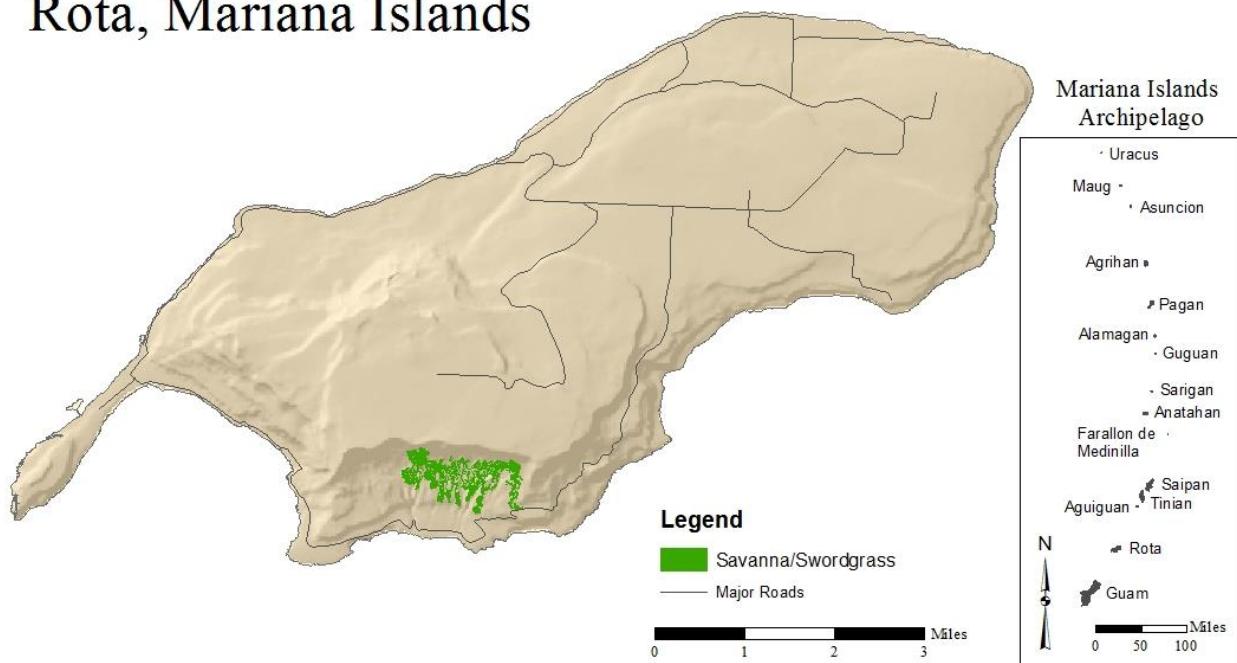
- Savanna/Swordgrass
- Major Roads



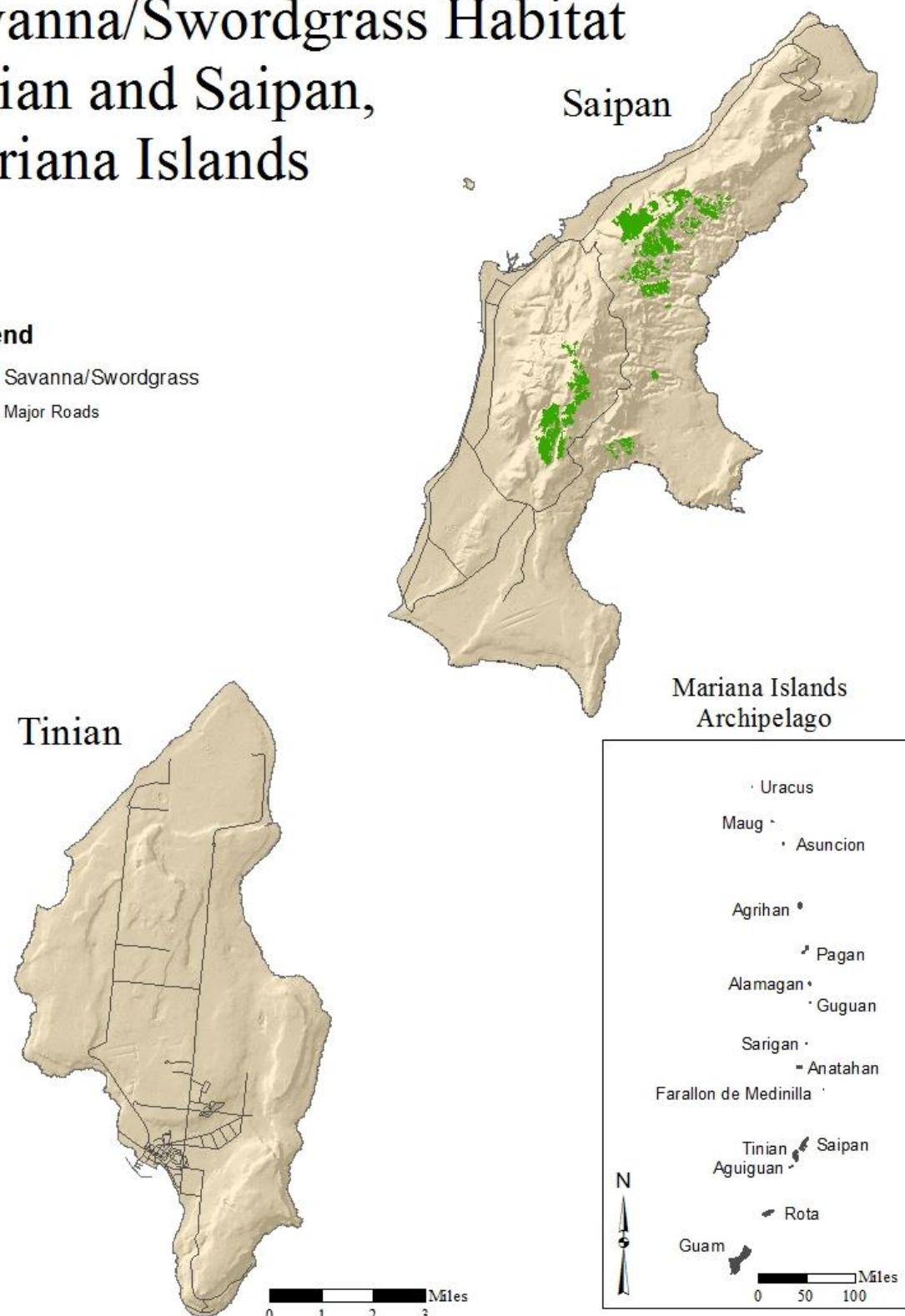
# Savanna/Swordgrass Habitat Alamagan, Pagan, and Agrihan, Mariana Islands



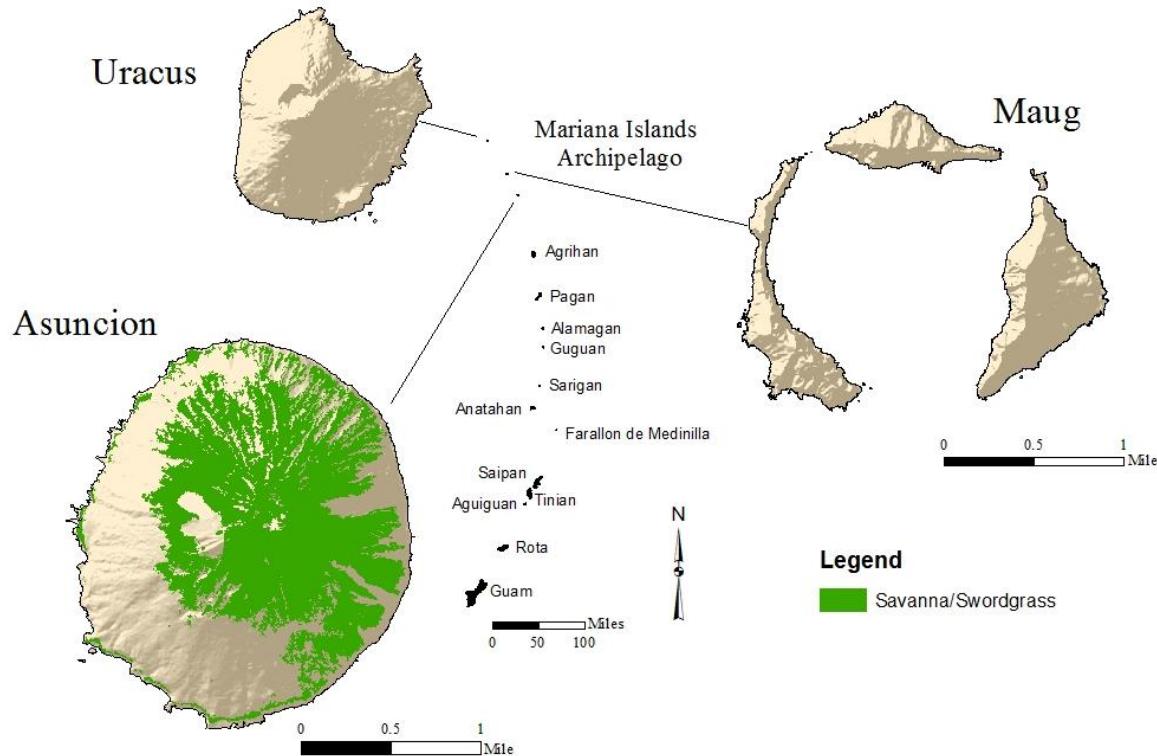
# Savanna/Swordgrass Habitat Rota, Mariana Islands



# Savanna/Swordgrass Habitat Tinian and Saipan, Mariana Islands

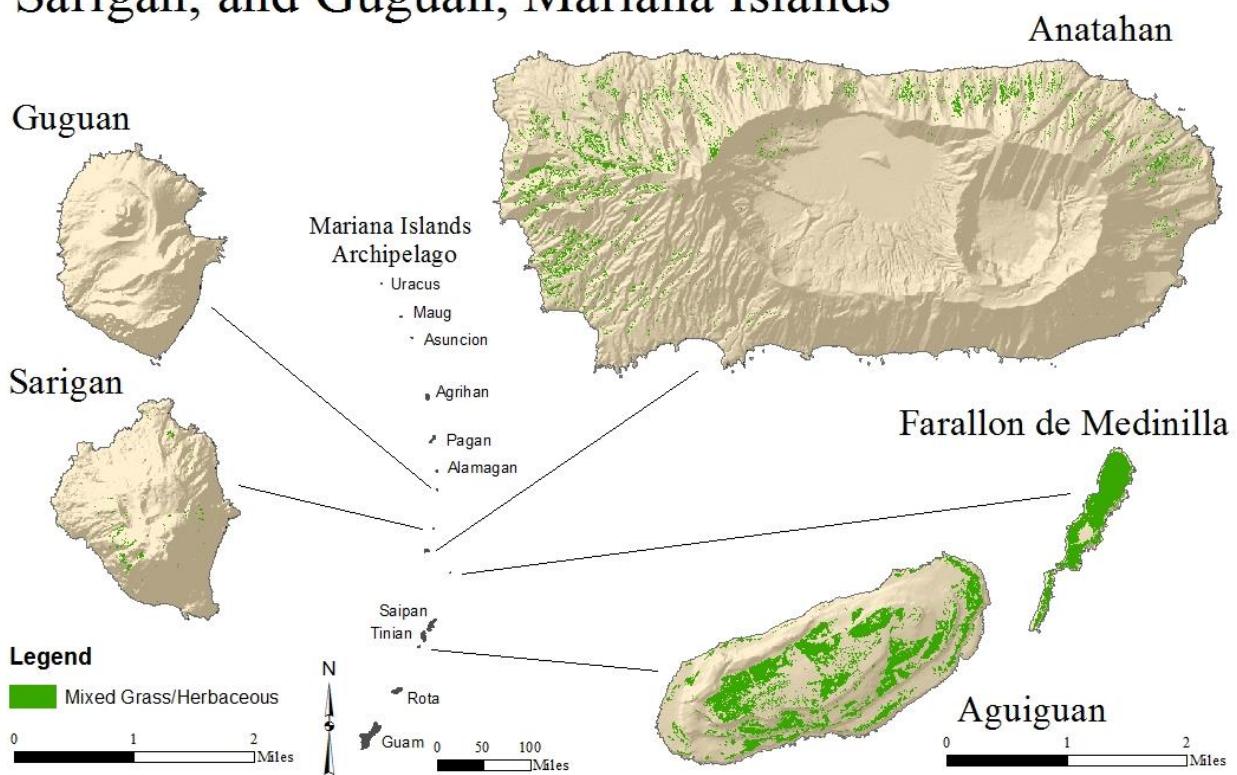


# Savanna/Swordgrass Habitat Asuncion, Maug, and Uracus, Mariana Islands



*Scrub and Herbaceous*

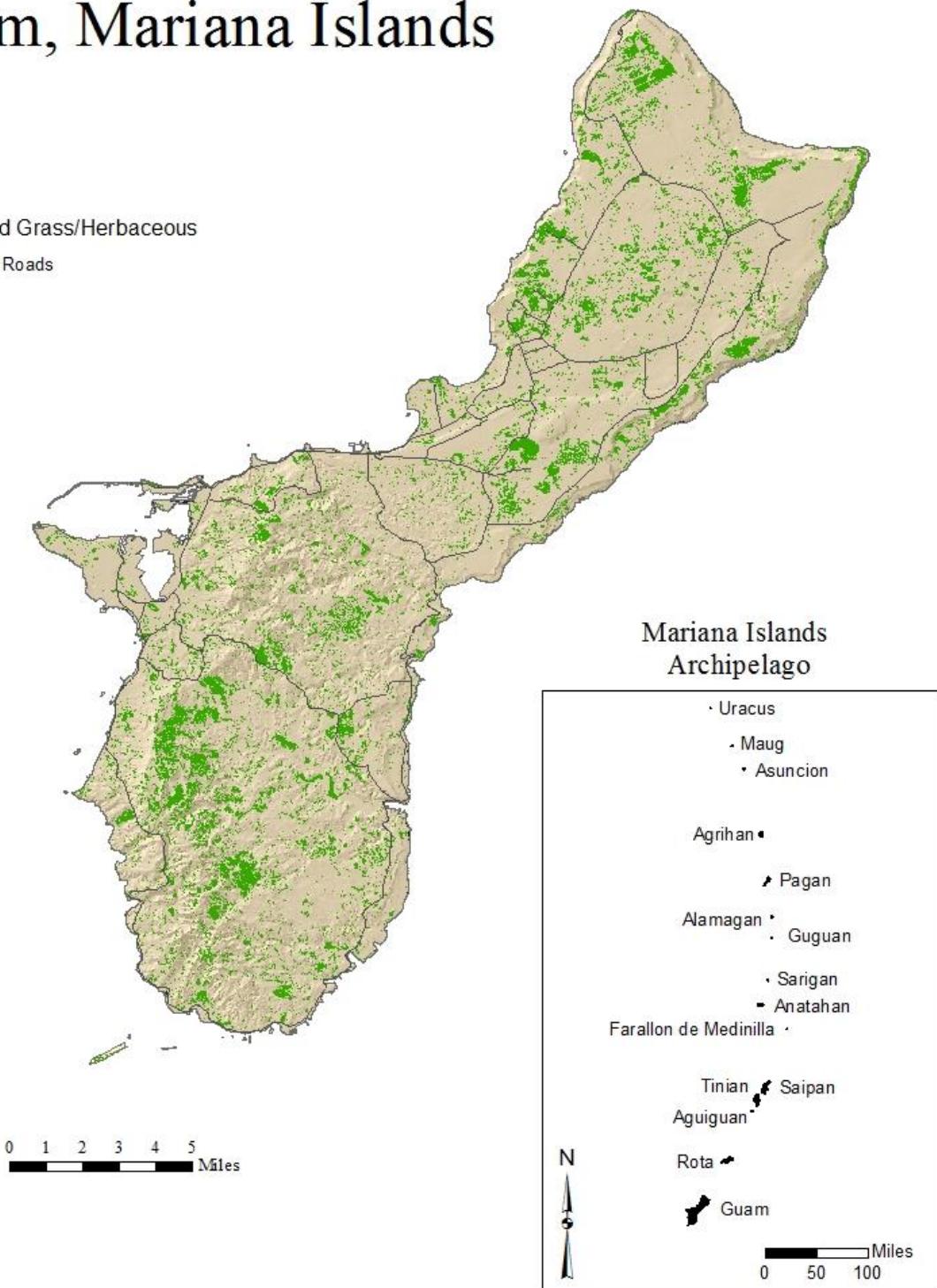
## Mixed Grass/Herbaceous Habitat Aguiguan, Farallon de Medinilla, Anatahan, Sarigan, and Guguan, Mariana Islands



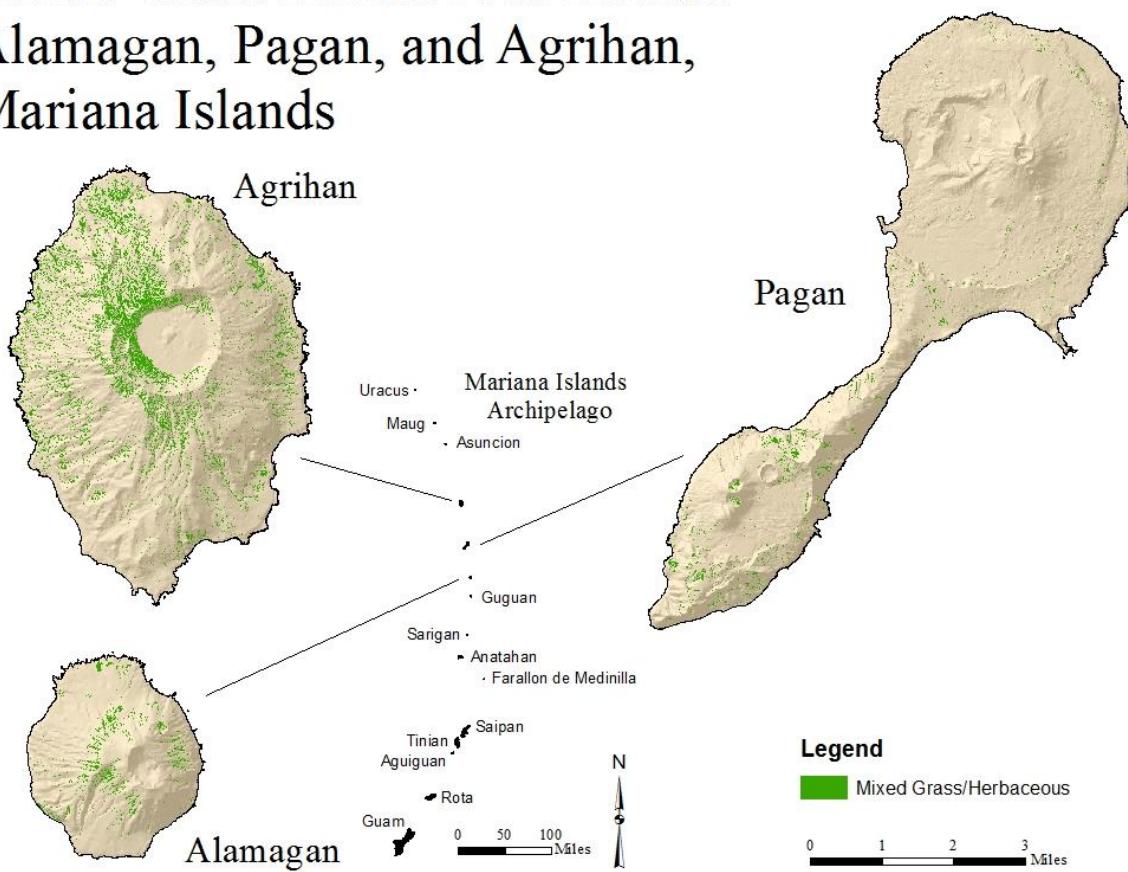
# Mixed Grass/Herbaceous Habitat Guam, Mariana Islands

## Legend

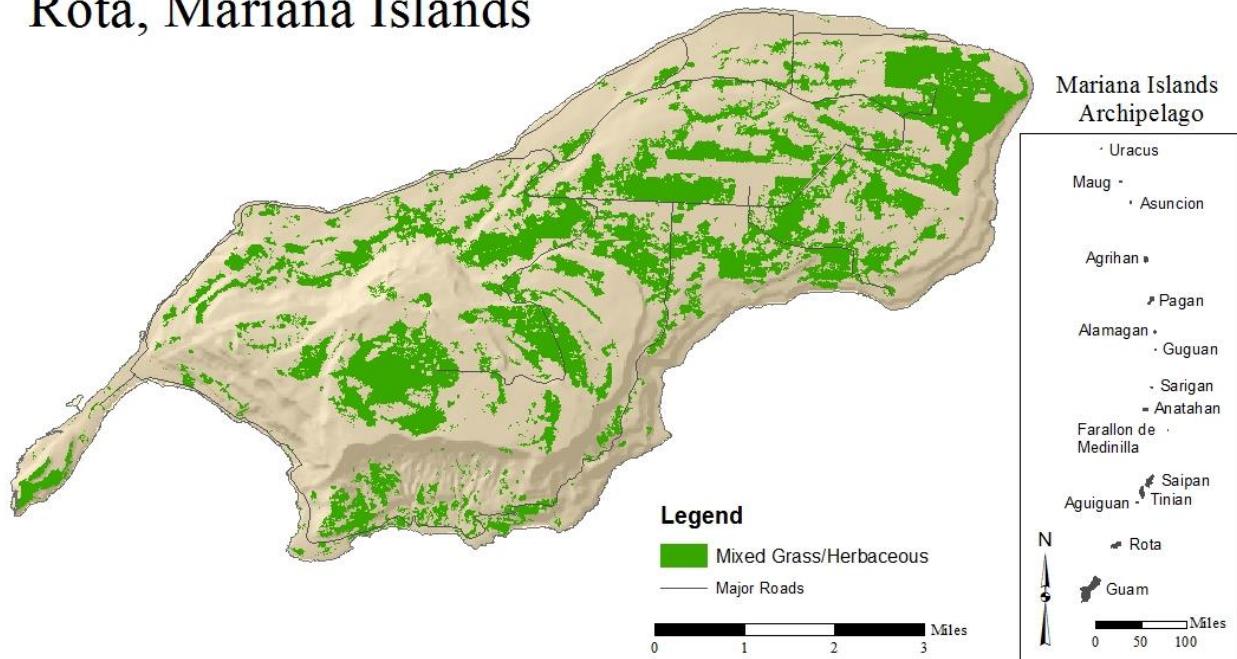
- Mixed Grass/Herbaceous
- Major Roads



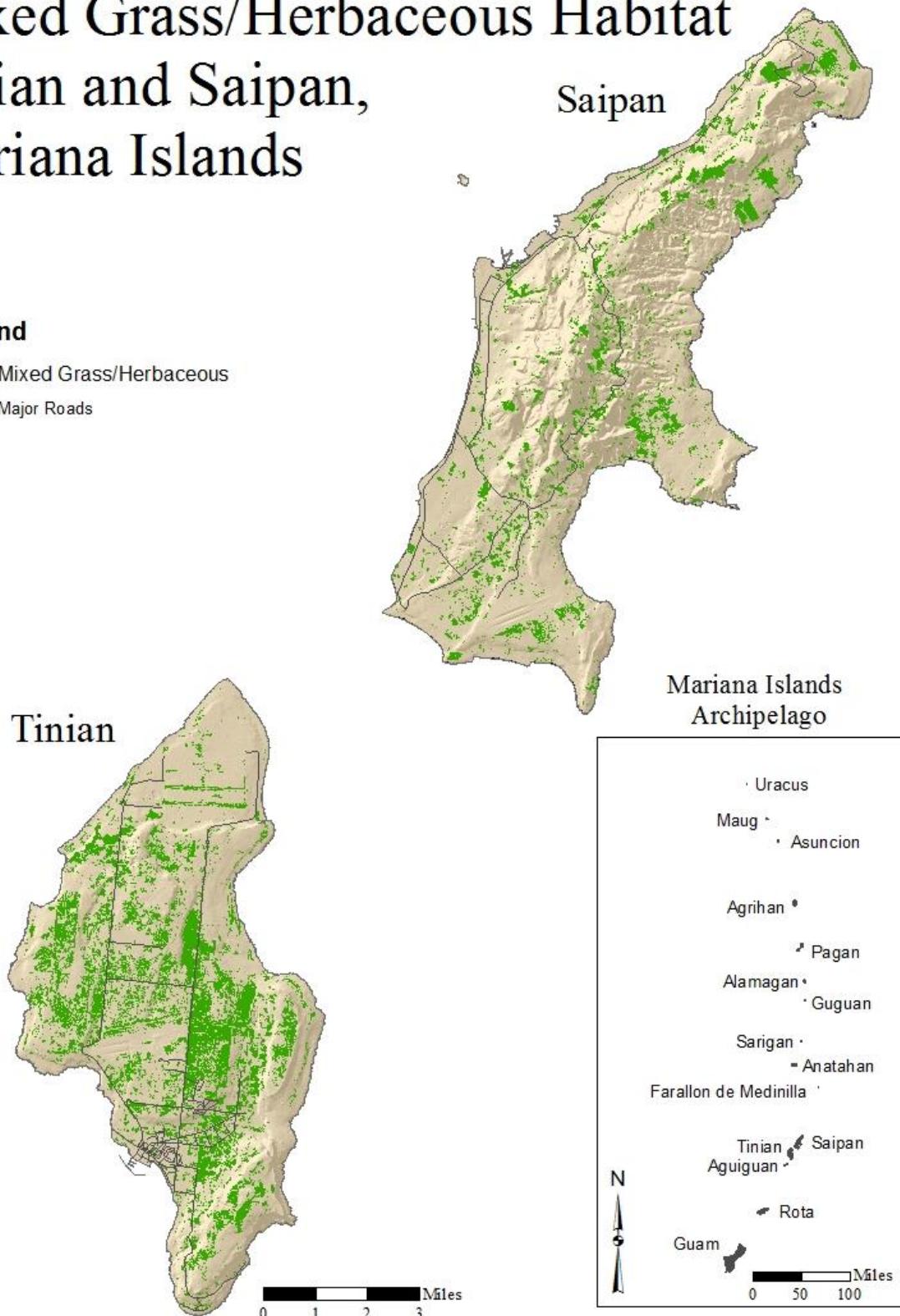
# Mixed Grass/Herbaceous Habitat Alamagan, Pagan, and Agrihan, Mariana Islands



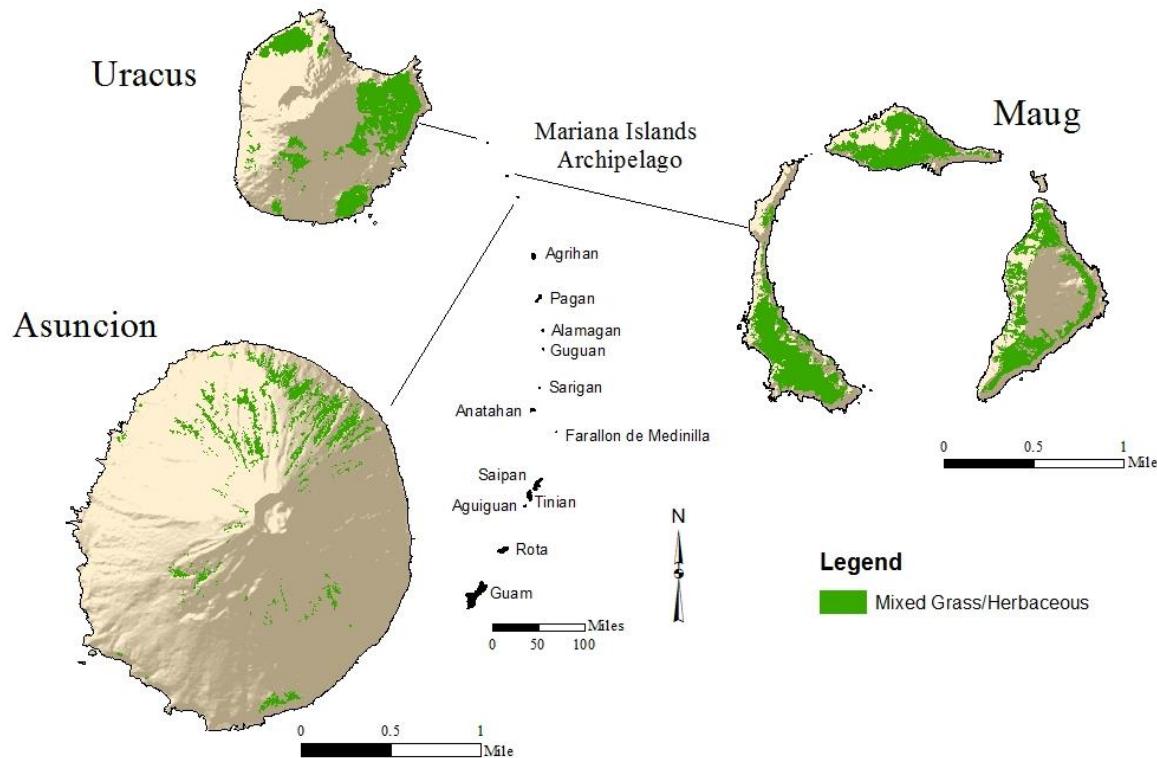
# Mixed Grass/Herbaceous Habitat Rota, Mariana Islands



# Mixed Grass/Herbaceous Habitat Tinian and Saipan, Mariana Islands

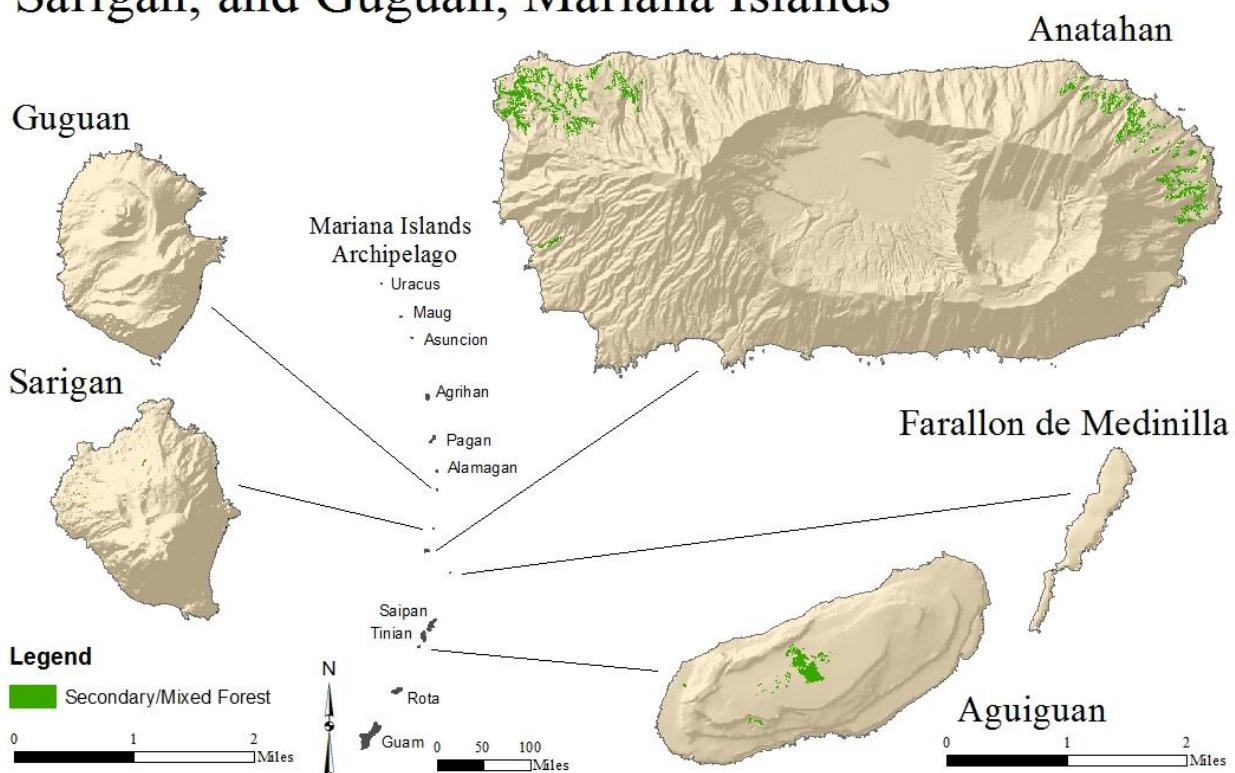


# Mixed Grass/Herbaceous Habitat Asuncion, Maug, and Uracus, Mariana Islands



*Secondary and Mixed Forest*

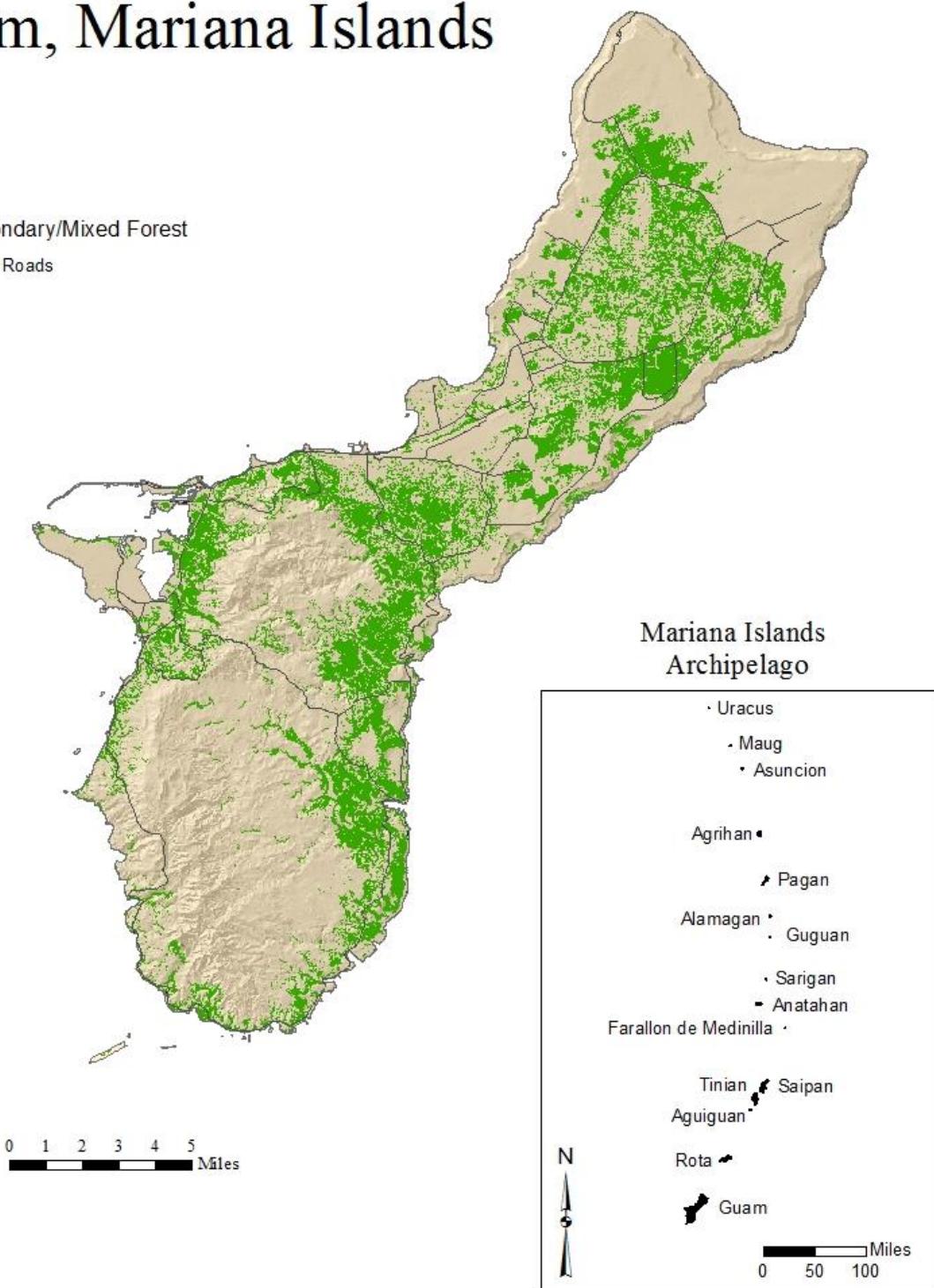
## Secondary/Mixed Forest Habitat Aguiguan, Farallon de Medinilla, Anatahan, Sarigan, and Guguan, Mariana Islands



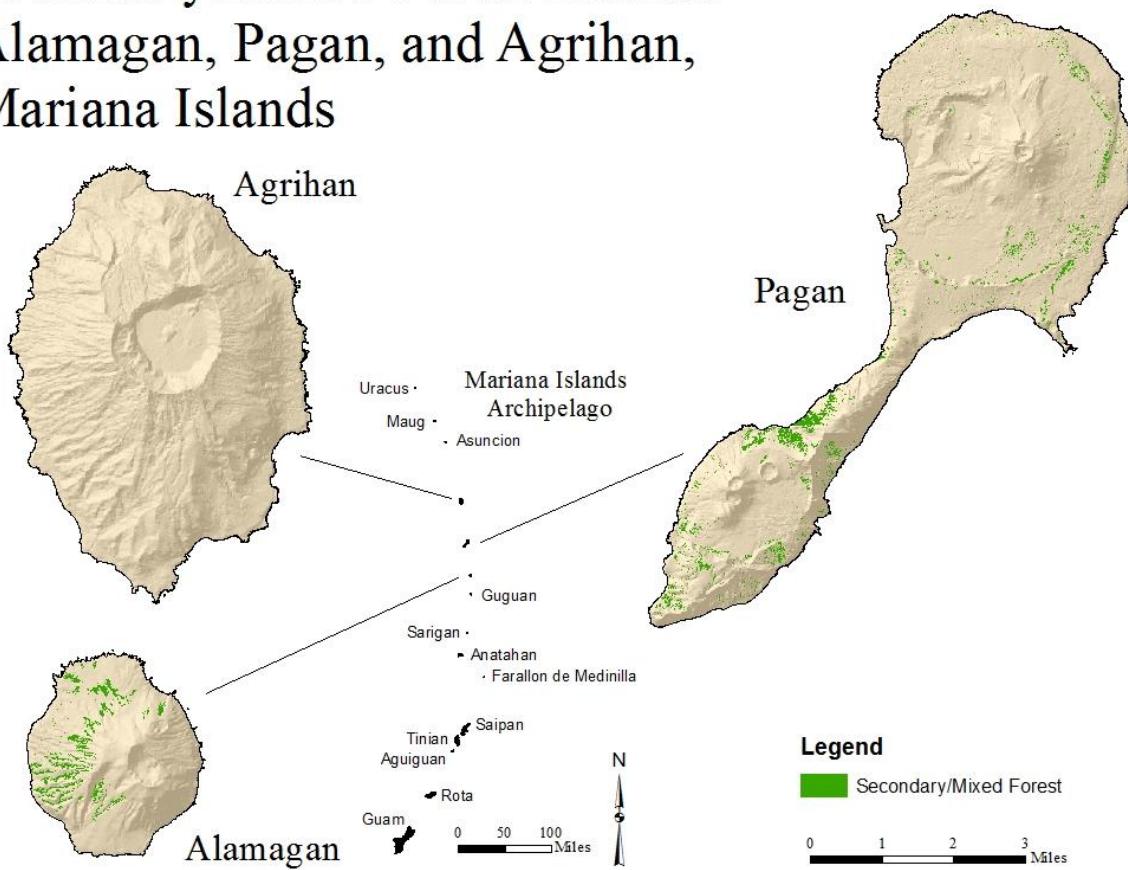
# Secondary/Mixed Forest Habitat Guam, Mariana Islands

## Legend

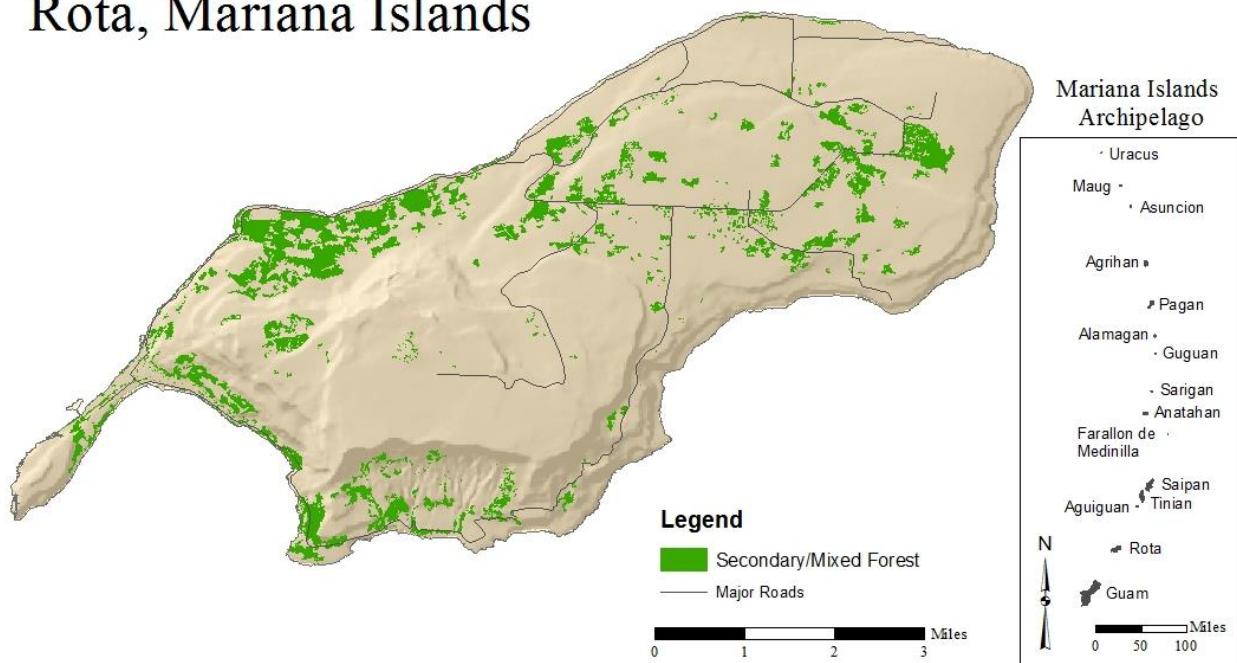
- Secondary/Mixed Forest
- Major Roads



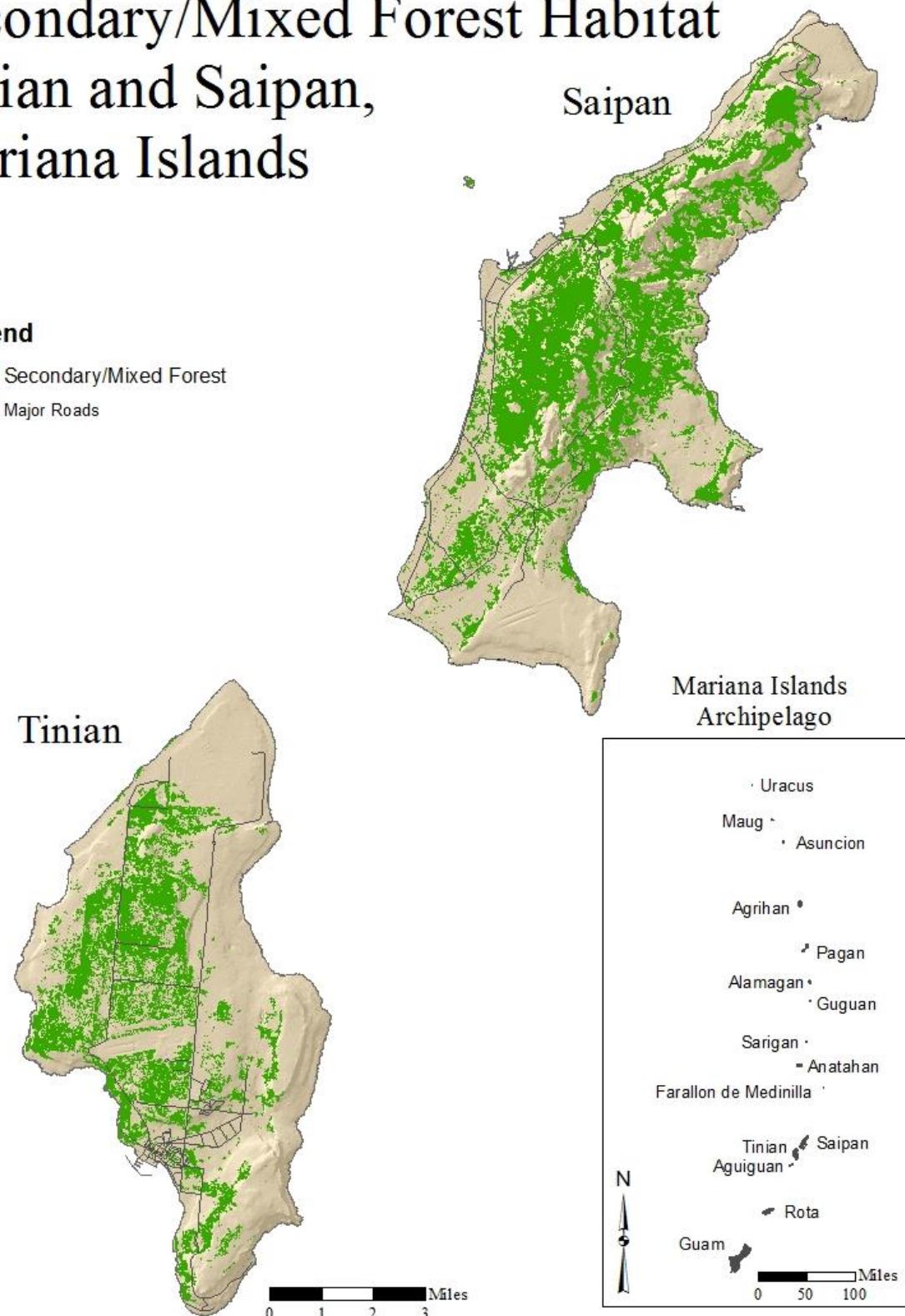
# Secondary/Mixed Forest Habitat Alamagan, Pagan, and Agrihan, Mariana Islands



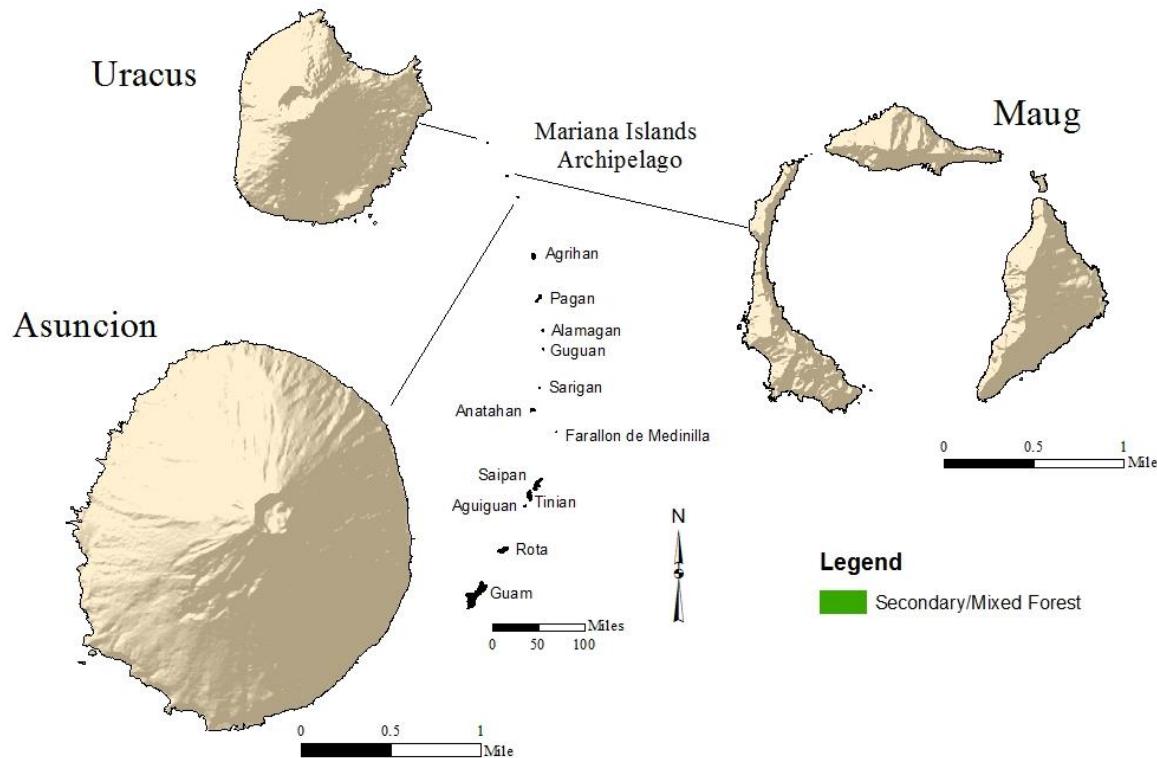
# Secondary/Mixed Forest Habitat Rota, Mariana Islands



# Secondary/Mixed Forest Habitat Tinian and Saipan, Mariana Islands



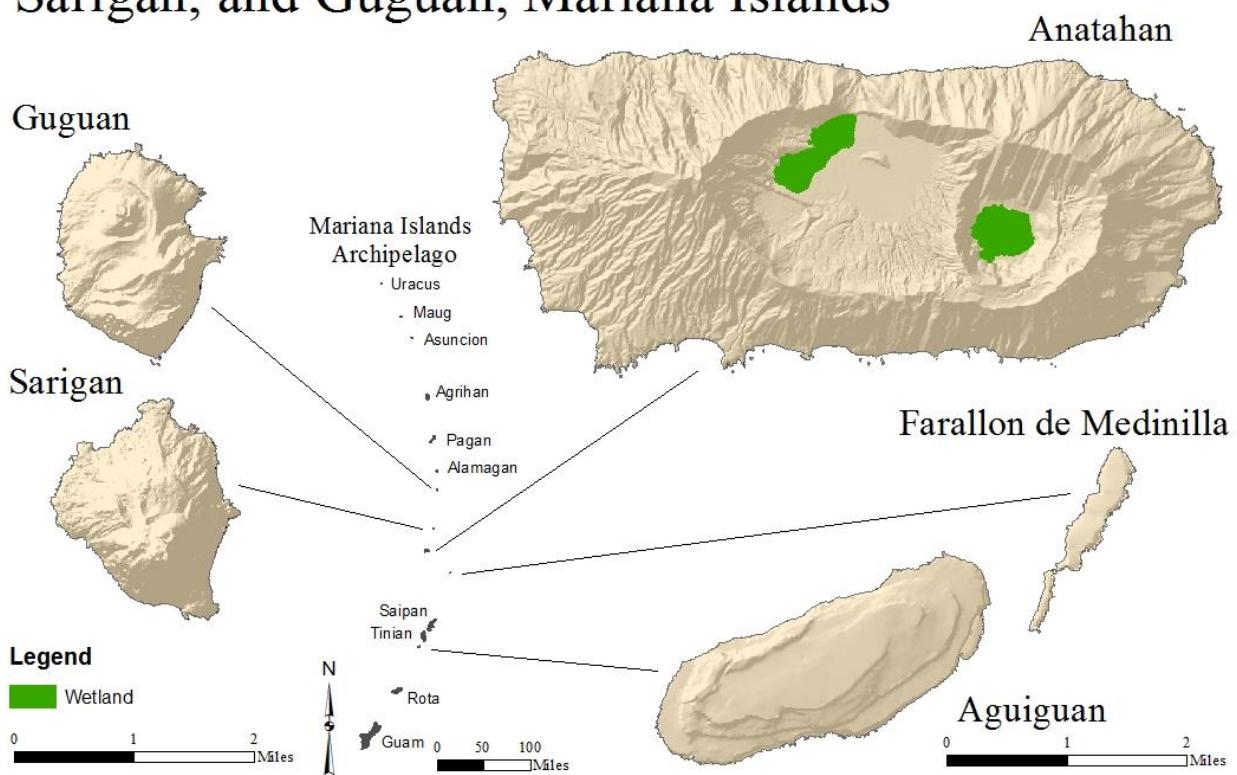
# Secondary/Mixed Forest Habitat Asuncion, Maug, and Uracus, Mariana Islands



*Wetland*

## Wetland Habitat

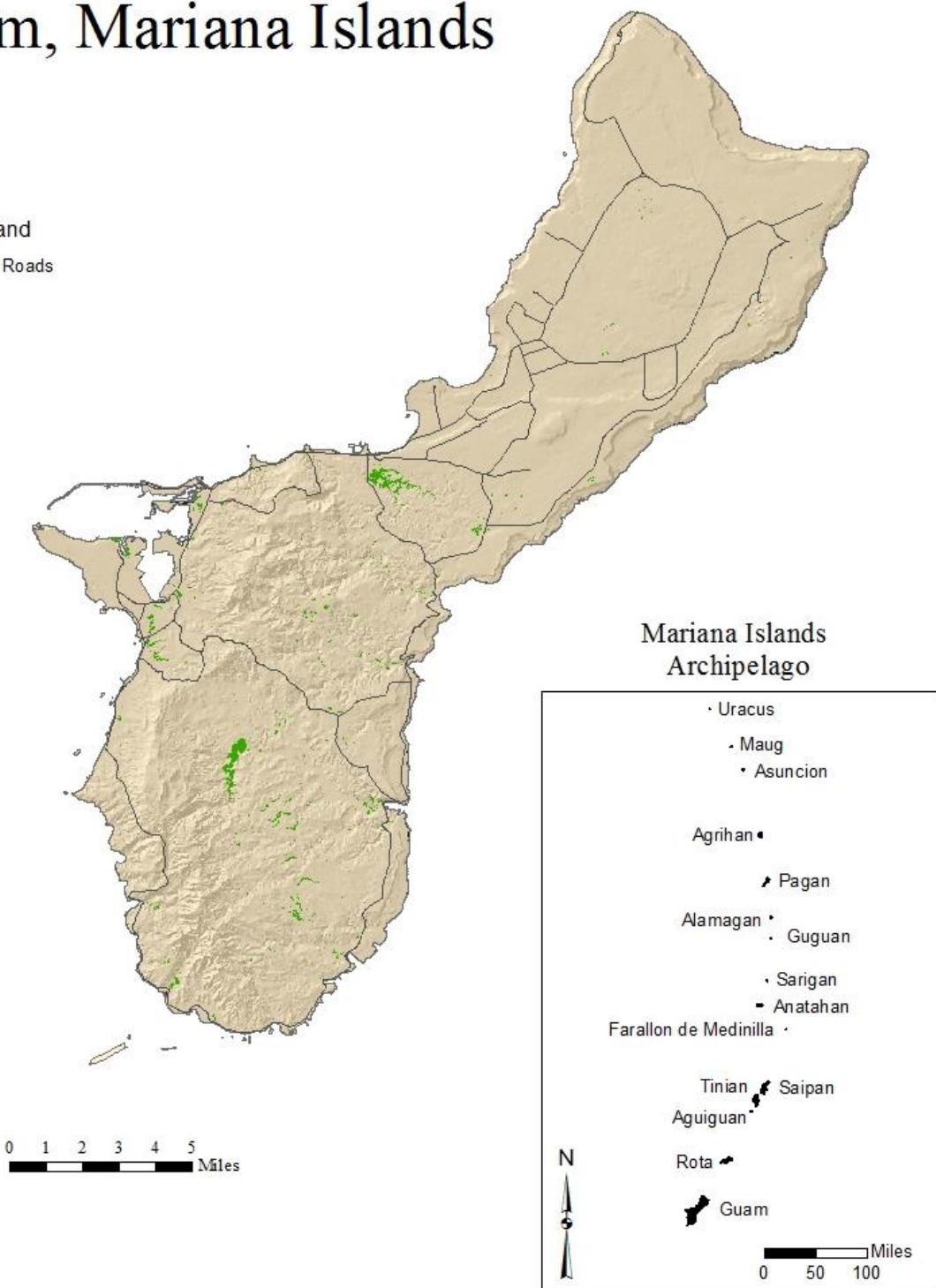
### Aguiguan, Farallon de Medinilla, Anatahan, Sarigan, and Guguan, Mariana Islands



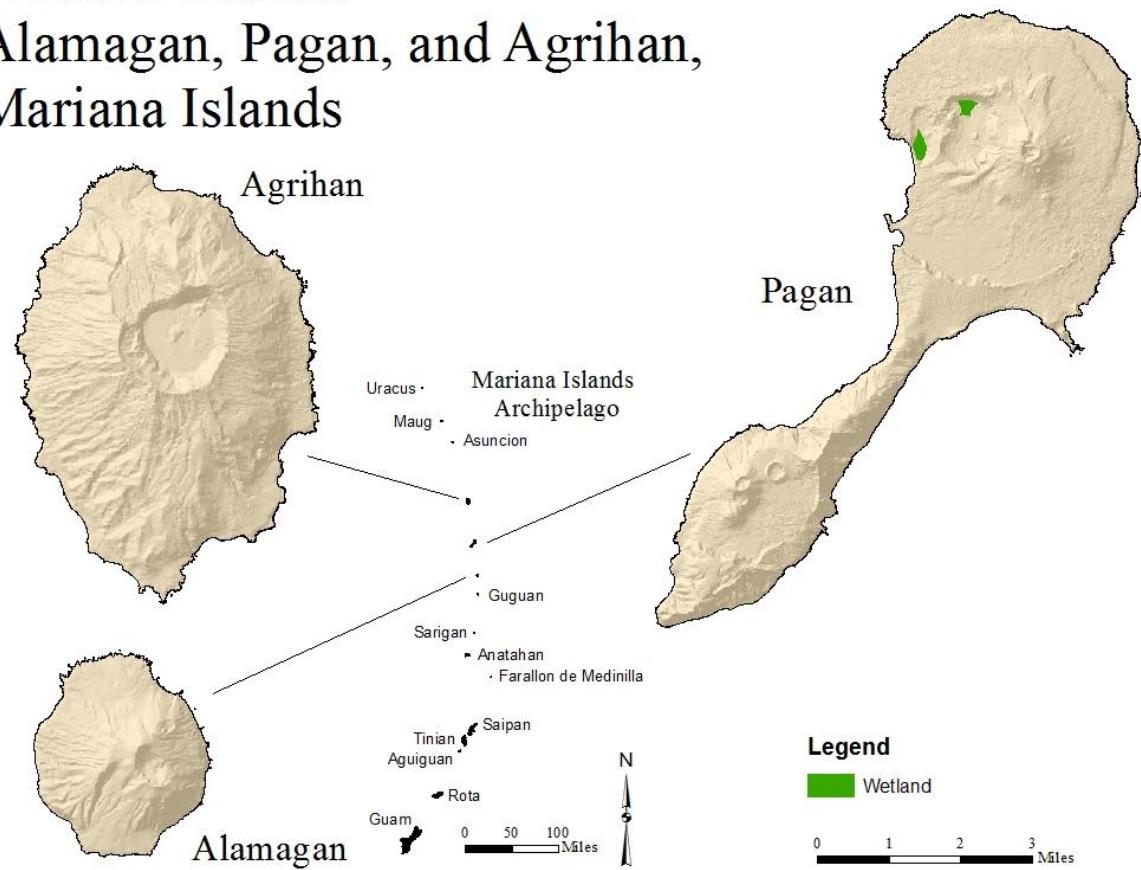
# Wetland Habitat Guam, Mariana Islands

## Legend

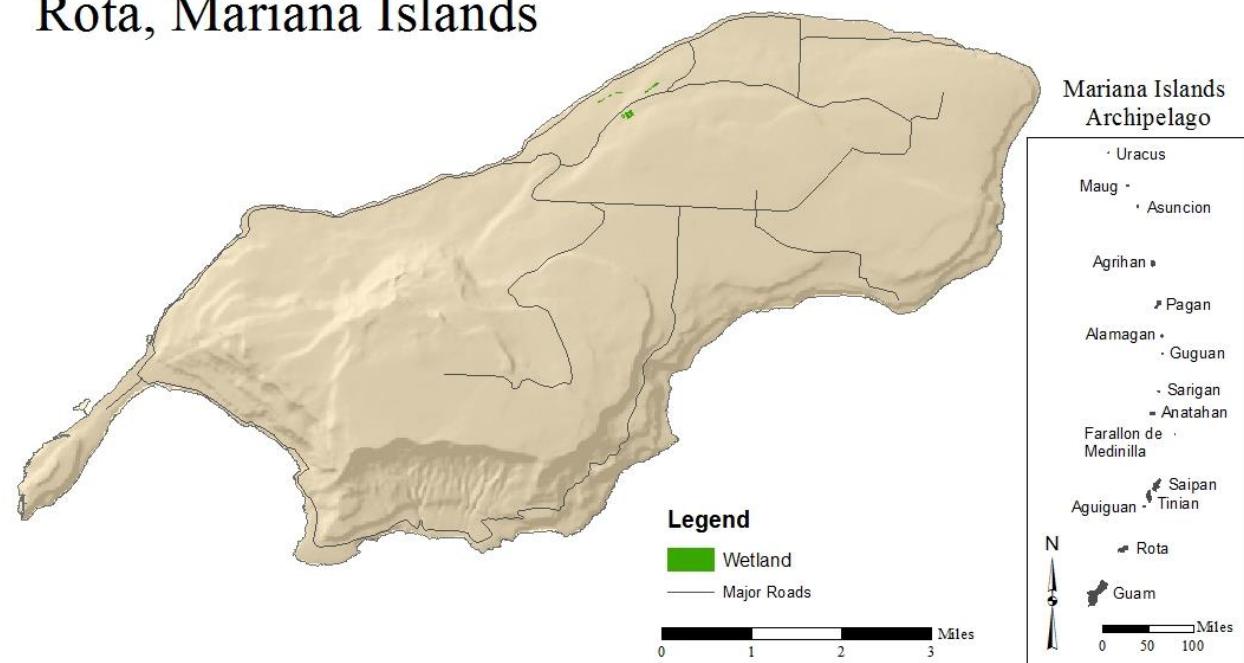
- Wetland
- Major Roads



# Wetland Habitat Alamagan, Pagan, and Agrihan, Mariana Islands



# Wetland Habitat Rota, Mariana Islands

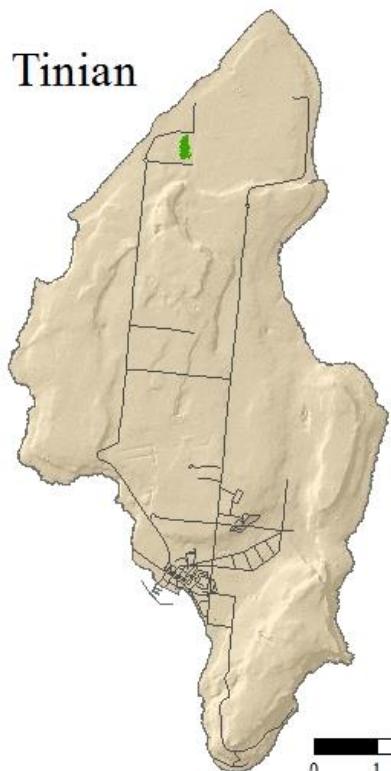


# Wetland Habitat Tinian and Saipan, Mariana Islands

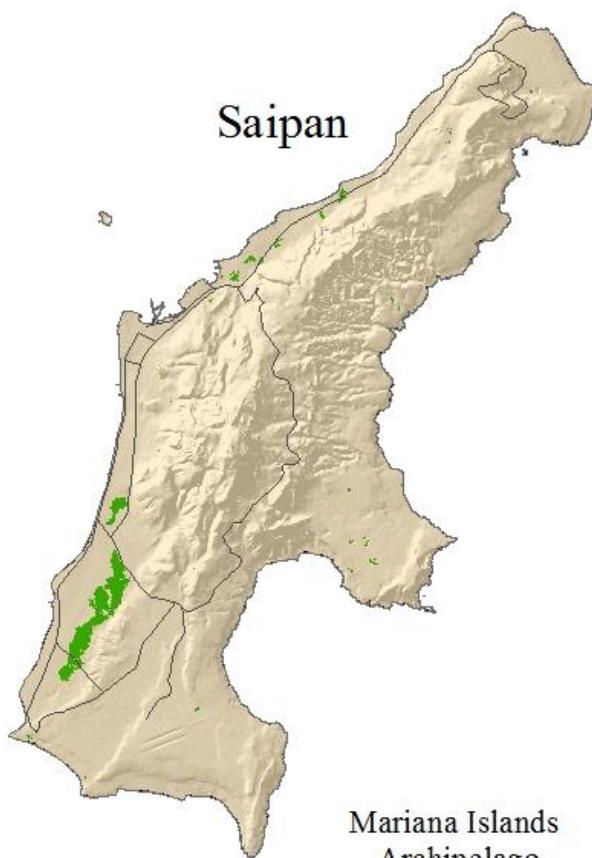
## Legend

- Wetland
- Major Roads

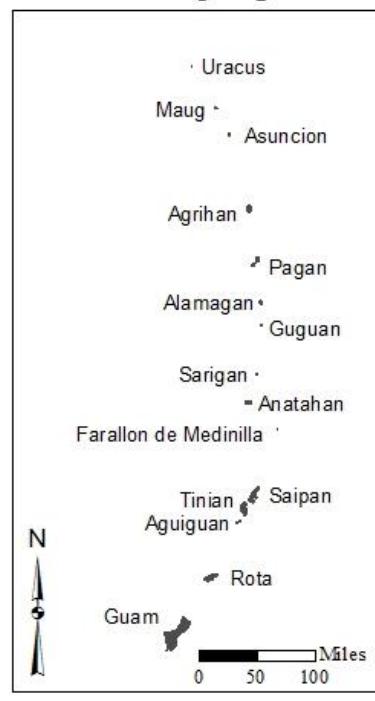
Tinian



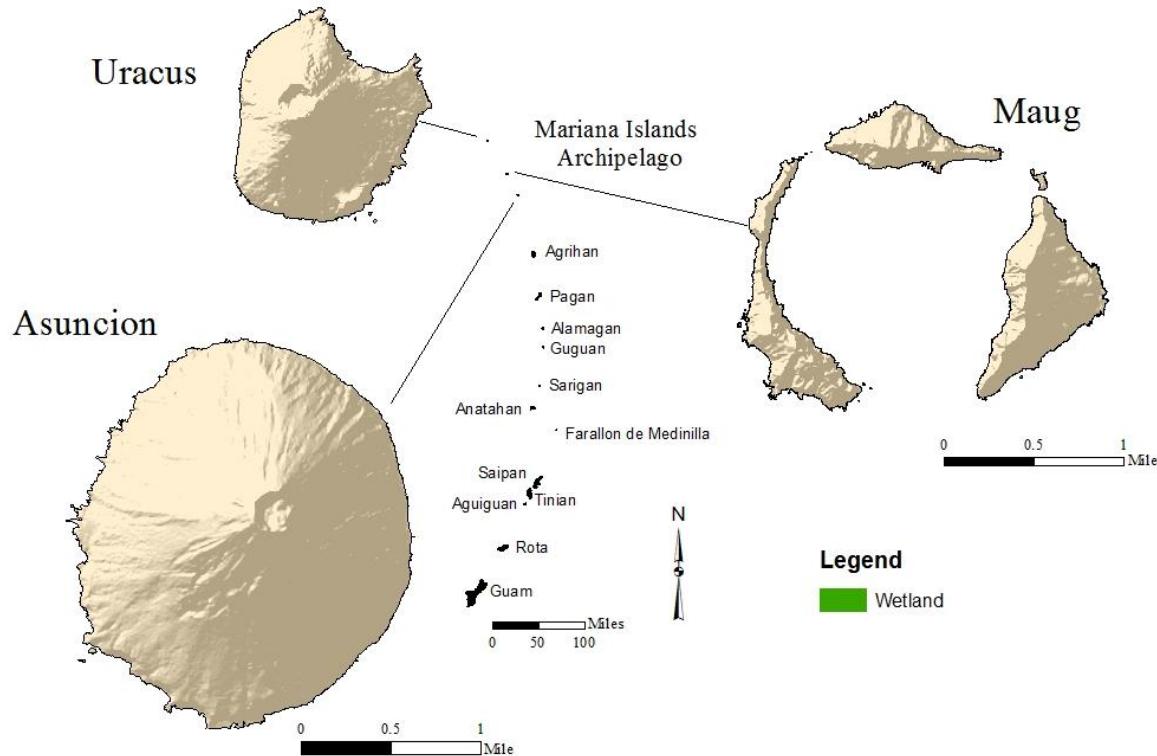
Saipan



Mariana Islands  
Archipelago



# Wetland Habitat Asuncion, Maug, and Uracus, Mariana Islands



## Appendix B. Tables

## Summary Information Provided

### Archipelago Summary

Habitat	Area (Acres)	Area (% of Marianas Islands)
<b>Barren</b>	11846	5
<b>Coastal</b>	2558	1
<b>Developed</b>	38361	15
<b>Leucaena Forest</b>	19194	8
<b>Monoculture Forest</b>	11585	5
<b>Native Forest</b>	38288	15
<b>Savanna and Grasslands</b>	38333	15
<b>Scrub and Herbaceous</b>	35688	14
<b>Secondary and Mixed Forest</b>	52464	21
<b>Unknown</b>	1160	<1
<b>Wetland</b>	1894	1

## Simple Island Summaries

### *Barren*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Barren</b>	FDM	45	25	<1
<b>Barren</b>	Maug	111	21	<1
<b>Barren</b>	Uracus	435	78	<1
<b>Barren</b>	Guguan	236	23	<1
<b>Barren</b>	Sarigan	332	30	<1
<b>Barren</b>	Aguiguan	202	12	<1
<b>Barren</b>	Asuncion	226	12	<1
<b>Barren</b>	Alamagan	505	16	<1
<b>Barren</b>	Anatahan	3225	39	1
<b>Barren</b>	Agrihan	184	2	<1
<b>Barren</b>	Pagan	2876	24	1
<b>Barren</b>	Rota	399	2	<1

<b>Barren</b>	Tinian	334	1	<1
<b>Barren</b>	Saipan	291	1	<1
<b>Barren</b>	Guam	2446	2	1

*Coastal*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Coastal</b>	Agrihan	38	<1	<1
<b>Coastal</b>	Pagan	90	1	<1
<b>Coastal</b>	Rota	373	2	<1
<b>Coastal</b>	Tinian	636	3	<1
<b>Coastal</b>	Saipan	468	2	<1
<b>Coastal</b>	Guam	953	1	<1

*Developed*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Developed</b>	Alamagan	<1	<1	<1
<b>Developed</b>	Agrihan	<1	<1	<1
<b>Developed</b>	Rota	1181	6	<1
<b>Developed</b>	Tinian	1542	6	1
<b>Developed</b>	Saipan	6788	23	3
<b>Developed</b>	Guam	28850	21	11

*Leucaena Forest*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Leucaena Forest</b>	Sarigan	9	1	<1
<b>Leucaena Forest</b>	Aguiguan	74	4	<1
<b>Leucaena Forest</b>	Agrihan	196	2	<1
<b>Leucaena Forest</b>	Pagan	2	<1	<1
<b>Leucaena Forest</b>	Rota	229	1	<1

<b>Leucaena Forest</b>	Tinian	8279	33	3
<b>Leucaena Forest</b>	Saipan	5492	19	2
<b>Leucaena Forest</b>	Guam	4914	4	2

#### *Monoculture Forest*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Monoculture Forest</b>	Maug	36	7	<1
<b>Monoculture Forest</b>	Sarigan	273	25	<1
<b>Monoculture Forest</b>	Aguiguan	30	2	<1
<b>Monoculture Forest</b>	Asuncion	156	8	<1
<b>Monoculture Forest</b>	Alamagan	508	16	<1
<b>Monoculture Forest</b>	Anatahan	3	<1	<1
<b>Monoculture Forest</b>	Agrihan	1013	9	<1
<b>Monoculture Forest</b>	Pagan	5177	44	2
<b>Monoculture Forest</b>	Rota	735	3	<1
<b>Monoculture Forest</b>	Tinian	904	4	<1
<b>Monoculture Forest</b>	Saipan	532	2	<1
<b>Monoculture Forest</b>	Guam	2217	2	1

#### *Native Forest*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Native Forest</b>	Maug	63	12	<1

<b>Native Forest</b>	Guguan	409	39	<1
<b>Native Forest</b>	Sarigan	125	11	<1
<b>Native Forest</b>	Aguiguan	939	55	<1
<b>Native Forest</b>	Asuncion	485	25	<1
<b>Native Forest</b>	Alamagan	252	8	<1
<b>Native Forest</b>	Anatahan	242	3	<1
<b>Native Forest</b>	Agrihan	2533	23	1
<b>Native Forest</b>	Pagan	25	<1	<1
<b>Native Forest</b>	Rota	10052	47	4
<b>Native Forest</b>	Tinian	1067	4	<1
<b>Native Forest</b>	Saipan	427	1	<1
<b>Native Forest</b>	Guam	21668	16	9

#### *Savanna and Grasslands*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Savanna and Grasslands</b>	Guguan	392	38	<1
<b>Savanna and Grasslands</b>	Sarigan	341	31	<1
<b>Savanna and Grasslands</b>	Asuncion	918	47	<1
<b>Savanna and Grasslands</b>	Alamagan	1530	48	1
<b>Savanna and Grasslands</b>	Anatahan	3678	44	1

<b>Savanna and Grasslands</b>	Agrihan	5357	49	2
<b>Savanna and Grasslands</b>	Pagan	2928	25	1
<b>Savanna and Grasslands</b>	Rota	225	1	<1
<b>Savanna and Grasslands</b>	Saipan	1194	4	<1
<b>Savanna and Grasslands</b>	Guam	21770	16	9

*Scrub and Herbaceous*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Scrub and Herbaceous</b>	FDM	129	72	<1
<b>Scrub and Herbaceous</b>	Maug	226	42	<1
<b>Scrub and Herbaceous</b>	Uracus	120	22	<1
<b>Scrub and Herbaceous</b>	Sarigan	15	1	<1
<b>Scrub and Herbaceous</b>	Aguiguan	446	26	<1
<b>Scrub and Herbaceous</b>	Asuncion	99	5	<1
<b>Scrub and Herbaceous</b>	Alamagan	146	5	<1
<b>Scrub and Herbaceous</b>	Anatahan	302	4	<1
<b>Scrub and Herbaceous</b>	Agrihan	1205	11	<1
<b>Scrub and Herbaceous</b>	Pagan	185	2	<1
<b>Scrub and Herbaceous</b>	Rota	5903	28	2
<b>Scrub and Herbaceous</b>	Tinian	6016	24	2

<b>Scrub and Herbaceous</b>	Saipan	3149	11	1
<b>Scrub and Herbaceous</b>	Guam	17747	13	7

*Secondary and Mixed Forest*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Secondary and Mixed Forest</b>	Sarigan	2	<1	<1
<b>Secondary and Mixed Forest</b>	Aguiguan	31	2	<1
<b>Secondary and Mixed Forest</b>	Alamagan	205	6	<1
<b>Secondary and Mixed Forest</b>	Anatahan	168	2	<1
<b>Secondary and Mixed Forest</b>	Pagan	403	3	<1
<b>Secondary and Mixed Forest</b>	Rota	2096	10	1
<b>Secondary and Mixed Forest</b>	Tinian	6186	25	2
<b>Secondary and Mixed Forest</b>	Saipan	10611	36	4
<b>Secondary and Mixed Forest</b>	Guam	32762	24	13

*Wetland*

Habitat	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Wetland</b>	Anatahan	249	3	<1
<b>Wetland</b>	Pagan	58	<1	<1
<b>Wetland</b>	Rota	9	<1	<1
<b>Wetland</b>	Tinian	35	<1	<1
<b>Wetland</b>	Saipan	450	2	<1
<b>Wetland</b>	Guam	1094	1	<1

Habitat Quality

*Barren*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Barren</b>	Barren	Federal DoD Leased	FDM	45	25	<1
<b>Barren</b>	Barren	Public	Maug	111	21	<1
<b>Barren</b>	Barren	Public	Uracus	435	78	<1
<b>Barren</b>	Barren	Public	Guguan	236	23	<1
<b>Barren</b>	Barren	Public	Sarigan	332	30	<1
<b>Barren</b>	Barren	Public	Aguiguan	202	12	<1
<b>Barren</b>	Barren	Public	Asuncion	226	12	<1
<b>Barren</b>	Barren	Public	Alamagan	505	16	<1
<b>Barren</b>	Barren	Public	Anatahan	3225	39	1
<b>Barren</b>	Barren	Public	Agrihan	184	2	<1
<b>Barren</b>	Barren	Public	Pagan	2876	24	1
<b>Barren</b>	Barren	Private	Rota	55	<1	<1
<b>Barren</b>	Barren	Public	Rota	227	1	<1
<b>Barren</b>	Barren	Public Homestead	Rota	7	<1	<1
<b>Barren</b>	Barren	Unknown	Rota	111	1	<1
<b>Barren</b>	Barren	Federal DoD Lease B*	Tinian	56	<1	<1

<b>Barren</b>	Barren	Federal DoD Leased	Tinian	62	<1	<1
<b>Barren</b>	Barren	Unknown	Tinian	216	1	<1
<b>Barren</b>	Barren	Private	Saipan	29	<1	<1
<b>Barren</b>	Barren	Public	Saipan	262	1	<1
<b>Barren</b>	Barren	Public Leased	Saipan	<1	<1	<1
<b>Barren</b>	Barren	Federal DoD	Guam	403	<1	<1
<b>Barren</b>	Barren	Federal NPS	Guam	10	<1	<1
<b>Barren</b>	Barren	Private	Guam	1090	1	<1
<b>Barren</b>	Barren	Public	Guam	303	<1	<1
<b>Barren</b>	Barren	Unknown	Guam	640	<1	<1
<b>Barren</b>	Barren	USFWS	Guam	<1	<1	<1

*Coastal*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Coastal</b>	Barren	Public	Agrihan	38	<1	<1
<b>Coastal</b>	Barren	Public	Pagan	90	1	<1
<b>Coastal</b>	Barren	Private	Rota	1	<1	<1
<b>Coastal</b>	Native Dominated	Private	Rota	9	<1	<1
<b>Coastal</b>	Barren	Public	Rota	44	<1	<1
<b>Coastal</b>	Native Dominated	Public	Rota	285	1	<1
<b>Coastal</b>	Barren	Unknown	Rota	21	<1	<1
<b>Coastal</b>	Native Dominated	Unknown	Rota	12	<1	<1
<b>Coastal</b>	Barren	Federal DoD Lease B*	Tinian	1	<1	<1
<b>Coastal</b>	Native Dominated	Federal DoD Lease B*	Tinian	93	<1	<1
<b>Coastal</b>	Barren	Federal DoD Leased	Tinian	6	<1	<1
<b>Coastal</b>	Native Dominated	Federal DoD Leased	Tinian	215	1	<1

<b>Coastal</b>	Barren	Unknown	Tinian	8	<1	<1
<b>Coastal</b>	Native Dominated	Unknown	Tinian	313	1	<1
<b>Coastal</b>	Barren	Federal NPS Leased	Saipan	2	<1	<1
<b>Coastal</b>	Barren	Private	Saipan	7	<1	<1
<b>Coastal</b>	Native Dominated	Private	Saipan	6	<1	<1
<b>Coastal</b>	Barren	Public	Saipan	117	<1	<1
<b>Coastal</b>	Native Dominated	Public	Saipan	333	1	<1
<b>Coastal</b>	Native Dominated	Public Homestead	Saipan	<1	<1	<1
<b>Coastal</b>	Barren	Public Leased	Saipan	1	<1	<1
<b>Coastal</b>	Native Dominated	Public Leased	Saipan	1	<1	<1
<b>Coastal</b>	Barren	Federal DoD	Guam	39	<1	<1
<b>Coastal</b>	Native Dominated	Federal DoD	Guam	169	<1	<1
<b>Coastal</b>	Barren	Federal NPS	Guam	5	<1	<1
<b>Coastal</b>	Barren	Private	Guam	44	<1	<1
<b>Coastal</b>	Native Dominated	Private	Guam	108	<1	<1
<b>Coastal</b>	Barren	Public	Guam	5	<1	<1
<b>Coastal</b>	Native Dominated	Public	Guam	189	<1	<1
<b>Coastal</b>	Barren	Unknown	Guam	128	<1	<1
<b>Coastal</b>	Native Dominated	Unknown	Guam	246	<1	<1
<b>Coastal</b>	Barren	USFWS	Guam	18	<1	<1
<b>Coastal</b>	Native Dominated	USFWS	Guam	2	<1	<1

*Developed*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Developed</b>	Developed	Public	Alamagan	<1	<1	<1
<b>Developed</b>	Developed	Public	Agrihan	<1	<1	<1
<b>Developed</b>	Barren	Private	Rota	9	<1	<1
<b>Developed</b>	Developed	Private	Rota	388	2	<1

<b>Developed</b>	Barren	Public	Rota	12	<1	<1
<b>Developed</b>	Developed	Public	Rota	738	3	<1
<b>Developed</b>	Developed	Public Homestead	Rota	30	<1	<1
<b>Developed</b>	Developed	Unknown	Rota	4	<1	<1
<b>Developed</b>	Developed	Federal DoD Lease B*	Tinian	234	1	<1
<b>Developed</b>	Developed	Federal DoD Leased	Tinian	301	1	<1
<b>Developed</b>	Barren	Unknown	Tinian	9	<1	<1
<b>Developed</b>	Developed	Unknown	Tinian	998	4	<1
<b>Developed</b>	Developed	Federal DoD Leased	Saipan	5	<1	<1
<b>Developed</b>	Developed	Federal NPS Leased	Saipan	48	<1	<1
<b>Developed</b>	Barren	Private	Saipan	29	<1	<1
<b>Developed</b>	Developed	Private	Saipan	4031	14	2
<b>Developed</b>	NonNative Dominated	Private	Saipan	<1	<1	<1
<b>Developed</b>	Open Water	Private	Saipan	1	<1	<1
<b>Developed</b>	Barren	Public	Saipan	27	<1	<1
<b>Developed</b>	Developed	Public	Saipan	2225	8	1
<b>Developed</b>	NonNative Dominated	Public	Saipan	<1	<1	<1
<b>Developed</b>	Open Water	Public	Saipan	<1	<1	<1
<b>Developed</b>	Developed	Public Homestead	Saipan	13	<1	<1
<b>Developed</b>	Barren	Public Leased	Saipan	9	<1	<1
<b>Developed</b>	Developed	Public Leased	Saipan	383	1	<1
<b>Developed</b>	Open Water	Public Leased	Saipan	1	<1	<1
<b>Developed</b>	Developed	Unknown	Saipan	18	<1	<1
<b>Developed</b>	Developed	Federal DoD	Guam	8515	6	3
<b>Developed</b>	Developed	Federal NPS	Guam	66	<1	<1
<b>Developed</b>	Barren	Private	Guam	31	<1	<1
<b>Developed</b>	Developed	Private	Guam	12179	9	5

<b>Developed</b>	NonNative Dominated	Private	Guam	<1	<1	<1
<b>Developed</b>	Barren	Public	Guam	58	<1	<1
<b>Developed</b>	Developed	Public	Guam	4292	3	2
<b>Developed</b>	NonNative Dominated	Public	Guam	1	<1	<1
<b>Developed</b>	Barren	Unknown	Guam	55	<1	<1
<b>Developed</b>	Developed	Unknown	Guam	3646	3	1
<b>Developed</b>	Developed	USFWS	Guam	8	<1	<1

*Leucaena Forest*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Leucaena Forest</b>	NonNative Dominated	Public	Sarigan	9	1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Public	Aguiguan	74	4	<1
<b>Leucaena Forest</b>	NonNative Dominated	Public	Agrihan	196	2	<1
<b>Leucaena Forest</b>	NonNative Dominated	Public	Pagan	2	<1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Private	Rota	154	1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Public	Rota	72	<1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Public Homestead	Rota	1	<1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Unknown	Rota	3	<1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Federal DoD Lease B*	Tinian	1369	5	1
<b>Leucaena Forest</b>	NonNative Dominated	Federal DoD Leased	Tinian	4006	16	2
<b>Leucaena Forest</b>	NonNative Dominated	Unknown	Tinian	2903	12	1
<b>Leucaena Forest</b>	NonNative Dominated	Federal NPS Leased	Saipan	<1	<1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Private	Saipan	1852	6	1
<b>Leucaena Forest</b>	NonNative Dominated	Public	Saipan	3393	12	1

<b>Leucaena Forest</b>	NonNative Dominated	Public Homestead	Saipan	124	<1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Public Leased	Saipan	122	<1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Unknown	Saipan	<1	<1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Federal DoD	Guam	1208	1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Federal NPS	Guam	39	<1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Private	Guam	2109	2	1
<b>Leucaena Forest</b>	NonNative Dominated	Public	Guam	727	1	<1
<b>Leucaena Forest</b>	NonNative Dominated	Unknown	Guam	832	1	<1

#### *Monoculture Forest*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Monoculture Forest</b>	NonNative Dominated	Public	Maug	36	7	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Sarigan	273	25	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Aguiguan	30	2	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Asuncion	156	8	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Alamagan	508	16	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Anatahan	3	<1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Agrihan	1013	9	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Pagan	5177	44	2
<b>Monoculture Forest</b>	NonNative Dominated	Private	Rota	456	2	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Rota	243	1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public Homestead	Rota	31	<1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Unknown	Rota	4	<1	<1

<b>Monoculture Forest</b>	NonNative Dominated	Federal DoD Lease B*	Tinian	354	1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Federal DoD Leased	Tinian	247	1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Unknown	Tinian	303	1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Federal DoD Leased	Saipan	<1	<1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Federal NPS Leased	Saipan	14	<1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Private	Saipan	277	1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Saipan	235	1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public Homestead	Saipan	3	<1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public Leased	Saipan	2	<1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Federal DoD	Guam	552	<1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Private	Guam	811	1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Public	Guam	248	<1	<1
<b>Monoculture Forest</b>	NonNative Dominated	Unknown	Guam	531	<1	<1
<b>Monoculture Forest</b>	NonNative Dominated	USFWS	Guam	75	<1	<1

#### *Native Forest*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Native Forest</b>	Native Dominated	Public	Maug	63	12	<1
<b>Native Forest</b>	Native Dominated	Public	Guguan	409	39	<1
<b>Native Forest</b>	Native Dominated	Public	Sarigan	125	11	<1
<b>Native Forest</b>	Native Dominated	Public	Aguiguan	939	55	<1

<b>Native Forest</b>	Native Dominated	Public	Asuncion	485	25	<1
<b>Native Forest</b>	Native Dominated	Public	Alamagan	252	8	<1
<b>Native Forest</b>	Native Dominated	Public	Anatahan	242	3	<1
<b>Native Forest</b>	Native Dominated	Public	Agrihan	2533	23	1
<b>Native Forest</b>	Native Dominated	Public	Pagan	25	<1	<1
<b>Native Forest</b>	Native Dominated	Private	Rota	1515	7	1
<b>Native Forest</b>	Native Dominated	Public	Rota	8294	39	3
<b>Native Forest</b>	Native Dominated	Public Homestead	Rota	240	1	<1
<b>Native Forest</b>	Native Dominated	Unknown	Rota	3	<1	<1
<b>Native Forest</b>	Native Dominated	Federal DoD Lease B*	Tinian	58	<1	<1
<b>Native Forest</b>	Native Dominated	Federal DoD Leased	Tinian	125	1	<1
<b>Native Forest</b>	Native Dominated	Unknown	Tinian	884	4	<1
<b>Native Forest</b>	Native Dominated	Private	Saipan	23	<1	<1
<b>Native Forest</b>	Native Dominated	Public	Saipan	405	1	<1
<b>Native Forest</b>	Native Dominated	Federal DoD	Guam	11735	9	5
<b>Native Forest</b>	Native Dominated	Federal NPS	Guam	17	<1	<1
<b>Native Forest</b>	Native Dominated	Private	Guam	3339	2	1
<b>Native Forest</b>	Native Dominated	Public	Guam	3164	2	1
<b>Native Forest</b>	Native Dominated	Unknown	Guam	3174	2	1
<b>Native Forest</b>	Native Dominated	USFWS	Guam	240	<1	<1

*Savanna and Grasslands*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Savanna and Grasslands</b>	Native Dominated	Public	Guguan	392	38	<1
<b>Savanna and Grasslands</b>	NonNative Dominated	Public	Sarigan	341	31	<1
<b>Savanna and Grasslands</b>	Native Dominated	Public	Asuncion	918	47	<1
<b>Savanna and Grasslands</b>	NonNative Dominated	Public	Alamagan	1530	48	1
<b>Savanna and Grasslands</b>	NonNative Dominated	Public	Anatahan	3678	44	1
<b>Savanna and Grasslands</b>	NonNative Dominated	Public	Agrihan	5357	49	2
<b>Savanna and Grasslands</b>	NonNative Dominated	Public	Pagan	2928	25	1
<b>Savanna and Grasslands</b>	NonNative Dominated	Private	Rota	26	<1	<1
<b>Savanna and Grasslands</b>	NonNative Dominated	Public	Rota	199	1	<1
<b>Savanna and Grasslands</b>	NonNative Dominated	Unknown	Rota	<1	<1	<1
<b>Savanna and Grasslands</b>	Native Dominated	Private	Saipan	286	1	<1
<b>Savanna and Grasslands</b>	Native Dominated	Public	Saipan	907	3	<1
<b>Savanna and Grasslands</b>	Native Dominated	Public Homestead	Saipan	1	<1	<1
<b>Savanna and Grasslands</b>	NonNative Dominated	Federal DoD	Guam	1453	1	1

<b>Savanna and Grasslands</b>	NonNative Dominated	Federal NPS	Guam	335	<1	<1
<b>Savanna and Grasslands</b>	NonNative Dominated	Private	Guam	8296	6	3
<b>Savanna and Grasslands</b>	NonNative Dominated	Public	Guam	5316	4	2
<b>Savanna and Grasslands</b>	NonNative Dominated	Unknown	Guam	6371	5	3

*Scrub and Herbaceous*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Scrub and Herbaceous</b>	Native Dominated	Federal DoD Leased	FDM	25	14	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Federal DoD Leased	FDM	105	59	<1
<b>Scrub and Herbaceous</b>	Native Dominated	Public	Maug	226	42	<1
<b>Scrub and Herbaceous</b>	Native Dominated	Public	Uracus	120	22	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public	Sarigan	15	1	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public	Aguiguan	446	26	<1
<b>Scrub and Herbaceous</b>	Native Dominated	Public	Asuncion	99	5	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public	Alamagan	146	5	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public	Anatahan	302	4	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public	Agrihan	1205	11	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public	Pagan	185	2	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Private	Rota	2226	10	1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public	Rota	2974	14	1

<b>Scrub and Herbaceous</b>	NonNative Dominated	Public Homestead	Rota	693	3	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Unknown	Rota	9	<1	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Federal DoD Lease B*	Tinian	2610	10	1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Federal DoD Leased	Tinian	1024	4	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Unknown	Tinian	2382	10	1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Federal NPS Leased	Saipan	20	<1	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Private	Saipan	1753	6	1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public	Saipan	1311	4	1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public Homestead	Saipan	53	<1	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public Leased	Saipan	13	<1	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Federal DoD	Guam	5764	4	2
<b>Scrub and Herbaceous</b>	NonNative Dominated	Federal NPS	Guam	166	<1	<1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Private	Guam	5332	4	2
<b>Scrub and Herbaceous</b>	NonNative Dominated	Public	Guam	3363	3	1
<b>Scrub and Herbaceous</b>	NonNative Dominated	Unknown	Guam	3097	2	1
<b>Scrub and Herbaceous</b>	NonNative Dominated	USFWS	Guam	24	<1	<1

#### *Secondary and Mixed Forest*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public	Sarigan	2	<1	<1
<b>Secondary and</b>	NonNative Dominated	Public	Aguiguan	31	2	<1

<b>Mixed Forest</b>						
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public	Alamagan	205	6	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public	Anatahan	168	2	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public	Pagan	403	3	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Private	Rota	1164	5	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public	Rota	693	3	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public Homestead	Rota	196	1	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Unknown	Rota	43	<1	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Federal DoD Lease B*	Tinian	2681	11	1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Federal DoD Leased	Tinian	1517	6	1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Unknown	Tinian	1988	8	1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Federal DoD Leased	Saipan	<1	<1	<1

<b>Secondary and Mixed Forest</b>	NonNative Dominated	Federal NPS Leased	Saipan	28	<1	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Private	Saipan	6763	23	3
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public	Saipan	3686	13	1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public Homestead	Saipan	114	<1	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public Leased	Saipan	21	<1	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Federal DoD	Guam	5203	4	2
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Federal NPS	Guam	345	<1	<1
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Private	Guam	16772	12	7
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Public	Guam	4721	4	2
<b>Secondary and Mixed Forest</b>	NonNative Dominated	Unknown	Guam	5721	4	2

*Wetland*

Habitat	Habitat Quality	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)

<b>Wetland</b>	Open Water	Public	Anatahan	249	3	<1
<b>Wetland</b>	Open Water	Public	Pagan	58	<1	<1
<b>Wetland</b>	NonNative Dominated	Public	Rota	1	<1	<1
<b>Wetland</b>	Open Water	Public	Rota	8	<1	<1
<b>Wetland</b>	Open Water	Federal DoD Lease B*	Tinian	<1	<1	<1
<b>Wetland</b>	NonNative Dominated	Federal DoD Leased	Tinian	34	<1	<1
<b>Wetland</b>	Open Water	Federal DoD Leased	Tinian	<1	<1	<1
<b>Wetland</b>	Open Water	Unknown	Tinian	1	<1	<1
<b>Wetland</b>	NonNative Dominated	Private	Saipan	180	1	<1
<b>Wetland</b>	Open Water	Private	Saipan	10	<1	<1
<b>Wetland</b>	NonNative Dominated	Public	Saipan	182	1	<1
<b>Wetland</b>	Open Water	Public	Saipan	65	<1	<1
<b>Wetland</b>	NonNative Dominated	Public Homestead	Saipan	2	<1	<1
<b>Wetland</b>	Open Water	Public Leased	Saipan	12	<1	<1
<b>Wetland</b>	NonNative Dominated	Federal DoD	Guam	101	<1	<1
<b>Wetland</b>	Open Water	Federal DoD	Guam	210	<1	<1
<b>Wetland</b>	NonNative Dominated	Federal NPS	Guam	1	<1	<1
<b>Wetland</b>	Open Water	Federal NPS	Guam	<1	<1	<1
<b>Wetland</b>	NonNative Dominated	Private	Guam	368	<1	<1
<b>Wetland</b>	Open Water	Private	Guam	48	<1	<1
<b>Wetland</b>	NonNative Dominated	Public	Guam	55	<1	<1
<b>Wetland</b>	Open Water	Public	Guam	32	<1	<1

<b>Wetland</b>	NonNative Dominated	Unknown	Guam	210	<1	<1
<b>Wetland</b>	Open Water	Unknown	Guam	70	<1	<1

## Land Ownership

### Barren

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)	
<b>Barren</b>	Federal DoD Leased	FDM	45	25	<1	
<b>Barren</b>	Public	Maug	111	21	<1	
<b>Barren</b>	Public	Uracus	435	78	<1	
<b>Barren</b>	Public	Guguan	236	23	<1	
<b>Barren</b>	Public	Sarigan	332	30	<1	
<b>Barren</b>	Public	Aguiguan	202	12	<1	
<b>Barren</b>	Public	Asuncion	226	12	<1	
<b>Barren</b>	Public	Alamagan	505	16	<1	
<b>Barren</b>	Public	Anatahan	3225	39	1	
<b>Barren</b>	Public	Agrihan	184	2	<1	
<b>Barren</b>	Public	Pagan	2876	24	1	
<b>Barren</b>	Private	Rota	55	<1	<1	
<b>Barren</b>	Public	Rota	227	1	<1	
<b>Barren</b>	Public Homestead	Rota	7	<1	<1	
<b>Barren</b>	Unknown	Rota	111	1	<1	
<b>Barren</b>	Federal DoD Lease B*	Tinian	56	<1	<1	
<b>Barren</b>	Federal DoD Leased	Tinian	62	<1	<1	
<b>Barren</b>	Unknown	Tinian	216	1	<1	
<b>Barren</b>	Private	Saipan	29	<1	<1	
<b>Barren</b>	Public	Saipan	262	1	<1	
<b>Barren</b>	Public Leased	Saipan	<1	<1	<1	
<b>Barren</b>	Federal DoD	Guam	403	<1	<1	

<b>Barren</b>	Federal NPS	Guam	10	<1	<1
<b>Barren</b>	Private	Guam	1090	1	<1
<b>Barren</b>	Public	Guam	303	<1	<1
<b>Barren</b>	Unknown	Guam	640	<1	<1
<b>Barren</b>	USFWS	Guam	<1	<1	<1

*Coastal*

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Coastal</b>	Public	Agrihan	38	<1	<1
<b>Coastal</b>	Public	Pagan	90	1	<1
<b>Coastal</b>	Private	Rota	11	<1	<1
<b>Coastal</b>	Public	Rota	329	2	<1
<b>Coastal</b>	Unknown	Rota	33	<1	<1
<b>Coastal</b>	Federal DoD Lease B*	Tinian	94	<1	<1
<b>Coastal</b>	Federal DoD Leased	Tinian	221	1	<1
<b>Coastal</b>	Unknown	Tinian	321	1	<1
<b>Coastal</b>	Federal NPS Leased	Saipan	2	<1	<1
<b>Coastal</b>	Private	Saipan	14	<1	<1
<b>Coastal</b>	Public	Saipan	450	2	<1
<b>Coastal</b>	Public Homestead	Saipan	<1	<1	<1
<b>Coastal</b>	Public Leased	Saipan	2	<1	<1
<b>Coastal</b>	Federal DoD	Guam	208	<1	<1
<b>Coastal</b>	Federal NPS	Guam	5	<1	<1
<b>Coastal</b>	Private	Guam	152	<1	<1
<b>Coastal</b>	Public	Guam	193	<1	<1
<b>Coastal</b>	Unknown	Guam	374	<1	<1
<b>Coastal</b>	USFWS	Guam	21	<1	<1

*Developed*

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Developed</b>	Public	Alamagan	<1	<1	<1
<b>Developed</b>	Public	Agrihan	<1	<1	<1
<b>Developed</b>	Private	Rota	397	2	<1
<b>Developed</b>	Public	Rota	750	4	<1
<b>Developed</b>	Public Homestead	Rota	30	<1	<1
<b>Developed</b>	Unknown	Rota	4	<1	<1
<b>Developed</b>	Federal DoD Lease B*	Tinian	234	1	<1
<b>Developed</b>	Federal DoD Leased	Tinian	301	1	<1
<b>Developed</b>	Unknown	Tinian	1006	4	<1
<b>Developed</b>	Federal DoD Leased	Saipan	5	<1	<1
<b>Developed</b>	Federal NPS Leased	Saipan	48	<1	<1
<b>Developed</b>	Private	Saipan	4061	14	2
<b>Developed</b>	Public	Saipan	2252	8	1
<b>Developed</b>	Public Homestead	Saipan	13	<1	<1
<b>Developed</b>	Public Leased	Saipan	392	1	<1
<b>Developed</b>	Unknown	Saipan	18	<1	<1
<b>Developed</b>	Federal DoD	Guam	8515	6	3
<b>Developed</b>	Federal NPS	Guam	66	<1	<1
<b>Developed</b>	Private	Guam	12210	9	5
<b>Developed</b>	Public	Guam	4351	3	2
<b>Developed</b>	Unknown	Guam	3700	3	1
<b>Developed</b>	USFWS	Guam	8	<1	<1

*Leucaena Forest*

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of

					<b>Marianas Islands)</b>
<b>Leucaena Forest</b>	Public	Sarigan	9	1	<1
<b>Leucaena Forest</b>	Public	Aguiguan	74	4	<1
<b>Leucaena Forest</b>	Public	Agrihan	196	2	<1
<b>Leucaena Forest</b>	Public	Pagan	2	<1	<1
<b>Leucaena Forest</b>	Private	Rota	154	1	<1
<b>Leucaena Forest</b>	Public	Rota	72	<1	<1
<b>Leucaena Forest</b>	Public Homestead	Rota	1	<1	<1
<b>Leucaena Forest</b>	Unknown	Rota	3	<1	<1
<b>Leucaena Forest</b>	Federal DoD Lease B*	Tinian	1369	5	1
<b>Leucaena Forest</b>	Federal DoD Leased	Tinian	4006	16	2
<b>Leucaena Forest</b>	Unknown	Tinian	2903	12	1
<b>Leucaena Forest</b>	Federal NPS Leased	Saipan	<1	<1	<1
<b>Leucaena Forest</b>	Private	Saipan	1852	6	1
<b>Leucaena Forest</b>	Public	Saipan	3393	12	1
<b>Leucaena Forest</b>	Public Homestead	Saipan	124	<1	<1
<b>Leucaena Forest</b>	Public Leased	Saipan	122	<1	<1
<b>Leucaena Forest</b>	Unknown	Saipan	<1	<1	<1
<b>Leucaena Forest</b>	Federal DoD	Guam	1208	1	<1
<b>Leucaena Forest</b>	Federal NPS	Guam	39	<1	<1
<b>Leucaena Forest</b>	Private	Guam	2109	2	1
<b>Leucaena Forest</b>	Public	Guam	727	1	<1

<b>Leucaena Forest</b>	Unknown	Guam	832	1	<1
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*Monoculture Forest*

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Monoculture Forest</b>	Public	Maug	36	7	<1
<b>Monoculture Forest</b>	Public	Sarigan	273	25	<1
<b>Monoculture Forest</b>	Public	Aguiguan	30	2	<1
<b>Monoculture Forest</b>	Public	Asuncion	156	8	<1
<b>Monoculture Forest</b>	Public	Alamagan	508	16	<1
<b>Monoculture Forest</b>	Public	Anatahan	3	<1	<1
<b>Monoculture Forest</b>	Public	Agrihan	1013	9	<1
<b>Monoculture Forest</b>	Public	Pagan	5177	44	2
<b>Monoculture Forest</b>	Private	Rota	456	2	<1
<b>Monoculture Forest</b>	Public	Rota	243	1	<1
<b>Monoculture Forest</b>	Public Homestead	Rota	31	<1	<1
<b>Monoculture Forest</b>	Unknown	Rota	4	<1	<1
<b>Monoculture Forest</b>	Federal DoD Lease B*	Tinian	354	1	<1
<b>Monoculture Forest</b>	Federal DoD Leased	Tinian	247	1	<1
<b>Monoculture Forest</b>	Unknown	Tinian	303	1	<1
<b>Monoculture Forest</b>	Federal DoD Leased	Saipan	<1	<1	<1
<b>Monoculture Forest</b>	Federal NPS Leased	Saipan	14	<1	<1

<b>Monoculture Forest</b>	Private	Saipan	277	1	<1
<b>Monoculture Forest</b>	Public	Saipan	235	1	<1
<b>Monoculture Forest</b>	Public Homestead	Saipan	3	<1	<1
<b>Monoculture Forest</b>	Public Leased	Saipan	2	<1	<1
<b>Monoculture Forest</b>	Federal DoD	Guam	552	<1	<1
<b>Monoculture Forest</b>	Private	Guam	811	1	<1
<b>Monoculture Forest</b>	Public	Guam	248	<1	<1
<b>Monoculture Forest</b>	Unknown	Guam	531	<1	<1
<b>Monoculture Forest</b>	USFWS	Guam	75	<1	<1

*Native Forest*

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Native Forest</b>	Public	Maug	63	12	<1
<b>Native Forest</b>	Public	Guguan	409	39	<1
<b>Native Forest</b>	Public	Sarigan	125	11	<1
<b>Native Forest</b>	Public	Aguiguan	939	55	<1
<b>Native Forest</b>	Public	Asuncion	485	25	<1
<b>Native Forest</b>	Public	Alamagan	252	8	<1
<b>Native Forest</b>	Public	Anatahan	242	3	<1
<b>Native Forest</b>	Public	Agrihan	2533	23	1
<b>Native Forest</b>	Public	Pagan	25	<1	<1
<b>Native Forest</b>	Private	Rota	1515	7	1
<b>Native Forest</b>	Public	Rota	8294	39	3

<b>Native Forest</b>	Public Homestead	Rota	240	1	<1
<b>Native Forest</b>	Unknown	Rota	3	<1	<1
<b>Native Forest</b>	Federal DoD Lease B*	Tinian	58	<1	<1
<b>Native Forest</b>	Federal DoD Leased	Tinian	125	1	<1
<b>Native Forest</b>	Unknown	Tinian	884	4	<1
<b>Native Forest</b>	Private	Saipan	23	<1	<1
<b>Native Forest</b>	Public	Saipan	405	1	<1
<b>Native Forest</b>	Federal DoD	Guam	11735	9	5
<b>Native Forest</b>	Federal NPS	Guam	17	<1	<1
<b>Native Forest</b>	Private	Guam	3339	2	1
<b>Native Forest</b>	Public	Guam	3164	2	1
<b>Native Forest</b>	Unknown	Guam	3174	2	1
<b>Native Forest</b>	USFWS	Guam	240	<1	<1

#### *Savanna and Grasslands*

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Savanna and Grasslands</b>	Public	Guguan	392	38	<1
<b>Savanna and Grasslands</b>	Public	Sarigan	341	31	<1
<b>Savanna and Grasslands</b>	Public	Asuncion	918	47	<1
<b>Savanna and Grasslands</b>	Public	Alamagan	1530	48	1

<b>Savanna and Grasslands</b>	Public	Anatahan	3678	44	1
<b>Savanna and Grasslands</b>	Public	Agrihan	5357	49	2
<b>Savanna and Grasslands</b>	Public	Pagan	2928	25	1
<b>Savanna and Grasslands</b>	Private	Rota	26	<1	<1
<b>Savanna and Grasslands</b>	Public	Rota	199	1	<1
<b>Savanna and Grasslands</b>	Unknown	Rota	<1	<1	<1
<b>Savanna and Grasslands</b>	Private	Saipan	286	1	<1
<b>Savanna and Grasslands</b>	Public	Saipan	907	3	<1
<b>Savanna and Grasslands</b>	Public Homestead	Saipan	1	<1	<1
<b>Savanna and Grasslands</b>	Federal DoD	Guam	1453	1	1
<b>Savanna and Grasslands</b>	Federal NPS	Guam	335	<1	<1
<b>Savanna and Grasslands</b>	Private	Guam	8296	6	3
<b>Savanna and Grasslands</b>	Public	Guam	5316	4	2
<b>Savanna and Grasslands</b>	Unknown	Guam	6371	5	3

*Scrub and Herbaceous*

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Scrub and Herbaceous</b>	Federal DoD Leased	FDM	129	72	<1
<b>Scrub and Herbaceous</b>	Public	Maug	226	42	<1
<b>Scrub and Herbaceous</b>	Public	Uracus	120	22	<1
<b>Scrub and Herbaceous</b>	Public	Sarigan	15	1	<1
<b>Scrub and Herbaceous</b>	Public	Aguiguan	446	26	<1
<b>Scrub and Herbaceous</b>	Public	Asuncion	99	5	<1
<b>Scrub and Herbaceous</b>	Public	Alamagan	146	5	<1
<b>Scrub and Herbaceous</b>	Public	Anatahan	302	4	<1
<b>Scrub and Herbaceous</b>	Public	Agrihan	1205	11	<1
<b>Scrub and Herbaceous</b>	Public	Pagan	185	2	<1
<b>Scrub and Herbaceous</b>	Private	Rota	2226	10	1
<b>Scrub and Herbaceous</b>	Public	Rota	2974	14	1
<b>Scrub and Herbaceous</b>	Public Homestead	Rota	693	3	<1
<b>Scrub and Herbaceous</b>	Unknown	Rota	9	<1	<1
<b>Scrub and Herbaceous</b>	Federal DoD Lease B*	Tinian	2610	10	1
<b>Scrub and Herbaceous</b>	Federal DoD Leased	Tinian	1024	4	<1
<b>Scrub and Herbaceous</b>	Unknown	Tinian	2382	10	1
<b>Scrub and Herbaceous</b>	Federal NPS Leased	Saipan	20	<1	<1
<b>Scrub and Herbaceous</b>	Private	Saipan	1753	6	1

<b>Scrub and Herbaceous</b>	Public	Saipan	1311	4	1
<b>Scrub and Herbaceous</b>	Public Homestead	Saipan	53	<1	<1
<b>Scrub and Herbaceous</b>	Public Leased	Saipan	13	<1	<1
<b>Scrub and Herbaceous</b>	Federal DoD	Guam	5764	4	2
<b>Scrub and Herbaceous</b>	Federal NPS	Guam	166	<1	<1
<b>Scrub and Herbaceous</b>	Private	Guam	5332	4	2
<b>Scrub and Herbaceous</b>	Public	Guam	3363	3	1
<b>Scrub and Herbaceous</b>	Unknown	Guam	3097	2	1
<b>Scrub and Herbaceous</b>	USFWS	Guam	24	<1	<1

*Secondary and Mixed Forest*

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Secondary and Mixed Forest</b>	Public	Sarigan	2	<1	<1
<b>Secondary and Mixed Forest</b>	Public	Aguiguan	31	2	<1
<b>Secondary and Mixed Forest</b>	Public	Alamagan	205	6	<1
<b>Secondary and Mixed Forest</b>	Public	Anatahan	168	2	<1
<b>Secondary and Mixed Forest</b>	Public	Pagan	403	3	<1
<b>Secondary and</b>	Private	Rota	1164	5	<1

<b>Mixed Forest</b>					
<b>Secondary and Mixed Forest</b>	Public	Rota	693	3	<1
<b>Secondary and Mixed Forest</b>	Public Homestead	Rota	196	1	<1
<b>Secondary and Mixed Forest</b>	Unknown	Rota	43	<1	<1
<b>Secondary and Mixed Forest</b>	Federal DoD Lease B*	Tinian	2681	11	1
<b>Secondary and Mixed Forest</b>	Federal DoD Leased	Tinian	1517	6	1
<b>Secondary and Mixed Forest</b>	Unknown	Tinian	1988	8	1
<b>Secondary and Mixed Forest</b>	Federal DoD Leased	Saipan	<1	<1	<1
<b>Secondary and Mixed Forest</b>	Federal NPS Leased	Saipan	28	<1	<1
<b>Secondary and Mixed Forest</b>	Private	Saipan	6763	23	3
<b>Secondary and Mixed Forest</b>	Public	Saipan	3686	13	1
<b>Secondary and Mixed Forest</b>	Public Homestead	Saipan	114	<1	<1

<b>Secondary and Mixed Forest</b>	Public Leased	Saipan	21	<1	<1
<b>Secondary and Mixed Forest</b>	Federal DoD	Guam	5203	4	2
<b>Secondary and Mixed Forest</b>	Federal NPS	Guam	345	<1	<1
<b>Secondary and Mixed Forest</b>	Private	Guam	16772	12	7
<b>Secondary and Mixed Forest</b>	Public	Guam	4721	4	2
<b>Secondary and Mixed Forest</b>	Unknown	Guam	5721	4	2

*Wetland*

Habitat	Land Ownership	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Wetland</b>	Public	Anatahan	249	3	<1
<b>Wetland</b>	Public	Pagan	58	<1	<1
<b>Wetland</b>	Public	Rota	9	<1	<1
<b>Wetland</b>	Federal DoD Lease B*	Tinian	<1	<1	<1
<b>Wetland</b>	Federal DoD Leased	Tinian	34	<1	<1
<b>Wetland</b>	Unknown	Tinian	1	<1	<1
<b>Wetland</b>	Private	Saipan	189	1	<1
<b>Wetland</b>	Public	Saipan	247	1	<1
<b>Wetland</b>	Public Homestead	Saipan	2	<1	<1
<b>Wetland</b>	Public Leased	Saipan	12	<1	<1

<b>Wetland</b>	Federal DoD	Guam	311	<1	<1
<b>Wetland</b>	Federal NPS	Guam	1	<1	<1
<b>Wetland</b>	Private	Guam	415	<1	<1
<b>Wetland</b>	Public	Guam	87	<1	<1
<b>Wetland</b>	Unknown	Guam	280	<1	<1

## Conservation

### *Barren*

Island	Reserve Type	Area in Reserves (Acres)	Island Area (Acres)	Reserve Area (% of Island)	Reserve Area (% of Marianas Islands)
<b>Maug</b>	CNMI	111	534	21	<1
<b>Uracus</b>	CNMI	435	554	78	<1
<b>Guguan</b>	CNMI	236	1038	23	<1
<b>Asuncion</b>	CNMI	226	1945	12	<1
<b>Rota</b>	CNMI	1	21214	<1	<1
<b>Rota</b>	CNMI and Rota	28	21214	<1	<1
<b>Rota</b>	Rota	58	21214	<1	<1
<b>Tinian</b>	CNMI Mitigation Area	1	25003	<1	<1
<b>Tinian</b>	Tinian	6	25003	<1	<1
<b>Saipan</b>	CNMI	56	29408	<1	<1
<b>Guam</b>	Eco Res Area	1	134421	<1	<1
<b>Guam</b>	Guam	50	134421	<1	<1
<b>Guam</b>	NPS	10	134421	<1	<1
<b>Guam</b>	Territorial Seashore	62	134421	<1	<1
<b>Guam</b>	USFWS NWR	<1	134421	<1	<1
<b>Guam</b>	USFWS NWR Overlay	169	134421	<1	<1

*Coastal*

Island	Reserve Type	Area in Reserves (Acres)	Island Area (Acres)	Reserve Area (% of Island)	Reserve Area (% of Marianas Islands)
Rota	CNMI	1	21214	<1	<1
Rota	CNMI and Rota	125	21214	1	<1
Rota	Rota	29	21214	<1	<1
Tinian	Tinian	23	25003	<1	<1
Saipan	CNMI	66	29408	<1	<1
Guam	Eco Res Area	1	134421	<1	<1
Guam	Guam	45	134421	<1	<1
Guam	NPS	5	134421	<1	<1
Guam	Territorial Seashore	30	134421	<1	<1
Guam	USFWS NWR	21	134421	<1	<1
Guam	USFWS NWR Overlay	174	134421	<1	<1

*Developed*

Island	Reserve Type	Area in Reserves (Acres)	Island Area (Acres)	Reserve Area (% of Island)	Reserve Area (% of Marianas Islands)
Rota	CNMI	<1	21214	<1	<1
Rota	CNMI and Rota	1	21214	<1	<1
Rota	Rota	29	21214	<1	<1
Tinian	Tinian	<1	25003	<1	<1
Saipan	CNMI	8	29408	<1	<1
Saipan	NPS	2	29408	<1	<1
Guam	Guam	11	134421	<1	<1
Guam	NPS	66	134421	<1	<1
Guam	Territorial Seashore	94	134421	<1	<1
Guam	USFWS NWR	8	134421	<1	<1

<b>Guam</b>	USFWS NWR Overlay	1870	134421	1	1
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*Leucaena Forest*

<b>Island</b>	<b>Reserve Type</b>	<b>Area in Reserves (Acres)</b>	<b>Island Area (Acres)</b>	<b>Reserve Area (% of Island)</b>	<b>Reserve Area (% of Marianas Islands)</b>
<b>Rota</b>	Rota	3	21214	<1	<1
<b>Tinian</b>	CNMI Mitigation Area	12	25003	<1	<1
<b>Tinian</b>	Tinian	16	25003	<1	<1
<b>Saipan</b>	CNMI	620	29408	2	<1
<b>Guam</b>	Eco Res Area	1	134421	<1	<1
<b>Guam</b>	Guam	<1	134421	<1	<1
<b>Guam</b>	NPS	39	134421	<1	<1
<b>Guam</b>	Territorial Seashore	49	134421	<1	<1
<b>Guam</b>	USFWS NWR Overlay	123	134421	<1	<1

*Monoculture Forest*

<b>Island</b>	<b>Reserve Type</b>	<b>Area in Reserves (Acres)</b>	<b>Island Area (Acres)</b>	<b>Reserve Area (% of Island)</b>	<b>Reserve Area (% of Marianas Islands)</b>
<b>Maug</b>	CNMI	36	534	7	<1
<b>Asuncion</b>	CNMI	156	1945	8	<1
<b>Rota</b>	CNMI	1	21214	<1	<1
<b>Rota</b>	CNMI and Rota	<1	21214	<1	<1
<b>Rota</b>	Rota	39	21214	<1	<1
<b>Tinian</b>	CNMI Mitigation Area	15	25003	<1	<1
<b>Tinian</b>	Tinian	11	25003	<1	<1
<b>Saipan</b>	CNMI	16	29408	<1	<1
<b>Saipan</b>	NPS	5	29408	<1	<1

<b>Guam</b>	Guam	173	134421	<1	<1
<b>Guam</b>	Territorial Seashore	137	134421	<1	<1
<b>Guam</b>	USFWS NWR	75	134421	<1	<1
<b>Guam</b>	USFWS NWR Overlay	488	134421	<1	<1

*Native Forest*

Island	Reserve Type	Area in Reserves (Acres)	Island Area (Acres)	Reserve Area (% of Island)	Reserve Area (% of Marianas Islands)
<b>Maug</b>	CNMI	63	534	12	<1
<b>Guguan</b>	CNMI	409	1038	39	<1
<b>Asuncion</b>	CNMI	485	1945	25	<1
<b>Rota</b>	CNMI	523	21214	2	<1
<b>Rota</b>	CNMI and Rota	364	21214	2	<1
<b>Rota</b>	Rota	2947	21214	14	1
<b>Tinian</b>	CNMI Mitigation Area	41	25003	<1	<1
<b>Tinian</b>	Tinian	80	25003	<1	<1
<b>Saipan</b>	CNMI	227	29408	1	<1
<b>Guam</b>	Eco Res Area	<1	134421	<1	<1
<b>Guam</b>	Guam	1344	134421	1	1
<b>Guam</b>	NPS	17	134421	<1	<1
<b>Guam</b>	Territorial Seashore	648	134421	<1	<1
<b>Guam</b>	USFWS NWR	240	134421	<1	<1
<b>Guam</b>	USFWS NWR Overlay	10559	134421	8	4

*Savanna and Grasslands*

Island	Reserve Type	Area in Reserves (Acres)	Island Area (Acres)	Reserve Area (% of Island)	Reserve Area (% of

					<b>Marianas Islands)</b>
<b>Guguan</b>	CNMI	392	1038	38	<1
<b>Asuncion</b>	CNMI	918	1945	47	<1
<b>Rota</b>	Rota	186	21214	1	<1
<b>Guam</b>	Guam	1181	134421	1	<1
<b>Guam</b>	NPS	335	134421	<1	<1
<b>Guam</b>	Territorial Seashore	2142	134421	2	1
<b>Guam</b>	USFWS NWR Overlay	1465	134421	1	1

*Scrub and Herbaceous*

<b>Island</b>	<b>Reserve Type</b>	<b>Area in Reserves (Acres)</b>	<b>Island Area (Acres)</b>	<b>Reserve Area (% of Island)</b>	<b>Reserve Area (% of Marianas Islands)</b>
<b>Maug</b>	CNMI	226	534	42	<1
<b>Uracus</b>	CNMI	120	554	22	<1
<b>Asuncion</b>	CNMI	99	1945	5	<1
<b>Rota</b>	CNMI	20	21214	<1	<1
<b>Rota</b>	CNMI and Rota	21	21214	<1	<1
<b>Rota</b>	Rota	967	21214	5	<1
<b>Tinian</b>	CNMI Mitigation Area	407	25003	2	<1
<b>Tinian</b>	Tinian	1	25003	<1	<1
<b>Saipan</b>	CNMI	87	29408	<1	<1
<b>Saipan</b>	NPS	11	29408	<1	<1
<b>Guam</b>	Eco Res Area	1	134421	<1	<1
<b>Guam</b>	Guam	764	134421	1	<1
<b>Guam</b>	NPS	166	134421	<1	<1
<b>Guam</b>	Territorial Seashore	383	134421	<1	<1
<b>Guam</b>	USFWS NWR	24	134421	<1	<1
<b>Guam</b>	USFWS NWR Overlay	4265	134421	3	2

*Secondary and Mixed Forest*

Island	Reserve Type	Area in Reserves (Acres)	Island Area (Acres)	Reserve Area (% of Island)	Reserve Area (% of Marianas Islands)
Rota	Rota	65	21214	<1	<1
Tinian	CNMI Mitigation Area	451	25003	2	<1
Tinian	Tinian	1	25003	<1	<1
Saipan	CNMI	790	29408	3	<1
Saipan	NPS	21	29408	<1	<1
Guam	Guam	171	134421	<1	<1
Guam	NPS	345	134421	<1	<1
Guam	Territorial Seashore	252	134421	<1	<1
Guam	USFWS NWR Overlay	3102	134421	2	1

*Wetland*

Island	Reserve Type	Area in Reserves (Acres)	Island Area (Acres)	Reserve Area (% of Island)	Reserve Area (% of Marianas Islands)
Tinian	Tinian	<1	25003	<1	<1
Saipan	CNMI	1	29408	<1	<1
Guam	Guam	5	134421	<1	<1
Guam	NPS	1	134421	<1	<1
Guam	Territorial Seashore	7	134421	<1	<1
Guam	USFWS NWR Overlay	258	134421	<1	<1

*Critical Habitat*

*Barren*

Island	Critical Habitat Type	Area in Critical	Island Area (Acres)	Critical Habitat Area (%)	Critical Habitat Area (%)

		Habitat (Acres)		of Island)	of Marianas Islands)
<b>Rota</b>	Aga	16	21214	<1	<1
<b>Rota</b>	Aga and Nosa Luta	1	21214	<1	<1
<b>Rota</b>	Nosa Luta	1	21214	<1	<1
<b>Guam</b>	Aga, Sihek, and Fanihi	<1	134421	<1	<1

*Coastal*

Island	Critical Habitat Type	Area in Critical Habitat (Acres)	Island Area (Acres)	Critical Habitat Area (% of Island)	Critical Habitat Area (% of Marianas Islands)
<b>Rota</b>	Aga	90	21214	<1	<1
<b>Guam</b>	Aga, Sihek, and Fanihi	21	134421	<1	<1

*Developed*

Island	Critical Habitat Type	Area in Critical Habitat (Acres)	Island Area (Acres)	Critical Habitat Area (% of Island)	Critical Habitat Area (% of Marianas Islands)
<b>Rota</b>	Aga	10	21214	<1	<1
<b>Rota</b>	Aga and Nosa Luta	1	21214	<1	<1
<b>Rota</b>	Nosa Luta	2	21214	<1	<1
<b>Guam</b>	Aga, Sihek, and Fanihi	8	134421	<1	<1

*Leucaena Forest*

Island	Critical Habitat Type	Area in Critical Habitat (Acres)	Island Area (Acres)	Critical Habitat Area (% of Island)	Critical Habitat Area (% of Marianas Islands)
Rota	Aga	87	21214	<1	<1

*Monoculture Forest*

Island	Critical Habitat Type	Area in Critical Habitat (Acres)	Island Area (Acres)	Critical Habitat Area (% of Island)	Critical Habitat Area (% of Marianas Islands)
Rota	Aga	89	21214	<1	<1
Rota	Aga and Nosa Luta	17	21214	<1	<1
Rota	Nosa Luta	19	21214	<1	<1
Guam	Aga, Sihek, and Fanihi	75	134421	<1	<1

*Native Forest*

Island	Critical Habitat Type	Area in Critical Habitat (Acres)	Island Area (Acres)	Critical Habitat Area (% of Island)	Critical Habitat Area (% of Marianas Islands)
Rota	Aga	3890	21214	18	2
Rota	Aga and Nosa Luta	1176	21214	6	<1
Rota	Nosa Luta	2494	21214	12	1
Guam	Aga, Sihek, and Fanihi	240	134421	<1	<1

*Savanna and Grasslands*

Island	Critical Habitat Type	Area in Critical Habitat (Acres)	Island Area (Acres)	Critical Habitat Area (% of Island)	Critical Habitat Area (% of Marianas Islands)
Rota	Aga	38	21214	<1	<1
Rota	Aga and Nosa Luta	1	21214	<1	<1
Rota	Nosa Luta	3	21214	<1	<1

*Scrub and Herbaceous*

Island	Critical Habitat Type	Area in Critical Habitat (Acres)	Island Area (Acres)	Critical Habitat Area (% of Island)	Critical Habitat Area (% of Marianas Islands)
Rota	Aga	426	21214	2	<1
Rota	Aga and Nosa Luta	13	21214	<1	<1
Rota	Nosa Luta	189	21214	1	<1
Guam	Aga, Sihek, and Fanihi	24	134421	<1	<1

*Secondary and Mixed Forest*

Island	Critical Habitat Type	Area in Critical Habitat (Acres)	Island Area (Acres)	Critical Habitat Area (% of Island)	Critical Habitat Area (% of Marianas Islands)
Rota	Aga	161	21214	1	<1
Rota	Aga and Nosa Luta	17	21214	<1	<1
Rota	Nosa Luta	25	21214	<1	<1

## Vegetation Type

### Barren

Habitat	Vegetation Class	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Barren</b>	Bare Rock	FDM	34	19	<1
<b>Barren</b>	Bare Soil/Gravel	FDM	11	6	<1
<b>Barren</b>	Bare Rock	Maug	111	21	<1
<b>Barren</b>	Bare Rock	Uracus	424	77	<1
<b>Barren</b>	Bare Soil/Gravel	Uracus	11	2	<1
<b>Barren</b>	Bare Rock	Guguan	119	11	<1
<b>Barren</b>	Bare Soil/Gravel	Guguan	117	11	<1
<b>Barren</b>	Bare Rock	Sarigan	98	9	<1
<b>Barren</b>	Bare Soil/Gravel	Sarigan	234	21	<1
<b>Barren</b>	Bare Rock	Aguiguan	159	9	<1
<b>Barren</b>	Bare Soil/Gravel	Aguiguan	43	2	<1
<b>Barren</b>	Bare Rock	Asuncion	109	6	<1
<b>Barren</b>	Bare Soil/Gravel	Asuncion	117	6	<1
<b>Barren</b>	Bare Rock	Alamagan	94	3	<1
<b>Barren</b>	Bare Soil/Gravel	Alamagan	411	13	<1
<b>Barren</b>	Bare Soil/Gravel	Anatahan	3225	39	1
<b>Barren</b>	Bare Rock	Agrihan	184	2	<1
<b>Barren</b>	Bare Rock	Pagan	2485	21	1
<b>Barren</b>	Bare Soil/Gravel	Pagan	391	3	<1
<b>Barren</b>	Bare Rock	Rota	250	1	<1
<b>Barren</b>	Bare Soil/Gravel	Rota	149	1	<1
<b>Barren</b>	Bare Rock	Tinian	319	1	<1
<b>Barren</b>	Bare Soil/Gravel	Tinian	15	<1	<1
<b>Barren</b>	Bare Rock	Saipan	241	1	<1
<b>Barren</b>	Bare Soil/Gravel	Saipan	50	<1	<1
<b>Barren</b>	Bare Rock	Guam	79	<1	<1

<b>Barren</b>	Bare Soil/Gravel	Guam	2366	2	1
<b>Barren</b>	Sand	Guam	2	<1	<1

### Coastal

Habitat	Vegetation Class	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Coastal</b>	Sand	Agrihan	38	<1	<1
<b>Coastal</b>	Sand	Pagan	90	1	<1
<b>Coastal</b>	Coastal Scrub	Rota	307	1	<1
<b>Coastal</b>	Sand	Rota	66	<1	<1
<b>Coastal</b>	Coastal Scrub	Tinian	621	2	<1
<b>Coastal</b>	Sand	Tinian	15	<1	<1
<b>Coastal</b>	Coastal Scrub	Saipan	339	1	<1
<b>Coastal</b>	Mangrove Wetland	Saipan	2	<1	<1
<b>Coastal</b>	Sand	Saipan	127	<1	<1
<b>Coastal</b>	Coastal Scrub	Guam	532	<1	<1
<b>Coastal</b>	Mangrove Wetland	Guam	182	<1	<1
<b>Coastal</b>	Sand	Guam	239	<1	<1

### Leucaena Forest

Habitat	Vegetation Class	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Leucaena Forest</b>	Leucaena Thicket	Sarigan	9	1	<1
<b>Leucaena Forest</b>	Leucaena Thicket	Aguiguan	74	4	<1
<b>Leucaena Forest</b>	Leucaena Thicket	Agrihan	196	2	<1
<b>Leucaena Forest</b>	Leucaena Thicket	Pagan	2	<1	<1
<b>Leucaena Forest</b>	Leucaena Thicket	Rota	229	1	<1
<b>Leucaena Forest</b>	Leucaena Thicket	Tinian	8279	33	3
<b>Leucaena Forest</b>	Leucaena Thicket	Saipan	5492	19	2

<b>Leucaena Forest</b>	Leucaena Thicket	Guam	4914	4	2
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### Monoculture Forest

Habitat	Vegetation Class	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Monoculture Forest</b>	Coconut Forest	Maug	36	7	<1
<b>Monoculture Forest</b>	Coconut Forest	Sarigan	273	25	<1
<b>Monoculture Forest</b>	Casuarina Forest	Aguiguan	30	2	<1
<b>Monoculture Forest</b>	Coconut Forest	Asuncion	156	8	<1
<b>Monoculture Forest</b>	Coconut Forest	Alamagan	508	16	<1
<b>Monoculture Forest</b>	Coconut Forest	Anatahan	3	<1	<1
<b>Monoculture Forest</b>	Casuarina Forest	Agrihan	10	<1	<1
<b>Monoculture Forest</b>	Coconut Forest	Agrihan	1003	9	<1
<b>Monoculture Forest</b>	Casuarina Forest	Pagan	4014	34	2
<b>Monoculture Forest</b>	Coconut Forest	Pagan	1163	10	<1
<b>Monoculture Forest</b>	Bamboo Thicket	Rota	68	<1	<1
<b>Monoculture Forest</b>	Casuarina Forest	Rota	170	1	<1
<b>Monoculture Forest</b>	Coconut Forest	Rota	497	2	<1
<b>Monoculture Forest</b>	Bamboo Thicket	Tinian	16	<1	<1
<b>Monoculture Forest</b>	Casuarina Forest	Tinian	781	3	<1
<b>Monoculture Forest</b>	Coconut Forest	Tinian	108	<1	<1
<b>Monoculture Forest</b>	Bamboo Thicket	Saipan	6	<1	<1
<b>Monoculture Forest</b>	Casuarina Forest	Saipan	231	1	<1
<b>Monoculture Forest</b>	Coconut Forest	Saipan	295	1	<1

<b>Monoculture Forest</b>	Acacia Forest	Guam	217	<1	<1
<b>Monoculture Forest</b>	Bamboo Thicket	Guam	508	<1	<1
<b>Monoculture Forest</b>	Casuarina Forest	Guam	147	<1	<1
<b>Monoculture Forest</b>	Coconut Forest	Guam	1345	1	1

#### Native Forest

Habitat	Vegetation Class	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Native Forest</b>	Hibiscus Thicket	Maug	39	7	<1
<b>Native Forest</b>	Native Volcanic Forest	Maug	23	4	<1
<b>Native Forest</b>	Native Volcanic Forest	Guguan	409	39	<1
<b>Native Forest</b>	Hibiscus Thicket	Sarigan	25	2	<1
<b>Native Forest</b>	Native Volcanic Forest	Sarigan	100	9	<1
<b>Native Forest</b>	Native Limestone Forest	Aguiguan	939	55	<1
<b>Native Forest</b>	Hibiscus Thicket	Asuncion	4	<1	<1
<b>Native Forest</b>	Native Volcanic Forest	Asuncion	480	25	<1
<b>Native Forest</b>	Hibiscus Thicket	Alamagan	252	8	<1
<b>Native Forest</b>	Hibiscus Thicket	Anatahan	242	3	<1
<b>Native Forest</b>	Hibiscus Thicket	Agrihan	3	<1	<1
<b>Native Forest</b>	Native Volcanic Forest	Agrihan	2530	23	1
<b>Native Forest</b>	Hibiscus Thicket	Pagan	25	<1	<1
<b>Native Forest</b>	Hibiscus Thicket	Rota	44	<1	<1
<b>Native Forest</b>	Native Limestone Forest	Rota	10008	47	4
<b>Native Forest</b>	Hibiscus Thicket	Tinian	33	<1	<1

<b>Native Forest</b>	Native Limestone Forest	Tinian	1034	4	<1
<b>Native Forest</b>	Hibiscus Thicket	Saipan	39	<1	<1
<b>Native Forest</b>	Native Limestone Forest	Saipan	388	1	<1
<b>Native Forest</b>	Hibiscus Thicket	Guam	114	<1	<1
<b>Native Forest</b>	Native Limestone Forest	Guam	12978	10	5
<b>Native Forest</b>	Native Volcanic Forest	Guam	8576	6	3

#### Savanna and Grasslands

Habitat	Vegetation Class	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
Savanna and Grasslands	Mixed Grass/Herbaceous	Guguan	392	38	<1
Savanna and Grasslands	Mixed Grass/Herbaceous	Sarigan	341	31	<1
Savanna and Grasslands	Mixed Grass/Herbaceous	Asuncion	918	47	<1
Savanna and Grasslands	Mixed Grass/Herbaceous	Alamagan	1530	48	1
Savanna and Grasslands	Mixed Grass/Herbaceous	Anatahan	3678	44	1
Savanna and Grasslands	Mixed Grass/Herbaceous	Agrihan	5357	49	2
Savanna and Grasslands	Mixed Grass/Herbaceous	Pagan	2928	25	1
Savanna and Grasslands	Grassland	Rota	225	1	<1
Savanna and Grasslands	Grassland	Saipan	1194	4	<1
Savanna and Grasslands	Grassland	Guam	21770	16	9

#### Scrub and Herbaceous

Habitat	Vegetation Class	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)

<b>Scrub and Herbaceous</b>	Mixed Grass/Herbaceous	FDM	105	59	<1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	FDM	25	14	<1
<b>Scrub and Herbaceous</b>	Mixed Grass/Herbaceous	Maug	214	40	<1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Maug	12	2	<1
<b>Scrub and Herbaceous</b>	Mixed Grass/Herbaceous	Uracus	120	22	<1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Sarigan	15	1	<1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Aguiguan	445	26	<1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Asuncion	99	5	<1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Alamagan	146	5	<1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Anatahan	302	4	<1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Agrihan	1205	11	<1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Pagan	185	2	<1
<b>Scrub and Herbaceous</b>	Mixed Grass/Herbaceous	Rota	4912	23	2
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Rota	991	5	<1
<b>Scrub and Herbaceous</b>	Mixed Grass/Herbaceous	Tinian	5260	21	2
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Tinian	756	3	<1
<b>Scrub and Herbaceous</b>	Mixed Grass/Herbaceous	Saipan	2122	7	1
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Saipan	1027	3	<1
<b>Scrub and Herbaceous</b>	Mixed Grass/Herbaceous	Guam	6474	5	3
<b>Scrub and Herbaceous</b>	Scrub/Shrub	Guam	11272	8	4

### Secondary and Mixed Forest

Habitat	Vegetation Class	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Secondary and Mixed Forest</b>	Mixed Introduced Forest	Sarigan	2	<1	<1
<b>Secondary and Mixed Forest</b>	Mixed Introduced Forest	Aguiguan	31	2	<1
<b>Secondary and Mixed Forest</b>	Mixed Introduced Forest	Alamagan	205	6	<1
<b>Secondary and Mixed Forest</b>	Mixed Introduced Forest	Anatahan	168	2	<1
<b>Secondary and Mixed Forest</b>	Mixed Introduced Forest	Pagan	403	3	<1
<b>Secondary and Mixed Forest</b>	Mixed Introduced Forest	Rota	2096	10	1
<b>Secondary and Mixed Forest</b>	Mixed Introduced Forest	Tinian	6186	25	2
<b>Secondary and Mixed Forest</b>	Mixed Introduced Forest	Saipan	10611	36	4
<b>Secondary and Mixed Forest</b>	Mixed Introduced Forest	Guam	30522	23	12
<b>Secondary and Mixed Forest</b>	Vitex Forest	Guam	2240	2	1

### Wetlands

Habitat	Vegetation Class	Island	Area (Acres)	Area (% of Island)	Area (% of Marianas Islands)
<b>Wetland</b>	Open Water	Anatahan	249	3	<1
<b>Wetland</b>	Open Water	Pagan	58	<1	<1
<b>Wetland</b>	Open Water	Rota	8	<1	<1
<b>Wetland</b>	Emergent Wetland	Tinian	34	<1	<1
<b>Wetland</b>	Emergent Wetland	Saipan	363	1	<1
<b>Wetland</b>	Open Water	Saipan	87	<1	<1
<b>Wetland</b>	Emergent Wetland	Guam	734	1	<1
<b>Wetland</b>	Open Water	Guam	360	<1	<1

NOAA-CCAP Summaries

CCAP Land Cover Category	Island & Year	Area (Acres)
<b>Unclassified</b>	Agrihan, 2001	170
<b>Grassland/Herbaceous</b>	Agrihan, 2001	84
<b>Evergreen Forest</b>	Agrihan, 2001	174
<b>Scrub/Shrub</b>	Agrihan, 2001	60
<b>Bare Land</b>	Agrihan, 2001	9
<b>Open Water</b>	Agrihan, 2001	28

CCAP Land Cover Category	Island & Year	Area (Acres)
<b>Grassland/Herbaceous</b>	Alamagan, 2007	25
<b>Evergreen Forest</b>	Alamagan, 2007	36
<b>Scrub/Shrub</b>	Alamagan, 2007	21
<b>Bare Land</b>	Alamagan, 2007	15
<b>Open Water</b>	Alamagan, 2007	14

CCAP Land Cover Category	Island & Year	Area (Acres)
<b>Unclassified</b>	Anatahan, 2005	3
<b>Grassland/Herbaceous</b>	Anatahan, 2005	121
<b>Evergreen Forest</b>	Anatahan, 2005	42
<b>Scrub/Shrub</b>	Anatahan, 2005	81
<b>Bare Land</b>	Anatahan, 2005	267
<b>Open Water</b>	Anatahan, 2005	60

<b>CCAP Land Cover Category</b>	<b>Island &amp; Year</b>	<b>Area (Acres)</b>
<b>Grassland/Herbaceous</b>	Asuncion, 2004	32
<b>Evergreen Forest</b>	Asuncion, 2004	49
<b>Scrub/Shrub</b>	Asuncion, 2004	21
<b>Bare Land</b>	Asuncion, 2004	19
<b>Open Water</b>	Asuncion, 2004	19

<b>CCAP Land Cover Category</b>	<b>Island &amp; Year</b>	<b>Area (Acres)</b>
<b>Grassland/Herbaceous</b>	FDM, 2004	1
<b>Evergreen Forest</b>	FDM, 2004	1
<b>Scrub/Shrub</b>	FDM, 2004	3
<b>Bare Land</b>	FDM, 2004	1
<b>Open Water</b>	FDM, 2004	5

<b>CCAP Land Cover Category</b>	<b>Island &amp; Year</b>	<b>Area (Acres)</b>
<b>Impervious Surface</b>	Guam, 2005	370
<b>Developed, Open Space</b>	Guam, 2005	430
<b>Cultivated Crops</b>	Guam, 2005	23
<b>Pasture/Hay</b>	Guam, 2005	<1
<b>Grassland/Herbaceous</b>	Guam, 2005	796
<b>Evergreen Forest</b>	Guam, 2005	1835
<b>Scrub/Shrub</b>	Guam, 2005	342

<b>Palustrine Forested Wetland</b>	Guam, 2005	71
<b>Palustrine Scrub/Shrub Wetland</b>	Guam, 2005	14
<b>Palustrine Emergent Wetland</b>	Guam, 2005	30
<b>Estuarine Forested Wetland</b>	Guam, 2005	4
<b>Estuarine Scrub/Shrub Wetland</b>	Guam, 2005	2
<b>Estuarine Emergent Wetland</b>	Guam, 2005	<1
<b>Unconsolidated Shore</b>	Guam, 2005	4
<b>Bare Land</b>	Guam, 2005	120
<b>Open Water</b>	Guam, 2005	392

CCAP Land Cover Category	Island & Year	Area (Acres)
<b>Impervious Surface</b>	Guam, 2011	391
<b>Developed, Open Space</b>	Guam, 2011	439
<b>Cultivated Crops</b>	Guam, 2011	18
<b>Pasture/Hay</b>	Guam, 2011	1
<b>Grassland/Herbaceous</b>	Guam, 2011	801
<b>Evergreen Forest</b>	Guam, 2011	1836
<b>Scrub/Shrub</b>	Guam, 2011	349
<b>Palustrine Forested Wetland</b>	Guam, 2011	72
<b>Palustrine Scrub/Shrub Wetland</b>	Guam, 2011	14
<b>Palustrine Emergent Wetland</b>	Guam, 2011	29
<b>Estuarine Forested Wetland</b>	Guam, 2011	4
<b>Estuarine Scrub/Shrub Wetland</b>	Guam, 2011	2

<b>Estuarine Emergent Wetland</b>	Guam, 2011	<1
<b>Unconsolidated Shore</b>	Guam, 2011	4
<b>Bare Land</b>	Guam, 2011	81
<b>Open Water</b>	Guam, 2011	394

<b>CCAP Land Cover Category</b>	<b>Island &amp; Year</b>	<b>Area (Acres)</b>
<b>Grassland/Herbaceous</b>	Guguan, 2004	8
<b>Evergreen Forest</b>	Guguan, 2004	13
<b>Scrub/Shrub</b>	Guguan, 2004	6
<b>Bare Land</b>	Guguan, 2004	5
<b>Open Water</b>	Guguan, 2004	8

<b>CCAP Land Cover Category</b>	<b>Island &amp; Year</b>	<b>Area (Acres)</b>
<b>Grassland/Herbaceous</b>	Maug, 2003	3
<b>Evergreen Forest</b>	Maug, 2003	4
<b>Scrub/Shrub</b>	Maug, 2003	5
<b>Bare Land</b>	Maug, 2003	4
<b>Open Water</b>	Maug, 2003	13
<b>CCAP Land Cover Category</b>	<b>Island &amp; Year</b>	<b>Area (Acres)</b>
<b>Grassland/Herbaceous</b>	Pagan, 2005	53
<b>Evergreen Forest</b>	Pagan, 2005	153
<b>Scrub/Shrub</b>	Pagan, 2005	45
<b>Bare Land</b>	Pagan, 2005	103

<b>Open Water</b>	Pagan, 2005	40
<b>CCAP Land Cover Category</b>	Island & Year	Area (Acres)
<b>Impervious Surface</b>	Rota, 1946	8
<b>Developed, Open Space</b>	Rota, 1946	<1
<b>Cultivated Crops</b>	Rota, 1946	33
<b>Grassland/Herbaceous</b>	Rota, 1946	155
<b>Evergreen Forest</b>	Rota, 1946	365
<b>Scrub/Shrub</b>	Rota, 1946	61
<b>Bare Land</b>	Rota, 1946	12
<b>Open Water</b>	Rota, 1946	22

<b>CCAP Land Cover Category</b>	<b>Island &amp; Year</b>	<b>Area (Acres)</b>
<b>Impervious Surface</b>	Rota, 2005	16
<b>Developed, Open Space</b>	Rota, 2005	26
<b>Cultivated Crops</b>	Rota, 2005	6
<b>Pasture/Hay</b>	Rota, 2005	15
<b>Grassland/Herbaceous</b>	Rota, 2005	138
<b>Evergreen Forest</b>	Rota, 2005	386
<b>Scrub/Shrub</b>	Rota, 2005	36
<b>Bare Land</b>	Rota, 2005	11
<b>Open Water</b>	Rota, 2005	22

CCAP Land Cover Category	Island & Year	Area (Acres)
Impervious Surface	Rota, 2014	17
Developed, Open Space	Rota, 2014	24
Cultivated Crops	Rota, 2014	10
Pasture/Hay	Rota, 2014	16
Grassland/Herbaceous	Rota, 2014	121
Evergreen Forest	Rota, 2014	392
Scrub/Shrub	Rota, 2014	42
Bare Land	Rota, 2014	12
Open Water	Rota, 2014	22

CCAP Land Cover Category	Island & Year	Area (Acres)
Unclassified	Saipan, 1945	5
Impervious Surface	Saipan, 1945	83
Developed, Open Space	Saipan, 1945	160
Cultivated Crops	Saipan, 1945	36
Grassland/Herbaceous	Saipan, 1945	273
Evergreen Forest	Saipan, 1945	170
Scrub/Shrub	Saipan, 1945	68
Palustrine Forested Wetland	Saipan, 1945	<1
Palustrine Scrub/Shrub Wetland	Saipan, 1945	2

<b>Palustrine Emergent Wetland</b>	Saipan, 1945	12
<b>Unconsolidated Shore</b>	Saipan, 1945	<1
<b>Bare Land</b>	Saipan, 1945	75
<b>Open Water</b>	Saipan, 1945	170

CCAP Land Cover Category	Island & Year	Area (Acres)
<b>Unclassified</b>	Saipan, 2005	1593
<b>Impervious Surface</b>	Saipan, 2005	89
<b>Developed, Open Space</b>	Saipan, 2005	89
<b>Cultivated Crops</b>	Saipan, 2005	11
<b>Pasture/Hay</b>	Saipan, 2005	4
<b>Grassland/Herbaceous</b>	Saipan, 2005	50
<b>Evergreen Forest</b>	Saipan, 2005	541
<b>Scrub/Shrub</b>	Saipan, 2005	70
<b>Palustrine Forested Wetland</b>	Saipan, 2005	4
<b>Palustrine Scrub/Shrub Wetland</b>	Saipan, 2005	4
<b>Palustrine Emergent Wetland</b>	Saipan, 2005	10
<b>Estuarine Forested Wetland</b>	Saipan, 2005	<1
<b>Estuarine Scrub/Shrub Wetland</b>	Saipan, 2005	<1
<b>Estuarine Emergent Wetland</b>	Saipan, 2005	<1
<b>Bare Land</b>	Saipan, 2005	11
<b>Open Water</b>	Saipan, 2005	36

CCAP Land Cover Category	Island & Year	Area (Acres)
<b>Impervious Surface</b>	Saipan, 2016	92
<b>Developed, Open Space</b>	Saipan, 2016	94
<b>Cultivated Crops</b>	Saipan, 2016	6
<b>Pasture/Hay</b>	Saipan, 2016	3
<b>Grassland/Herbaceous</b>	Saipan, 2016	53
<b>Evergreen Forest</b>	Saipan, 2016	527
<b>Scrub/Shrub</b>	Saipan, 2016	77
<b>Palustrine Forested Wetland</b>	Saipan, 2016	4
<b>Palustrine Scrub/Shrub Wetland</b>	Saipan, 2016	4
<b>Palustrine Emergent Wetland</b>	Saipan, 2016	10
<b>Estuarine Forested Wetland</b>	Saipan, 2016	<1
<b>Estuarine Scrub/Shrub Wetland</b>	Saipan, 2016	<1
<b>Estuarine Emergent Wetland</b>	Saipan, 2016	<1
<b>Bare Land</b>	Saipan, 2016	13
<b>Open Water</b>	Saipan, 2016	36

CCAP Land Cover Category	Island & Year	Area (Acres)
<b>Grassland/Herbaceous</b>	Sarigan, 2006	5
<b>Evergreen Forest</b>	Sarigan, 2006	13
<b>Scrub/Shrub</b>	Sarigan, 2006	6

<b>Bare Land</b>	Sarigan, 2006	10
<b>Open Water</b>	Sarigan, 2006	8

<b>CCAP Land Cover Category</b>	<b>Island &amp; Year</b>	<b>Area (Acres)</b>
<b>Impervious Surface</b>	Tinian, 2005	27
<b>Developed, Open Space</b>	Tinian, 2005	23
<b>Cultivated Crops</b>	Tinian, 2005	4
<b>Pasture/Hay</b>	Tinian, 2005	35
<b>Grassland/Herbaceous</b>	Tinian, 2005	92
<b>Evergreen Forest</b>	Tinian, 2005	505
<b>Scrub/Shrub</b>	Tinian, 2005	53
<b>Palustrine Forested Wetland</b>	Tinian, 2005	<1
<b>Palustrine Scrub/Shrub Wetland</b>	Tinian, 2005	<1
<b>Palustrine Emergent Wetland</b>	Tinian, 2005	1
<b>Bare Land</b>	Tinian, 2005	12
<b>Open Water</b>	Tinian, 2005	25

<b>CCAP Land Cover Category</b>	<b>Island &amp; Year</b>	<b>Area (Acres)</b>
<b>Impervious Surface</b>	Tinian, 2014	27
<b>Developed, Open Space</b>	Tinian, 2014	26
<b>Cultivated Crops</b>	Tinian, 2014	3

<b>Pasture/Hay</b>	Tinian, 2014	41
<b>Grassland/Herbaceous</b>	Tinian, 2014	84
<b>Evergreen Forest</b>	Tinian, 2014	507
<b>Scrub/Shrub</b>	Tinian, 2014	52
<b>Palustrine Forested Wetland</b>	Tinian, 2014	1
<b>Palustrine Scrub/Shrub Wetland</b>	Tinian, 2014	<1
<b>Palustrine Emergent Wetland</b>	Tinian, 2014	1
<b>Bare Land</b>	Tinian, 2014	11
<b>Open Water</b>	Tinian, 2014	25

CCAP Land Cover Category	Island & Year	Area (Acres)
<b>Grassland/Herbaceous</b>	Uracus, 2004	3
<b>Scrub/Shrub</b>	Uracus, 2004	1
<b>Bare Land</b>	Uracus, 2004	13
<b>Open Water</b>	Uracus, 2004	5

## Appendix C. Code to Summarize the Habitat Information in Figures and Tables

```

#Mari K Reeves

#18_08_07_MarianasTeamSummaries

#This code takes in a csv file from the intersection of the Marianas Island Habitats, reclassified by the
Marianas Island Team

#During June of 2018, with land ownership and conservation layers, and produces summary tables and
figures from the information

#here is the name and location of the final file on the J drive:
#J:\PIOGIS12\APPS\Geog-Marianas\2017 Habitat
Status\Data\HSA_Ownership_Conservation\AllIsle_Categorized_Owner_Conservation_CH.shp

rm(list = ls()) #remove all past worksheet variables

set.seed(333)

# Read in Base Packages -----
pckg <- c("plyr","dplyr","reshape2", "tidyverse", "tidyr","RColorBrewer", "ggplot2","curl",
         "RCurl","parallel","gdalUtils","rgdal","rgeos", "spsurvey", "maptools",
         "spatial", "sp", "raster", "maptools", "spatialEco", "openxlsx",
         "SpatialPack", "spatstat", "microbenchmark", "Hmisc",
         "snowfall", "tictoc", "ggmap")

# READING IN PACKAGES
for(i in 1:length(pckg)){
  if ((!pckg[i] %in% installed.packages())==T) {
    install.packages(pckg[i], repos="http://cran.us.r-project.org",
                     dependencies = T)
  }
}

```

```

print(pckg[i])
do.call("library", list(pckg[i]))

}else{
  print(pckg[i])
  do.call("library", list(pckg[i]))
}

}

#Define Directories
#BaseDir <- "E:/1New/HSAs/"
BaseDir<-"C:/Users/marieeves/Documents/HSAs/"

WorkingDir<-paste0(BaseDir, "HSAReports/18_07_17_MarianasDoOver")
ReportOut<-paste0(WorkingDir, "/FiguresTablesToCheck")
setwd(WorkingDir)
list.files(WorkingDir)

# [1] "18_07_17_EndOfCodeWorkspace.RData"
"18_08_01_EndOfCodeWorkspace.RData"

# [3] "AllIsle_Categorized_Owner_Conversation_CH_AttrExport_28June2018.csv"
"FiguresTablesToCheck"

# [5] "FiguresTablesToShare"

sysCRS<-"+proj=utm +zone=55 +ellps=WGS84 +towgs84=0,0,0,-0,-0,-0,0 +units=m +no_defs"
haven<-read.csv(paste0(WorkingDir,
"/AllIsle_Categorized_Owner_Conversation_CH_AttrExport_28June2018.csv"))

names(haven)

#check for missing values
levels(haven$MI_Hab)

```

```

missing<-haven[haven$MI_Hab == " ",]
missingarea<-sum(missing$Acres)#30283.22

#fred says this is ocean - so dropping these data
dryhaven<-haven[haven$MI_Hab != " ",]

haven<-dryhaven

levels(haven$VegClss)

levels(haven$CCAP_Cl)
#~~~~~Manipulate the data file to prep for summary

#Bind island names and total area to the file
islandarea<-aggregate(haven$Acres, by = list(haven>Name), FUN = sum)

names(islandarea)<-c( "Name" , "TotallIslandArea_Acres")
names(haven)
haven<-merge(haven, islandarea, by = "Name")

safehaven<-haven[,c(
"Name","VegClss","HabQual","MI_Hab","Acres","LndOwn","Cons","CH","TotallIslandArea_Acres")]
names(safehaven)<-c(
"island","vegclass","HabQual","habtype","AreaAcres","owner","Cons","CH","IslandAreaAcres")

#get rid of blank spaces in levels and reclassify some names

safehaven$habtype<-as.character(safehaven$habtype)

```

```

safehaven$habtype[safehaven$habtype == "Savanna/Swordgrass"]<- "Savanna and Grasslands"
safehaven$habtype[safehaven$habtype == "Scrub/Herbaceous"]<- "Scrub and Herbaceous"
safehaven$habtype[safehaven$habtype == " "]<- "No Data"
safehaven$habtype[safehaven$habtype == "Secondary/Mixed Forest"]<- "Secondary and Mixed Forest"
safehaven$habtype<-as.factor(safehaven$habtype)
levels(safehaven$habtype)

```

```

#Fix color palette to colorblind friendly:http://www.cookbook-r.com/Graphs/Colors\_\(ggplot2\)/
# The palette with grey:
cbPalette <- c("#999999", "#E69F00", "#56B4E9", "#009E73", "#F0E442", "#0072B2", "#D55E00",
  "#CC79A7", "#000000", "red", "green")

```

```

#make a list of habitats to loop through
havenlist<-unique(safehaven$habtype)
str(havenlist)

```

```
ArchipelagoAcres<-sum(safehaven$AreaAcres)#281653.3
```

```

levels(haven$VegClss)
levels(haven$CCAP_Cl)
levels(haven$FS_Clss)
#Summarize Acres in Each Habitat by Habitat
simplehabsummary<-aggregate(safehaven$AreaAcres, by = list(safehaven$habtype), FUN = sum)

```

```

simplehabsummary$PercentArchArea<-(simplehabsummary$x /ArchipelagoAcres)*100
#drop island area and reorganize columns
simplehabsummary<-simplehabsummary[,c("Group.1","x",

```

```

"PercentArchArea" )]

names(simplehabsummary)<-c("Habitat", "Area (Acres)",
                           "Area (% of Marianas Islands)")

a<-ggplot(simplehabsummary, aes(simplehabsummary$Habitat, simplehabsummary$`Area (Acres)`))

plotname<-paste0(ReportOut, "/MarianasHabitatPlot.jpg")

plottitle<-"Habitat Area Summary"

pretty<-a+geom_bar(stat = "identity")+
  labs(title = plottitle, x = "Habitat", y = "Area (Acres)" ) +
  theme(axis.text.x = element_text(angle=90, vjust=0.5, size=12))+
  scale_fill_manual(values=cbPalette)

ggsave(filename=plotname, plot=pretty, device = "jpg")

simplehabsummary$`Area (Acres)`<-round(simplehabsummary$`Area (Acres)`, digits = 0)
simplehabsummary$`Area (Acres)`[simplehabsummary$`Area (Acres)`<1]<-"<1"
simplehabsummary$`Area (% of Marianas Islands)`<-round(simplehabsummary$`Area (% of Marianas Islands)`, digits = 0)
simplehabsummary$`Area (% of Marianas Islands)`[simplehabsummary$`Area (% of Marianas Islands)`<1]<-"<1"

tablename<-paste0(ReportOut, "/MarianasHabitatTable.csv")

write.csv(simplehabsummary, file = tablename)

#Summarize Acres in Each Habitat by Island

```

```

SimpleIslandSummary<-function(myhabitat){

# for(myhabitat in havenlist){

subtable<-safehaven[safehaven$habtype == myhabitat,]

summary<-aggregate(subtable$AreaAcres, by = list(subtable$habtype,
                                                 subtable$island, subtable$IslandAreaAcres), FUN = sum)

summary$PercentIslandArea<-(summary$x/summary$Group.3)*100
summary$PercentArchArea<-(summary$x /ArchipelagoAcres)*100

#drop island area and reorganize columns

summary<-summary[,c("Group.1","Group.2","x",
                    "PercentIslandArea" , "PercentArchArea" )]

names(summary)<-c("Habitat", "Island", "Area (Acres)",
                  "Area (% of Island)", "Area (% of Marianas Islands)")

summary`Area (Acres)`<-round(summary`Area (Acres)`, digits = 0)
summary`Area (Acres)`[summary`Area (Acres)`<1]<"<1"
summary`Area (% of Marianas Islands)`<-round(summary`Area (% of Marianas Islands)`, digits = 0)
summary`Area (% of Marianas Islands)`[summary`Area (% of Marianas Islands)`<1]<"<1"
summary`Area (% of Island)` <-round(summary`Area (% of Island)`, digits = 0)
summary`Area (% of Island)` [summary`Area (% of Island)` <1]<"<1"

tablename<-paste0(ReportOut, "/Marianas", myhabitat, "IslandTable.csv")
write.csv(summary, file = tablename)

summary$area<-as.numeric(summary`Area (Acres)`)

a<-ggplot(summary, aes(summary$Island, summary$area))

plotname<-paste0(ReportOut, "/Marianas", myhabitat, "IslandPlot.jpg")

plottitle<-paste0(myhabitat, " Area Summary")

pretty<-a+geom_bar(stat = "identity")+
  labs(title = plottitle, x = "Island", y = "Area (Acres)" ) +
  theme(axis.text.x = element_text(angle=90, vjust=0.5, size=12))+
```

```

scale_fill_manual(values=cbPalette)

ggsave(filename=plotname, plot=pretty, device = "jpg")

}

lapply(havenlist, SimpleIslandSummary)

#Summarize Acres in each Habitat by Land Ownership

#Make a plot of Land Ownership by island

#SimpleOwnershipSummary<-function(myhabitat){

for(myhabitat in havenlist){

subtable<-safehaven[safehaven$habtype == myhabitat,]

summary<-aggregate(subtable$AreaAcres, by = list(subtable$habtype,
                                                 subtable$owner,
                                                 subtable$island, subtable$IslandAreaAcres), FUN = sum)

summary$PercentArchArea<-(summary$x / ArchipelagoAcres)*100
summary$PercentIslandArea<-(summary$x/summary$Group.4)*100

#drop island area and reorganize columns

summary<-summary[,c("Group.1","Group.2","Group.3","x",
                     "PercentIslandArea","PercentArchArea")]

names(summary)<-c("Habitat", "Land Ownership", "Island", "Area (Acres)",
                  "Area (% of Island)","Area (% of Marianas Islands)")

summary$`Area (Acres)`<-round(summary$`Area (Acres)`, digits = 0)
summary$`Area (Acres)`[summary$`Area (Acres)`<1]<- "<1"
summary$`Area (% of Marianas Islands)`<-round(summary$`Area (% of Marianas Islands)`, digits = 0)
summary$`Area (% of Marianas Islands)`[summary$`Area (% of Marianas Islands)`<1]<- "<1"

```

```

summary$`Area (% of Island)` <- round(summary$`Area (% of Island)` , digits = 0)
summary$`Area (% of Island)` [summary$`Area (% of Island)` <1]<- "<1"
tablename<-paste0(ReportOut, "/Marianas", myhabitat, "OwnTable.csv")
write.csv(summary, file = tablename)
summary$area<-as.numeric(summary$`Area (Acres)`)

a<-ggplot(summary, aes(summary$Island, summary$area, fill = summary$`Land Ownership`))

plotname<-paste0(ReportOut, "/Marianas", myhabitat, "LandOwnershipPlot.jpg")
plottitle<-paste0(myhabitat, " Land Ownership Summary")
pretty<-a+geom_bar(stat = "identity", position = "fill")+
  labs(fill = "Land Ownership", title = plottitle, x = "Island", y = "Area (Proportion of Total Habitat on Island)" ) +
  theme(axis.text.x = element_text(angle=90, vjust=0.5, size=12))+
  scale_fill_manual(values=cbPalette)
ggsave(filename=plotname, plot=pretty, device = "jpg")

}

#lapply(havenlist, SimpleOwnershipSummary)

```

#Summarize Acres in each Habitat by Habitat Quality

```

#SimpleHabQualSummary<-function(myhabitat){

for(myhabitat in havenlist){

  subtable<-safehaven[safehaven$habtype == myhabitat,]

  summary<-aggregate(subtable$AreaAcres, by = list(subtable$habtype,
    subtable$HabQual, subtable$owner,
    subtable$island, subtable$IslandAreaAcres), FUN = sum)

  summary$PercentArchArea<-(summary$x / ArchipelagoAcres)*100
  summary$PercentIslandArea<-(summary$x/summary$Group.5)*100
}

```

```

#drop island area and reorganize columns

summary<-summary[,c("Group.1","Group.2","Group.3","Group.4","x",
  "PercentIslandArea" , "PercentArchArea" )]

names(summary)<-c("Habitat", "Habitat Quality", "Land Ownership", "Island", "Area (Acres)",
  "Area (% of Island)", "Area (% of Marianas Islands)")

summary$`Area (Acres)`<-round(summary$`Area (Acres)` , digits = 0)
summary$`Area (Acres)`[summary$`Area (Acres)`<1]<-<"1"
summary$`Area (% of Marianas Islands)`<-round(summary$`Area (% of Marianas Islands)` , digits = 0)
summary$`Area (% of Marianas Islands)`[summary$`Area (% of Marianas Islands)`<1]<-<"1"
summary$`Area (% of Island)` <-round(summary$`Area (% of Island)` , digits = 0)
summary$`Area (% of Island)` [summary$`Area (% of Island)` <1]<-<"1"

tablename<-paste0(ReportOut, "/Marianas", myhabitat, "QualityTable.csv")

write.csv(summary, file = tablename)

summary$area<-as.numeric(summary$`Area (Acres)`)

a<-ggplot(summary, aes(summary$Island, summary$area, fill = summary$`Habitat Quality` ))

plotname<-paste0(ReportOut, "/Marianas", myhabitat, "HabitatQualityPlot.jpg")
plottitle<-paste0(myhabitat, " Habitat Quality Summary")
pretty<-a+geom_bar(stat = "identity", position = "fill")+
  labs(fill = "Habitat Quality", title = plottitle, x = "Island", y = "Area (Proportion of Total Habitat on
Island)" ) +
  theme(axis.text.x = element_text(angle=90, vjust=0.5, size=12))+

  scale_fill_manual(values=cbPalette)

ggsave(filename=plotname, plot=pretty, device = "jpg")

}

#lapply(havenlist, SimpleHabQualSummary)

```

```
#Summarize Acres in each Habitat in Conservation
```

```
#ReserveAreaSummary<-function(myhabitat){  
for (myhabitat in havenlist ){  
  subtable<-safehaven[safehaven$habtype == myhabitat,]  
  subtable<-subtable[subtable$Cons != "None" ,]  
  
  summary<-aggregate(subtable$AreaAcres, by = list(subtable$island,  
    subtable$Cons,subtable$IslandAreaAcres ), FUN = sum)}
```

```
summary$PercentIsleArea<-(summary$x/summary$Group.3)*100
```

```
summary$PercentArchArea<-(summary$x /ArchipelagoAcres)*100
```

```
names(summary)<-c("Island", "Reserve Type", "Island Area (Acres)", "Area in Reserves (Acres)",  
"Reserve Area (% of Island)","Reserve Area (% of Marianas Islands)")
```

```
#reorder these to make more sense
```

```
summary<-summary[, c("Island", "Reserve Type", "Area in Reserves (Acres)", "Island Area (Acres)",  
"Reserve Area (% of Island)","Reserve Area (% of Marianas Islands)" )]
```

```
summary`Area in Reserves (Acres)`<-round(summary$`Area in Reserves (Acres)`, digits = 0)
```

```
summary`Island Area (Acres)`<-round(summary$`Island Area (Acres)`, digits = 0)
```

```
summary`Reserve Area (% of Island)`<-round(summary$`Reserve Area (% of Island)`, digits = 0)
```

```

summary$`Reserve Area (% of Marianas Islands)`<-round(summary$`Reserve Area (% of Marianas Islands)` , digits = 0)

# summary<-summary[, c("Island", "Habitat", "Habitat Quality", "Area in Reserves (Acres)",
#                      "Reserve Area (% of Island)",
#                      "Reserve Area (% of Marianas Islands)")]

res<-ggplot(summary, aes(summary$Island, summary$`Area in Reserves (Acres)` , fill =
summary$`Reserve Type` ))
plotname<-paste0(ReportOut, "/Marianas", myhabitat, "ReserveTypePlot.jpg")
plottitle<-paste0(myhabitat, " Reserve Type Summary")
prettyrhythm<-res+geom_bar(stat = "identity", position = "stack")+
  labs(title = plottitle, x = "Island", y = "Area in Reserves (Acres) " , fill = "Reserve Type") +
  theme(axis.text.x = element_text(angle=90, vjust=0.5, size=12))+
  scale_fill_manual(values=cbPalette)
ggsave(filename=plotname, plot=prettyrhythm, device = "jpg")

summary$`Area in Reserves (Acres)`[summary$`Area in Reserves (Acres)` <1]<- "<1"

summary$`Reserve Area (% of Island)`[ summary$`Reserve Area (% of Island)` <1]<- "<1"

summary$`Reserve Area (% of Marianas Islands)`[summary$`Reserve Area (% of Marianas Islands)` <1
]<- "<1"

tablename<-paste0(ReportOut, "/Marianas", myhabitat, "ReserveStatusTable.csv")

```

```

write.csv(summary, file = tablename)

}

#Summarize Area in Critical Habitat

for (myhabitat in havenlist ){

  subtable<-safehaven[safehaven$habtype == myhabitat,]

  subtable<-subtable[subtable$CH != "None" ,]

  summary<-aggregate(subtable$AreaAcres, by = list(subtable$Island,
                                                 subtable$CH,subtable$IslandAreaAcres ), FUN = sum)

  summary$PercentIsleArea<-(summary$x/summary$Group.3)*100
  summary$PercentArchArea<-(summary$x /ArchipelagoAcres)*100

  names(summary)<-c("Island", "Critical Habitat Type", "Island Area (Acres)", "Area in Critical Habitat (Acres)",
                    "Critical Habitat Area (% of Island)","Critical Habitat Area (% of Marianas Islands)")

  #reorder these to make more sense

  summary<-summary[, c("Island", "Critical Habitat Type", "Area in Critical Habitat (Acres)", "Island Area (Acres)",
                    "Critical Habitat Area (% of Island)","Critical Habitat Area (% of Marianas Islands") )]

  summary$`Area in Critical Habitat (Acres)`<-round(summary$`Area in Critical Habitat (Acres)`, digits = 0)
  summary$`Island Area (Acres)`<-round(summary$`Island Area (Acres)`, digits = 0)
}

```

```

summary$`Critical Habitat Area (% of Island)`<-round(summary$`Critical Habitat Area (% of Island)` ,
digits = 0)

summary$`Critical Habitat Area (% of Marianas Islands)`<-round(summary$`Critical Habitat Area (% of Marianas Islands)` , digits = 0)

# summary<-summary[, c("Island", "Habitat", "Habitat Quality", "Area in Critical Habitat (Acres)" ,
#                   "Critical Habitat Area (% of Island)" ,
#                   "Critical Habitat Area (% of Marianas Islands)" )]

res<-ggplot(summary, aes(summary$Island, summary$`Area in Critical Habitat (Acres)` , fill =
summary$`Critical Habitat Type` ))

plotname<-paste0(ReportOut, "/Marianas", myhabitat, "Critical HabitatTypePlot.jpg")

plottitle<-paste0(myhabitat, " Critical Habitat Type Summary")

prettyrhythm<-res+geom_bar(stat = "identity", position = "stack")+
  labs(title = plottitle, x = "Island", y = "Area in Critical Habitat (Acres) " , fill = "Critical Habitat Type") +
  theme(axis.text.x = element_text(angle=90, vjust=0.5, size=12))+

  scale_fill_manual(values=cbPalette)

ggsave(filename=plotname, plot=prettyrhythm, device = "jpg")

summary$`Area in Critical Habitat (Acres)`[summary$`Area in Critical Habitat (Acres)` <1]<- "<1"

summary$`Critical Habitat Area (% of Island)`[ summary$`Critical Habitat Area (% of Island)` <1]<- "<1"

summary$`Critical Habitat Area (% of Marianas Islands)`[summary$`Critical Habitat Area (% of Marianas Islands)`<1 ]<- "<1"

```

```

tablename<-paste0(ReportOut, "/Marianas", myhabitat, "CritHabStatusTable.csv")

write.csv(summary, file = tablename)

}

#####
#####  

#summarize Acres in each habitat by veg class, which will get us the amount of agriculture.

SimpleIslandSummary<-function(myhabitat){

  # for(myhabitat in havenlist){

    subtable<-safehaven[safehaven$habtype == myhabitat,]

    summary<-aggregate(subtable$AreaAcres, by = list(subtable$habtype, subtable$vegclass,
                                                    subtable$island, subtable$IslandAreaAcres), FUN = sum)

    summary$PercentIslandArea<-(summary$x/summary$Group.4)*100
    summary$PercentArchArea<-(summary$x /ArchipelagoAcres)*100

    #drop island area and reorganize columns

    summary<-summary[,c("Group.1","Group.2", "Group.3","x",
                        "PercentIslandArea" , "PercentArchArea" )]

    names(summary)<-c("Habitat", "Vegetation Class", "Island", "Area (Acres)",
                      "Area (% of Island)", "Area (% of Marianas Islands)")

    summary$`Area (Acres)`<-round(summary$`Area (Acres)` , digits = 0)
    summary$`Area (% of Marianas Islands)`<-round(summary$`Area (% of Marianas Islands)` , digits = 0)
    summary$`Area (% of Island)` <-round(summary$`Area (% of Island)` , digits = 0)
}

```

```

summary$area<-as.numeric(summary$`Area (Acres)`)

a<-ggplot(summary, aes(summary$Island, summary$area, fill = summary$`Vegetation Class`))
plotname<-paste0(ReportOut, "/Marianas", myhabitat, "VegetationPlot.jpg")
plottitle<-paste0(myhabitat, " Vegetation Summary")
pretty<-a+geom_bar(stat = "identity")+
  labs(title = plottitle, x = "Island", y = "Area (Acres)" , fill = "Land Cover") +
  theme(plot.title = element_text(hjust = -0.45, vjust=2.12), axis.text.x = element_text(angle=90,
vjust=0.5, size=12))+
  scale_fill_manual(values=cbPalette)
ggsave(filename=plotname, plot=pretty, device = "jpg")

summary$`Area (% of Marianas Islands)`[summary$`Area (% of Marianas Islands)`<1]<"<1"
summary$`Area (Acres)`[summary$`Area (Acres)`<1]<"<1"
summary$`Area (% of Island)` [summary$`Area (% of Island)` <1]<"<1"
tablename<-paste0(ReportOut, "/Marianas", myhabitat, "VegetationTable.csv")
write.csv(summary, file = tablename)
}

lapply(havenlist[10], SimpleIslandSummary)

#Get Pasture land in each habitat from CCAP data
#~~~~~
~~~


#bring in the habitat data

```

```

HabitatDir<- "C:/Users/marieeves/Documents/HSAs/SHADataFiles/MarianasFiles/Marianas_Veg_Final"
#habitats<-readOGR(dsn = HabitatDir, layer = "AllIsle_Categorized_Owner_Conservation_CH") #This file
is too big. It's a nightmare. Going with isle specific files

#read in CCAP files for Rota, Tinian, and Saipan

CCAPDir<-"C:/Users/marieeves/Documents/HSAs/SHADataFiles/NOAA_CCAP/CNMI/"

ccapGuam<-raster(paste0(CCAPDir, "cnmi_guam_2011_ccap_hr_land_cover.img"))
habitatGuam<-readOGR(dsn = HabitatDir, layer = "Guamcategorized")

ccapRota<-raster(paste0(CCAPDir, "cnmi_rota_2014_ccap_hr_land_cover_20180202.img"))
habitatRota<-readOGR(dsn = HabitatDir, layer = "Rotacategorized")

ccapTinian<-raster(paste0(CCAPDir, "2014_tinian_ccap_hr_lc_20180625.img" ))
habitatTinian<-readOGR(dsn = HabitatDir, layer = "Tiniancategorized")

ccapSaipan<-raster(paste0(CCAPDir, "2016_saipan_csc_qa_20180731.img" ))
habitatSaipan<-readOGR(dsn = HabitatDir, layer = "Saipancategorized")

#These ran forever and didn't run. Doing simplified count tables below
#The habitats are too many polygons now, so one idea is to go back to prior files
# rota_CCAP2Hab<-raster::extract(ccapRota, habitatRota)
# saipan_CCAP2Hab<-raster::extract(ccapSaipan, habitatSaipan)
# guam_CCAP2Hab<-raster::extract(ccapGuam, habitatGuam)
# tinian_CCAP2Hab<-raster::extract(ccapTinian, habitatTinian)

CCAPFiles<-list.files(CCAPDir, '\\.img$', full.names=T)
CCAPCrosswalk<-read.csv(paste0(WorkingDir, "/CCAP_CrosswalkLC.csv"))

```

```

setwd(ReportOut)

for(file in CCAPFiles){

z<-stack(file)

print(proj4string(z))#check the projection

myres<-res(z)#get the resolution of z (m2 per pixel) for count to area conversion

myreso<-myres[1]#assign the first element of resolution to a variable so we can use it for math

y<-freq(z)#count pixels in each value category

y<-data.frame(y)#turn in into a data frame

names(y)<-c("value", "count")#give the columns names

sqmperpixel<-myreso^2

y$aream2<-y$count/sqmperpixel#convert counts to areas

y$AreaHa<-y$aream2*0.0001

names(y)<-c("Value" , "pixel_count" , "aream2", "AreaHa")

pasture<-left_join(y, CCAPCrosswalk)

pasture<-pasture[pasture$Class_Name != "Background",]

pasture<-pasture[!is.na(pasture$Class_Name),]

changename<-sub("C:/Users/marieeves/Documents/HSAs/SHADataFiles/NOAA_CCAP/CNMI/cnmi_",
               "", file)

changename<-sub("_ccap_hr_land_cover.img", ".csv", changename)

islandyear<-sub(".csv", "", changename)

islandyear<-sub("_", " ", islandyear)

islandyear<-capitalize(islandyear)

pasture$island_year<-islandyear


pasture$AreaAcres<-pasture$AreaHa*2.471

cows2keep<-c("Class_Name", "island_year", "AreaAcres" )

smallpasture<-pasture[,cows2keep]

```

```

names(smallpasture)<-c("CCAP Land Cover Category", "Island & Year", "Area (Acres)")

smallpasture$`Area (Acres)`<-round(smallpasture$`Area (Acres)`, digits = 0)

a<-ggplot(smallpasture, aes(smallpasture$`CCAP Land Cover Category`, smallpasture$`Area (Acres)`))

plotname<-paste0(ReportOut, "/Marianas", changename, "CCAPPlot.jpg")

plottitle<-paste0(islandyear, ", CCAP Land Cover Summary")

pretty<-a+geom_bar(stat = "identity")+

  labs(title = plottitle, x = "Land Cover", y = "Area (Acres)" ) + 

  theme(plot.title = element_text(hjust = 0.01, vjust=2.12), axis.text.x = element_text(angle=90,
vjust=0.5, size=12))+

  scale_fill_manual(values=cbPalette)

ggsave(filename=plotname, plot=pretty, device = "jpg")

smallpasture$`Area (Acres)`[smallpasture$`Area (Acres)`<1]<-"<1"

write.csv(smallpasture, file = changename)

}

#####
#####
#####

#Make Toni a developed plot retaining only the following categories:

#one more I think (hope) super easy request. In the developed veg plot, could you just modify the
legend?

#The categories I kept are: developed, developed veg, bare soil/gravel (added sand) and ag.

levels(safehaven$vegclass)

```

```

vegkeepers<-c( "Developed", "Developed Vegetation", "Bare Soil/Gravel" , "Agriculture" )

vegetable<-safehaven[safehaven$habtype == "Developed",]

vegetable<-vegetable[vegetable$vegclass %in% vegkeepers, ]

vegetable$vegclass<-sub("Bare Soil/Gravel" , "Bare Soil, Gravel, and Sand" , vegetable$vegclass)

vegsum<-aggregate(vegetable$AreaAcres, by = list(vegetable$habtype, vegetable$vegclass,
                                                 vegetable$island, vegetable$IslandAreaAcres), FUN = sum)

vegsum$PercentIslandArea<-(vegsum$x/vegsum$Group.4)*100
vegsum$PercentArchArea<-(vegsum$x /ArchipelagoAcres)*100

#drop island area and reorganize columns

vegsum<-vegsum[,c("Group.1","Group.2", "Group.3","x",
                  "PercentIslandArea" , "PercentArchArea" )]

names(vegsum)<-c("Habitat", "Vegetation Class", "Island", "Area (Acres)",
                  "Area (% of Island)", "Area (% of Marianas Islands)")

vegsum$`Area (Acres)`<-round(vegsum$`Area (Acres)` , digits = 0)
vegsum$`Area (% of Marianas Islands)`<-round(vegsum$`Area (% of Marianas Islands)` , digits = 0)
vegsum$`Area (% of Island)` <-round(vegsum$`Area (% of Island)` , digits = 0)

vegsum<-vegsum[vegsum$`Area (Acres)`>1,] # This drops Islands with small areas from the figure.

```

```

a<-ggplot(vegsum, aes(vegsum$Island, vegsum$`Area (Acres)` , fill = vegsum$`Vegetation Class`))

plotname<-paste0(ReportOut, "/MarianasDevelopedVegetationPlot.jpg")

plottitle<-"Developed Land Cover Summary"

pretty<-a+geom_bar(stat = "identity")+
  labs(title = plottitle, x = "Island", y = "Area (Acres)" , fill = "Land Cover") +
  theme(plot.title = element_text(hjust = 0.01, vjust=2.12), axis.text.x = element_text(angle=90,
  vjust=0.5, size=12))+
```

```

scale_fill_manual(values=cbPalette)

ggsave(filename=plotname, plot=pretty, device = "jpg")

vegsum$`Area (% of Marianas Islands)`[vegsum$`Area (% of Marianas Islands)`<1]<- "<1"
vegsum$`Area (Acres)`[vegsum$`Area (Acres)`<1]<- "<1"
vegsum$`Area (% of Island)` [vegsum$`Area (% of Island)` <1]<- "<1"
tablename<-"MarianasDevelopedVegetationTable.csv"
write.csv(vegsum, file = tablename)

save.image("~/HSAs/HSAReports/18_07_17_MarianasDoOver/18_07_17_EndOfCodeWorkspace.RData")
)

save.image("~/HSAs/HSAReports/18_07_17_MarianasDoOver/18_08_01_EndOfCodeWorkspace.RData")
)

save.image("~/HSAs/HSAReports/18_07_17_MarianasDoOver/18_08_07_EndOfCodeWorkspace.RData")
)

```

## Appendix D. R Code to Import and Summarize the polygon based shape files for the Marianas Islands.

```
#Mari K Reeves  
  
#Habitat Status Assessments  
  
#This code helps us summarize rates of land use and land cover change in the Mariana Islands  
#filename: "J:/PIOGIS12/APPS/SH_CC/Mari/HSAs/HabitatStatusAssessmentsR/18_04_  
27_ImportMergeSummarizeHabitats.R"  
  
rm(list = ls()) #remove all past worksheet variables  
  
set.seed(333)  
  
# Read in Base Packages -----  
  
pckg <- c("plyr","dplyr","tidyverse", "tidyr","RColorBrewer", "ggplot2","curl",  
"RCurl","parallel","gdalUtils","rgdal","rgeos", "spsurvey",  
"spatial","sp", "raster", "maptools", "spatialEco", "RStoolbox",  
"SpatialPack", "spatstat", "microbenchmark","fifer", 'stringr',  
"snowfall", "tictoc", "ggmap")  
  
# READING IN PACKAGES  
  
for(i in 1:length(pckg)){  
  if ((!pckg[i] %in% installed.packages())==T) {  
    install.packages(pckg[i], repos="http://cran.us.r-project.org",  
      dependencies = T)  
    print(pckg[i])  
    do.call("library", list(pckg[i]))
```

```

}else{
  print(pckg[i])
  do.call("library", list(pckg[i]))
}

}

.libPaths()

#Define Directories
#BaseDir <- "E:/1New/HSAs/"
BaseDir<-"C:/Users/marieeves/Documents/HSAs/"
WorkingDir<-paste0(BaseDir, "HabitatStatusAssessmentsR/Marianas/")
MarianasDir<-paste0(BaseDir, "SHADataFiles/MarianasFiles/Marianas_Veg_Final")
TestDir<-paste0(MarianasDir, "/Files2Test")
setwd(WorkingDir)
list.files(WorkingDir)

sysCRS<-"+proj=utm +zone=55 +ellps=WGS84 +towgs84=0,0,0,-0,-0,-0,0 +units=m +no_defs"

#read in a merge file to give islands names
names<-read.csv(paste0(MarianasDir,"/islandnames.csv"))

crosswalk<-read.csv(paste0(WorkingDir,
"/18_06_24_RevisedMarianasHabitatCrosswalkSavannahs.csv"))

#also convert vegclass from factor to character in crosswalk table from Fred
crosswalk$VegClass<-as.character(crosswalk$VegClass)

#replace "Farallon de Medinilla" with "FDM" so that joins work
crosswalk$Name<-as.character(crosswalk$Name)

```

```

crosswalk$Name[crosswalk$Name == "Farallon de Medinilla"]<- "FDM"

vegfiles<-list.files(MarianasDir, pattern='\\.shp$')

#This is a function to merge Fred's vegetation polygons with his habitat Habitat Quality classifications
#for each Island, code calculate the current acreages in each combination of habitat and quality for
#the Mariana Islands habitats

#vegimport<-function(veg){
for (veg in vegfiles){

  lyr <- sub(".shp$", "", veg)#This gets rid of the .shp extension in the list of files
  g<-readOGR(dsn = MarianasDir, layer = lyr )#This reads in the point file for each island
  #print(proj4string(g))#check the spatial projections
  g<-spTransform(g, CRS(sysCRS))#transform to WGS84 UTM zone 4 if needed
  print(proj4string(g))#recheck the spatial projections
  #plot(g)

  #get to the island name
  newname<-sub("_Veg_*.*shp$", "", veg)
  #add island name to the file as a column (this is needed for merge in next steps)
  g@data$Name<-newname
  #convert factor to character, so we can merge the two files based on this column
  g@data$VegClass<-as.character(g@data$VegClass)
  #bring in habitat quality data
  g_crosswalk<-merge(g, crosswalk)

  #calculate area of each polygon
  g_area<-gArea(g_crosswalk, byid = TRUE)
}

```

```

#append the area to the datafile

g_crosswalk<-cbind(g_crosswalk,g_area)

#check if this worked..it did and make a table for summary info

g_data<-g_crosswalk@data


#make a name for the table

tbl1name<-paste0(newname, "tbl.csv")


#write this table to csv

write.csv(g_data, file = tbl1name)


#Summarize this numeric vector by habitat type

names(g_data)<-c("VegClass" , "Name", "CCAP_Class" , "FS_Class", "Isle" , "HabQual" , "SHC_Hab" ,
"MI_Hab" , "Comment" ,

"Response" , "MITComments", "finalhab" , "Area")



#calculate area in square meters for habitat quality of each habitat type

g_summary<-aggregate(g_data$Area, by=list(g_data$HabQual, g_data$finalhab ), FUN = sum )


#send the shpfile to the global env

assign(newname, g_crosswalk, envir = globalenv())


#make a name for the shpfile

shapename<-paste0(newname, "categorized")


#write shapefile to drive

writeOGR(g_crosswalk, dsn = TestDir, layer = shapename, driver="ESRI Shapefile", overwrite_layer = T


#name the summary table

```

```
tbl2name<-paste0(newname,"summary.csv")  
  
#assign the island summary table to the global env  
assign(tbl2name, g_summary, envir = globalenv())  
  
write.csv(g_summary, file = tbl2name)  
  
}  
  
#lapply(vegfiles, vegimport)  
  
#~~~~~  
~~~
```

